New Industrialization Strategy of Hunan Province

Hunan Development Strategy

Asian Development Bank

July 2010
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Printed in the People's Republic of China

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### Abbreviations

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<th>Abbreviation</th>
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<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<tr>
<td>Bi-Pattern Society</td>
<td>Resource Saving and Environmental Friendly Society</td>
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<td>BOT</td>
<td>Build-Operate-Transfer</td>
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<tr>
<td>Chang-Zhu-Tan</td>
<td>Changsha, Zhuzhou, and Xiangtan</td>
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<td>CPC</td>
<td>Communist Party of China</td>
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<td>EA</td>
<td>Executive Agency</td>
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<td>EITEP</td>
<td>Euro Institute for Information and Technology Transfer in Environmental Protection</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>HNASS</td>
<td>Hunan Academy of Social Sciences</td>
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<td>HNDEP</td>
<td>Hunan Department of Environmental Protection</td>
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<td>HNDOF</td>
<td>Hunan Department of Finance</td>
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<td>HNDRC</td>
<td>Hunan Development and Reform Commission</td>
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<td>HNEIC</td>
<td>Hunan Economic Information Center</td>
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<td>HNIPSR</td>
<td>Hunan Institute of Policy and Science Research</td>
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<td>HR</td>
<td>Human Resources</td>
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<td>IER</td>
<td>Institute of Economic Research, NDRC</td>
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<td>IMF</td>
<td>International Monetary Fund</td>
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<td>IIITE</td>
<td>Institute of Industrial and Technological Economics, NDRC</td>
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<td>MIAO</td>
<td>Mechanical Industry Administration Office, Hunan Province</td>
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<td>MOF</td>
<td>Ministry of Finance, PRC</td>
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<td>NDRC</td>
<td>National Development and Reform Commission</td>
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<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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<td>PRC</td>
<td>People's Republic of China</td>
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<td>PPP</td>
<td>Private-Public-Partnership</td>
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<td>R&amp;D</td>
<td>Research and Development</td>
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<td>RIFS</td>
<td>Research Institute for Fiscal Science, MOF</td>
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<td>SAT</td>
<td>State Administration of Taxation, PRC</td>
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<td>SC</td>
<td>Steering Committee</td>
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<td>SOEs</td>
<td>State-Owned Enterprises</td>
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<td>TA</td>
<td>Technical Assistance</td>
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<td>TOT</td>
<td>Transfer-Operate-Transfer</td>
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<td>UNDP</td>
<td>United Nations Development Program</td>
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<td>WB</td>
<td>World Bank</td>
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<td>10FYP</td>
<td>the 10th Five-year Plan (2001-2005)</td>
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<td>11FYP</td>
<td>the 11th Five-year Plan (2006-2010)</td>
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<tr>
<td>Code</td>
<td>Description</td>
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<td>12FYP</td>
<td>the 12th Five-year Plan (2011-2015)</td>
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<td>13FYP</td>
<td>the 13th Five-year Plan (2016-2020)</td>
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<td>CNY</td>
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<td>$</td>
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Acknowledgements

The People’s Republic of China (PRC) is facing many contradictions in the course of industrialization, such as the contradiction between the upgrading of industrial structure and the expansion of its scope, the contradiction between demand for upgrading of industrial structure and insufficient labor supply, and the contradiction between the rapid growth of industrial sectors and their environmental and social responsibilities. The new industrialization road is a new thought presented in terms of the PRC’s actual situation and the world development trend of industry. The new industrialization is in essence an industrialization mode selected in the country making use of modern technologies and as propelled by economic globalization under the background of high population pressure, resource constraint and environmental restriction, in view of the catch-up strategic objectives.

The technical assistance (TA) project Development Strategy of Hunan Province (hereinafter referred to as “the project”) is a part of the ADB TA project TA 7036 PRC: Provincial Development Strategies for Selected Provinces in the Central Region, aiming to help the Party Committee and Government of Hunan Province to formulate a long-term development strategy. The project examines closely the new industrialization strategy of Hunan Province, aiming to explore a good and fast strategic approach to achieve economic and social development goals in such a traditional agricultural area as Hunan Province.

No matter in 12FYP period or 13FYP period or even in a longer period of time afterwards, to promote new industrialization is of top priority among all jobs in Hunan Province. Basic ideas and strategic measures presented in the project outputs will constitute an important basis for decision making during 12FYP for Hunan Province. In addition, the project outputs will have a bigger impact and play a greater role in the development of Hunan, in the central region, and even in the development of the whole country in the long-term. It will provide experience for the transition of the development pattern in the PRC.

This project was prepared by the IER, NDRC of the PRC. The consulting team consists of international consultants, national consultants, and independent consultants. The project outputs include: (i) the main report New Industrialization Strategy of Hunan Province; (ii) subreport 1 Strategy for Equipment Manufacturing Industrial Development of Hunan Province; (iii) subreport 2 Strategy for Coordinated Development of the logistics industry of Hunan Province; and (iv) subreport 3 Strategy of Energy Conservation and Environmental Protection in Hunan Province.

The main report was prepared by Chen Xinnian. The subreport 1 was prepared
by Zeng Zhize and Sun Xuegong. The subreport 2 was prepared by Luo Boyang and Zhou Zhenhong. The subreport 3 was prepared by Liu Shan. Mr. Klaus Ritter (International consultant) provided international experience and case study in energy development relevant to Hunan. Mr. Chen Langnan (International Consultant) provided international experience and case study in equipment manufacturing and logistics relevant to Hunan. Tang Yuwen offered recommendations on investment and financing strategy and policy. Liu Shangxi (Independent Consultant) and Zeng Jianguang (Independent Consultant) prepared fiscal reforms and policy design for new industrialization in Hunan. Besides, other experts who were involved in field study and discussion include: Xiang Wei, Wang Yun, Yang Juan, Chen Shaoqiang, Chang Hong, Chen Guo, Chen Wen, Sun Jianjun, and Wang Qian.

The consulting team got strong support from the Steering Committee (SC) and executive agency (EA) for our research, and also benefited from opinions given by experts with NDRC (e.g. Liu Fuyuan, Fan Hengshan, Chen Dongqi, Ma Xiaohe, Chang Xiuze, Zhang Yansheng, Guo Xiaopei, Zang Yueru, Yang Xiaobing, Wang Yueping, and Wu Xiaohua); and experts in Hunan Province (e.g. Liu Maosong, Wu Jinming, and Dai Leping). The instructions given by those experts have broadened the research mind of the consulting team and ensured the quality of the project. We want to give special thanks to all these experts.

We would like to thank Ms. Kanokpan Lao-Araya (Economist, ADB) and Mr. Zhuang Jian (Senior Economics Officer, ADB) who are the TA task managers, Ms. Gan Mei (Assistant Project Analyst, ADB) who helped administer the TA finance.

Finally, we want to thank Mr. Klaus Ritter who reviewed, edited and polished the final reports, and Ms. Wang Yun who helped with reviewing and editing.
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Executive Summary

The Development Strategy of Hunan Province of TA project (hereinafter referred to as “the project”) is a part of the ADB support program for regions and provinces in the central part of the PRC to design their development strategies, and it aims to help the Party Committee and Government of Hunan Province to formulate the long-term development strategy. The project examines closely the new industrialization strategy of Hunan Province, aiming to explore a good and fast strategic approach to achieve economic and social development of such a traditional agricultural region as Hunan Province. According to basic conditions and inherent requirements of Hunan, the project especially focuses on three fields - equipment manufacturing, logistics and energy conservation and environmental protection for special research.

From October 2008 to April 2010, instructed by ADB project officials, led by the SC with the support of EA and involvement and cooperation of stakeholders, the consulting team spent 18 months of painstaking efforts to complete the final report. In the process of research, the team managed to introduce an opening research mechanism with some new theories, methods and approaches by combining all kinds of research forces and resources, broke through limitations of doing things in its own way, of doing repetitive researches and of research and decision out of association, thus providing an important base to improve the quality of research achievements and strengthen the role of research achievements in decision making. The team developed multiple field investigations, field studies and deskwork to collect and analyze a large amount of materials and data, learned lessons from ADB TA-projects, listened to views of famous experts within and outside the province, and studied and drew lessons from international experience, to form the final research report and achieve the intended purpose of this project. The final report includes: (i) the main report New Industrialization Strategy of Hunan Province; (ii) subreport Strategy for Equipment Manufacturing Industrial Development of Hunan Province; (iii) subreport Strategy for Coordinated Development of the logistics industry of Hunan Province; (iv) subreport Strategy of Energy Conservation and Environmental Protection in Hunan Province.

The consulting team has consulted with the drafting group of Hunan Provincial 12FYP for many times. The project outputs have been used in the preparation of the provincial 12FYP, providing great reference value for Hunan Province to formulate 12FYP in a scientific manner. Basic ideas and strategic measures presented in the project outputs will constitute an important basis for decision making during 12FYP for Hunan Province. The development of strategic emerging industries is the core of the new industrialization. The Chinese government is drafting a national guidance and
planning preparation for the development of strategic emerging industries. In this case, the research findings in this project provide important reference for the drafting and preparation team. In addition to that, the project outputs will play a bigger impact and a greater role in the development of Hunan, central part of the PRC and even the long-term development of the whole country, providing experience for the PRC to transform the pattern of development.

I Basic Ideas of New Industrialization Strategy of Hunan Province

Based on the situation and inherent requirements of industrialization of Hunan Province the basic ideas of New Industrialization Strategy of Hunan Province can be summarized in this way:

“Three promotion and one construction” strategy: “to promote self-innovation, to promote green low carbon economic development, to promote industrial clusters and agglomeration and to construct powerful and harmonious systems and mechanisms.” That is, Hunan should always focus on the main line of transformation of development pattern; focus on improving the self-innovation capability; promote the adjustment and optimization of industrial structures, product structures, organizational structures and technological structures of enterprises; foster strategic emerging industries focusing on developing the low carbon industry and low carbon economy so as to develop a low carbon industrial system of Hunan’s characteristics; improve traditional industries and develop consumer goods industry aggressively orienting at improvement of local supply rate of industries and added value of products; further integrate and improve various industrial parks with achievement of intensive operation of land as the breakthrough; thus eventually develop and expand the influence of Chang-Zhu-Tan core growth pole; and in order to construct the system and mechanism for new industrialization by fostering market dynamic and improving market competitiveness.

All this is embodied in the following six aspects:

(I) To promote self-innovation with greater emphasis on scientific and technological progress and improvement of the quality of laborers

With the marketization and globalization, the economic competition will rise. Technology will play an increasingly important role in the industrial production. The economic competition will depend largely on the level of technical level of production. Technological innovation and human capital become the most important endogenous variables and driving force. New industrialization is mainly driven by scientific and technological progress and characterized in capital and knowledge intensive industries. It demands the economic growth to transform from mainly relying on increased
material consumption to technological progress, improvement of the quality of labors, and management innovation. Human capital and technology should be the core of economic competition. Therefore, it is necessary to pay attention to the full use of HR; at the same time it is of great necessity to emphasize on the cultivation and development of HR, to increase investment in human capital for higher level of HR advantages, and to promote self-innovation and scientific and technological progress as the leading and supporting force for the new industrialization.

(II) To promote the development of green, circular and low-carbon economy and strengthen capacity for sustainable development

Hunan should speed up the pace of comprehensive transformation of development pattern of Hunan energy conservation and environmental protection as well as the entire economic and social development pattern, according to the status of energy saving in Hunan and the world’s economic and social future direction. That is, (i) to change the development concept of achieving a fast GDP growth and carrying out scientific development view and advocate low carbon economy, circular economy; (ii) to foster the new economic growth point of low carbon emission, recycling characteristics; (iii) to construct industry, building and transportation system of low carbon emission, recycling characteristics; (iv) to promote to form the resource-saving and environment-friendly production mode, life style and consumption mode, so as to achieve the general objective of realizing the first construction of low carbon economy, circular economy province in the PRC.

(III) To increase the local content and increase the value-added of products in order to establish highly specialized industrial clusters

At present, the local content of parts and components in the equipment manufacturing industry of Hunan Province is less than 40%, which not only seriously restricts the further development of the equipment manufacturing industry in the province, but also prevents the increase of employment opportunities and the improvement of urbanization level. It is required to, in accordance with the goals to make the leading enterprises stronger and improve the supporting ability of small and medium enterprises and by taking large backbone enterprise groups and name-brand products as the leading elements, take market-based measures, in order to extend the industrial chain, increase the supporting ability and supporting radius of large/small and medium enterprises, and cultivate and establish highly specialized industrial clusters. Hunan should take a full advantage of mineral resources, intensifying policy support degree, developing in the direction of deep, complicated and advanced resource industries (or products), putting great efforts on the deep-processing of resource-based industries, lengthening the chain of industrial development to take the way of development by combining the upper and lower stream industries. The main objective is to increase the value-added of products and change the advantage of mineral resources into the advantage of mineral resources processing.
(IV) To take coordinated development of light and heavy industries as well as labor-intensive and capital-intensive industries

During structural adjustments, we should first make adjustments and optimizations between the light and heavy industries. For a province that just entered into the medium-term industrialization, the obvious heavy industrialization is contrary to industrialization. Besides, comparing with light industry, heavy industry is an industry with big investment, long cycle, and it is an industry that takes a slow effect and brings large destruction to the environment. Again, in terms of the employment opportunities provided by industry, heavy industry is generally a capital-intensive industry while light industry is a labor-intensive industry. Light industry has a high output ratio, takes a fast effect and makes large contributions to fiscal revenue. Meanwhile, it is easy for light industry to form the industrial chain, strongly to drive agriculture and to provide a wide employment scope for the society. In the process of the industrialization in Hunan, what lacks most are funds and what needs to be solved most is the employment problem. Therefore, Hunan must intensify the development of light industry. Hunan should pay attention to develop some industries that can promote the agricultural development and its industrialization. For example, Hunan should develop the featured food processing industry. Through the further processing of the agricultural and sideline products, Hunan could form such a development mode for the agricultural industrialization that the market promotes the process, the process brings about crop and plant cultivation, and crop and plant cultivation gives an impetus to agricultural economics to transfer the advantage of agricultural resources into agro-product processing with a view to increasing the income of the farmers and improving the employment level of the rural labor force.

(V) To promote the spatial concentration, to increase economic first degree and to form the core growth pole

There is a contradiction between cluster development and balanced development. Hunan should stress spatial concentration on regional development at the present stage. Over 70% of the cities in Hunan are medium and small cities. Only Changsha, the capital, is an extra-large city with over 1 million people. There is no super-large center city with strong radiating effect in the province. In other words, Hunan, as an underdeveloped inland province, lacks core growth poles that can drive economic development of the entire province. Chang-Zhu-Tan are significant zones of economic and social development in Hunan. The advantages within the province are obvious, and the economic development level and input and output benefits of the three cities are leading in the province. However, because of scattered distribution, similar industrial structure, insufficient integration of resources, lack of composite force, and limited driving and radiating influence over other cities and regions, the scale effect and aggregation effect of Chang-Zhu-Tan cannot be brought into full play. The economic strength of Chang-Zhu-Tan City Cluster is still far behind second-class
city clusters of the PRC. Compared with first-class city clusters of the PRC such as Yangtze River Delta, Pearl River Delta and Jing-Jin-Ji, the disparity is much more substantial. To realize prosperity, Hunan has to further intensify the development of Chang-Zhu-Tan and facilitate Chang-Zhu-Tan City Cluster to take the lead in development in order to form a core growth pole. The formation of a core growth pole in Chang-Zhu-Tan not only substantially enhances the economic role and comprehensive competitiveness of Hunan, but also is likely to have greater radiating and driving role in the development of Central or Southwest of the PRC.

(VI) To construct powerful and harmonious institutional mechanisms

The long-term planning economy system disabled people’s thoughts and concepts whose market awareness is not suitable for the demand of market economy. Quite a number of enterprises are highly dependent on the government other than market. The non-governmental economy is still weak and the ability of the government to mobilize economic resources remains strong. It is required to form a new system and mechanism through continuing to emancipate the ideas and deepen reform and opening. Therefore, Hunan should actively cultivate market, combine the government planning with the market mechanism, gradually develop enterprises as the mainstay of economy, develop industry and other industries according to the market demand and enable market to exert the basic function of configuring resources in a wider range and to the greater extent.

II Policies and Measures to Promote Hunan Province’s New Industrialization Strategy

(I) To update ideas and concepts positively and form the all-round opening up institutional mechanisms

Hunan Province has once been an old industrial base in the PRC. It is an inland province in relatively unfavorable location and with relatively backward minded people where the industrial and urban development shows insufficient capacity in driving employment. There’s neither prime private enterprise groups and nor concentrated sustainable foreign investment whereas the present industrial base is very weak. To break the balance and the backward development for great-leap-forward development in such a relatively backward region, external forces shall be introduced and relied on. Consequently, an all-round opening pattern shall come into shape soon. And the opening-up can bring ideas, updates and institutional mechanism reforms. At present, for Hunan, to realize all-round opening up externally and internally it is necessary to take the advantage of natural resources, human resources, and system, to transform governmental function and strengthen serving awareness of government, to improve the investment environment and to enhance the effort in investment attraction. All these will help to attract more industries, specialists,
funds and techniques to gather in Hunan, and make Hunan become a paradise for entrepreneurship.

(II) To establish technological self-innovation mechanism and positively advance the combination of industry, education and research

Hunan should foster and build the main body of technical innovation at multiple levels, and in particular, enable enterprises to become the main body of technological progress and innovation, intensively support and establish a group of national level and provincial level corporate technical centers. Hunan should further expand international communication and cooperation, support and establish diversified cooperative R&D institutions, make great efforts to attract inbound enterprises to set up R&D institutions in the province, encourage and support local enterprises and scientific research institutes to seek cooperative research and development in developed regions and foreign countries. Hunan should also establish a reasonable intellectual property right system, and practice preferential policies to introduce technologies. Hunan should establish venture capital investment mechanism, and support the industrialization of high and new technologies. It will be important for Hunan to positively advance the combination of industry, education and research, lead enterprises and various professional scientific research institutes and higher education institutions to carry out joint breakthrough around key technical bottleneck, and promote the production and industrialization of high new technical results. The government should support and lead scientists and technicians to create business with new technical results, and make them become the core force of speeding up high new technical industrialization.

(III) To strengthen the adjustment of industrial structure, accelerate the elimination of backward productivity and speed up the development of low-carbon economic industry clusters

(i) To control increment. Hunan should strictly restrain the construction of new high energy consumption and high pollution projects, and limit the growing of high energy consumption and high pollution industry. Hunan should manage new investments by sticking to the two “strobes” of land and credit, and the entry standard related to energy conservation and environmental protection. It is necessary to execute the entry conditions of 13 industries such as steel, ferroalloy, coking etc., which are controlled by the government. The government shall establish energy conservation evaluations, check mechanisms, as well as estimation mechanisms of environmental influence for new started projects.

(ii) To reconstruct stock. Hunan shall accelerate the elimination of disqualified production capacity. The government should carry out plans of eliminating disqualified production capacity in industries such as electricity, steel, cement, coal, paper making etc., establish mechanisms for eliminating disqualified energy production capacity, improve and carry out corresponding policy measures on closing
up enterprises. The government should improve local administrative rules and policy systems, establishing efficient encouragement and restraint mechanisms on rejecting the work complete mechanism, as well as long efficient management mechanism; to give stimulating rewards and punishment to energy production rejected. The provincial government should increase the financial support to rejected energy production in less developed areas.

(iii) To carry out pilot work. Hunan will first experiment in high energy consuming and high pollutant industries such as power, transportation, building, metallurgical, chemical, petrochemical industries for exploring the major fields, to exploit a development for low carbon economy. Hunan should build actively “low carbon economy development zones”, “low carbon industrial parks”, “circular economy parks”. The pilots should be built in Changsha, Zhuzhou, Xiangtan and other cities, to stimulate the rapid development of low carbon economy of surrounding areas and the whole province.

(IV) To strengthen training of local labors and change the labor resources into capital advantage of human resources

For Hunan, to take the way to the new industrialization and improve self innovation capability, beside large quantities of scientists, engineers and economic management talents, hundreds of thousands of high professional talents and high quality labors are demanded. Therefore, Hunan shall start at the right beginning by taking various measures to speed up development of vocational education, improve labor quality and advance the transformation of the province with a large population to a province with most human resources, and focus on vocational education, basic education and rural investment in education, in order to improve the quality of human resources and expertise, take the province as the trial base for reform and development of rural vocational education, the vocational skills training base, the base of export of high-quality labor services, change the labor resources into capital advantage of human resources.

(V) To guide the accumulation of factors of production to the central city and to further intensify the development of Chang-Zhu-Tan City Group

To form the core growth pole of Chang-Zhu-Tan, Hunan must rapidly change the space structure of enterprises and population, form centripetal force towards Chang-Zhu-Tan, and concentrate manufacturing industry and population into Chang-Zhu-Tan through rapid assembly in this region under the support of policies and capitals of the province. A city is mainly supported by industries; the development core of “3+5” City Cluster consists in Chang-Zhu-Tan. Therefore, the entire province should first concentrate enterprises into Chang-Zhu-Tan to cultivate and expand dominant industries, meanwhile, intensify the relation of internal industries and other 5 cities should intensify the cooperation and coordination with the dominant industries of Chang-Zhu-Tan, and specify regional division. First,
integrated construction of Chang-Zhu-Tan should be accelerated, the internal administrative metes and bounds of Chang-Zhu-Tan City cluster should be broken through, and advantageous resources should be integrated to form composite force. Especially, the development of industrial parks is still encumbered by such disadvantages as non-conspicuous of dominant industries and low concentration degree of industry clusters. Therefore, the industrial development capability of industrial parks should be further integrated and promoted, supporting forces concentrated, and the rationality of dominant industries and their space structure facilitated. Second, the promotion of industry technology level should be adhered to as the objective, and the ability of independence and innovation intensified. Third, the strategic opportunity of “implementation first and pilot first” of dual-type a “Bi-Pattern” society (resource saving and environment friendly society) should be grasped, the policy support of the state for a “Bi-Pattern” society construction of Chang-Zhu-Tan utilized to the utmost, the strategic emerging industrialized bases with circulating economy and high technology leading in the PRC established, and more economic growth points with autonomous intellectual property rights as the core cultivated.

III Investment and Financing Strategies and Local Fiscal Reforms and Policy Design for New Industrialization of Hunan Province

(1) Investment and financing strategies

From now on to 2020, Hunan Province is still in the key period in promoting the new industrialization when infrastructure construction, urbanization, industrial upgrading, social development demand of financing and investment fiercely require large scale of financial and investment activities, at an annual increase rate over 20%. Since Hunan Province is located in the central part of the PRC and in an unfavorable position in the marketization and intensified capital distribution pattern indicating rigorous supply and demand conflicts of structural capital, the basic ideas of financing and investment strategy shall be: (i) to ensure reasonable investment rate in terms of strategic height and constant expansion of investment and financing channel; (ii) to insist on the principle of energy conservation and environmental protection, constantly bringing forth new ideas on financing and investment mode; (iii) to construct a diverse investment and financing system required by the new industrialization in Hunan Province, optimizing the environment and innovating the system and mechanism for investment and financing to form scientific and sound industrial guidelines.

Specific strategic countermeasures include: Hunan should increase government investment continuously and credit support; fully use the capital market for direct financing; improve the investment promotion standard; utilize private capitals through
multiple channels; further deepen the investment and financing system reform and optimize the investment and financing environment.

**II) Local fiscal reforms and policy design for the new industrialization**

To promote new industrialization, Hunan needs to reform the local fiscal system and design reasonable fiscal and tax policies. The contents of reforming fiscal system are as follows: establishing a fiscal system under the provincial level and fiscal revenue and public expenditure system, increasing public investment input, managing to establish a intra-intergovernmental fiscal transfer system in Hunan, applying new management measures like PPP, etc. Fiscal and tax policies are divided into medium and long-term policy, like cultivating human capital and attracting strategic investors, and short-term policy, like implementing subsidy and preferential tax policy, making full use of current policy, establishing risk investment funds and accelerating rationalization.

**IV Strategies for the Three Focused Areas**

**I) Strategy for Equipment Manufacturing Industrial Development of Hunan Province**

Equipment manufacturing industry, serving as one of the mainstay industries in Hunan, is the largest industry with the production and sales of over CNY200 billion. In addition, three competitive industry clusters have been made, and some of them lead in the PRC. Therefore, it is essential for Hunan to strengthen equipment manufacturing to promote the new industrialization.

**Development ideas:**

Hunan should make efforts to improve self-innovation ability, create world-famous brands, cooperate with enterprises owned by the central government, improving the local content rate, enlarge industrial scale, develop enterprise groups, cultivate and establish highly specialized industrial clusters.

It is essential to promote fiscal and financial innovation and establish strong investment and financing supporting system for equipment manufacturing industrial development, establish supporting system and service system for technological innovation in equipment manufacturing industry and improve innovation ability, make effective use of human resources and provide guarantee for sufficient and qualified talent persons, raise level of logistics industry to promote equipment manufacturing industrial development, and strengthen resource saving and environmental protection to realize sustainable development. Meanwhile, we suggest, in the near future that Hunan should put emphasis on strengthening organization leadership and management and create more relaxed policy environment on the basis of the implementation of national relevant polices. In the middle term, the government should emphasize on formulating and promulgating a guiding catalog for investment
in and development of equipment manufacturing industry in Hunan Province and issue preferential policies which will win the feeling of talents. And in the long term, Hunan should make efforts to strengthen intellectual property rights protection of equipment manufacturing industry and vigorously cultivate regional brands of equipment manufacturing industry.

(II) Strategy for Energy Conservation and Environmental Protection in Hunan Province

Energy conservation and environmental protection can bring about great opportunities for industry development while to some extent it may be the constraint and limitation for the industrialization. Therefore, it is necessary for Hunan to stick to the strategy of energy conservation and environmental protection.

Development ideas:

Hunan should change the development concept of achieving a fast GDP growth and carry out scientific development view; advocate low carbon economy, circular economy, and foster new economic growth point of low carbon emission, recycling characteristics; construct industry, building and transportation system of low carbon emission, recycling characteristics; promote to form the resource-saving and environment-friendly production mode, life style and consumption mode. New energies like low carbon or carbon-free energies should be developed and the development of clean energies like solar, wind, biomass and nuclear energies should be accelerated to fulfill high efficient and clean utilization of energy. We suggest the government striving to achieve the general objective of realizing the first construction of low carbon economy, circular economy province in the PRC.

Therefore, a series of more improved, supporting and powerful policies and measures should be put forward, including improving the laws in the fields of energy conservation and environmental protection, strengthening the enforcement and supervision of energy conservation and environmental protection, making policies of finance and taxation of encouraging the development of low carbon and circular economy, attempting to establish an emission trading market of carbon and so on. Special efforts of innovation on financing method of government and enterprises should be made, in order to solve the problem of lack of capital in energy conservation and environmental protection in developing regions.

(III) Strategy for Coordinating the Development of the Logistics Industry of Hunan Province

Affected by traditional concepts, systems or technology, manufacturing and logistics in Hunan respectively develop, so manufacturing in Hunan covers a smaller proportion of the regional gross product than the national average level, while the cost on logistics cover a larger proportion than the national average level. Therefore, it is important for Hunan to solve problems related to taking the location and transportation advantages, adopting advanced logistics theory and technology,
learning from developed countries, effectively integrating logistics and manufacturing, harmoniously developing them and gaining a win-win situation to promote the new industrialization and enrich citizens and the province.

**Development ideas:**

The government should stick to business-oriented and market demand to mainly promote the coordinated development of the logistics industry and the manufacturing industry, taking Changsha, Zhuzhou and Xiangtan city group as a leader, to make Hunan a modern regional logistics center linking the east and the west. Through the integration and penetration of the logistics industry and the manufacturing industry, it is necessary to promote joint collaboration among various types of enterprises on the basis of professional labor division, and to strengthen the synergy linkage of the regional logistics industry, and finally this will contribute to the overall coordination sustainable development of the logistics industry in Hunan.

The coordinated development of the logistics industry in Hunan should focus on four key points: First, accelerating the construction of modern logistics service systems; second, fostering multi-channel logistics service markets; third, strengthening the construction of supporting carrier of logistics industry; fourth, optimizing the spatial layout of the logistics industry to form a spatial structure focused on “one core, three circles, three channels”.

The focus of policies should be as follows: to relax registration conditions; to standardize fee management and the market order; to implement tax concessions; to support land use; to accelerate the integration of existing social logistics resources; to increase its input into the development of the logistics industry; and to speed up the training of personnel for logistics industry in Hunan.
Chapter I  Research Background and Objective

I  General Introduction of Hunan Province

Hunan Province is located in the middle of Southern the PRC, by the middle stretch of the Yangtze River (24°39'-30°08'N and 108°47'-114°15'E) with an area of 211,800 square kilometers ranking it 11th among all the provinces and municipalities in coverage, bounded on the north by the Yangtze River, on the south by Guangdong and Guangxi, on the west by Guizhou and Chongqing and on the east by Jiangxi.

Hunan covers 2 percent of the PRC's land mass, and contains about 5 percent of its population. The population is primarily concentrated around the Dongting Plain and the main river valleys. According to the Hunan population sampling survey, by the end of 2008, Hunan had a total population of 6,845,200 of which 42.15% was the urban population while 57.85% was the rural population.

Rich in natural resources, Hunan has long been known as a “Land of Rice and Fish‖, the “Home of Nonferrous Metals”, “Home of Non-metallic Minerals‖ and a “Tourist Paradise”. Located in the central, subtropical zone, Hunan has a continental wet monsoon climate. With much sunshine, plentiful rain, and distinct seasons, Hunan is very favorable for agricultural and animal production.

Hunan has long been known as the granary of the PRC, a Land of Rice and Fish. With only 3 percent of Chinese farmland, Hunan boasts a high yield of rice, cotton, oranges, live pigs, rapeseed plants and aquatic products which accounts for 6 percent, 8 percent, 13 percent, 11 percent, 6 percent and 8 percent of the totals respectively.

In recent years, Hunan has witnessed great development in its total economic output. Its GDP reached CNY1, 115.6 billion in 2008, and was 14 times that of 1978. The local budgetary fiscal revenues reached CNY72.27 billion in 2008 and were 26 times that of 1978. And the per capita GDP was CNY17,521 in 2008, 10.3 times that of 1978. As for the three strata of industry in the economy, the share of primary industry was 18%, the share of secondary industry was 44.2%, and the share of tertiary industry was 37.8%; while in 1978, share of the three strata of industry to the GDP was 40.7: 40.7: 18.6. The per capita disposable income of urban household was CNY13,821 in 2008, which was 6.5 times that of 1978. And the per capita annual net income of rural household was CNY4,513, which was 6.1 times that of 1978. As for the living standards, the indicator, Engel’s Coefficient of urban household was 39.9% in 2008, declined by 17.5 percentage points.
II Introduction of TA Project

Since the medium and long-term development plan for Hebei Province was launched in 2003, ADB has been providing technical support for some Chinese provinces to work out their development strategies, which plays an important role in assisting those provinces to make their medium and long-term development plan. Up to now, there have been 4 finished or ongoing TA projects, covering 6 provinces, municipalities or autonomous regions, i.e. Hebei Province, Inner Mongolia, Xinjiang Uygur Autonomous Region, Gansu Province, Hunan Province and Jiangxi Province (among them, Xinjiang and Gansu strategies, Hunan and Jiangxi strategies are combined into one TA project respectively). The Development Strategy of Hunan Province of the TA project (hereinafter referred to as “the project”) consists of the ADB support program for regions and provinces in the central part of the PRC to design their development strategies.

III Research Scope and Achievements

The project is focused on new supporting and coordinating strategies onto the road to new industrialization of Hunan, aiming to find a good and quick strategic way to achieve social and economic development of such a traditionally agricultural region as Hunan Province. According to the basic conditions and interior requirements of the new industrialization of Hunan, the project specially selects 3 fields - equipment manufacturing, logistics and energy conservation and environmental protection for special research. Hunan now is in the mid-stage of industrialization. So it is a historical duty and also the only way for Hunan to vigorously promote industrialization. During the industrialization, the industry output and employment, especially the manufacturing output and employment, come to cover a larger proportion in economy, and the urbanization process will develop with the industrialization. Besides, the tertiary industry covers more fields of service, and agriculture is gradually modernized. However, Hunan should not rely on extensive development especially in the rapid-development period like some developed countries to realize industrialization at the cost of high energy consumption and environment pollution. Instead, new industrialization should be resorted to.

The new industrialization aims to achieve the catch-up strategy objective with the help of modern technology and economic globalization in spite of Hunan’s large population together with resource and environmental constraints, and it is a new way for industrialization. It marks the industrialization with reducing energy and resource consumption and environment pollution. Great importance is given to ecological construction and environmental protection in achieving industrialization. In addition, it is emphasized that we should achieve a balance between economic development and the other parts, including people, resource and environment. Energy conservation
and environmental protection can bring about great opportunities for industry development while to some extent it may be a constraint and limitation for the industrialization. Therefore, it is necessary for Hunan to stick to the strategy of energy conservation and environmental protection.

Based on energy conservation and environmental protection, it is necessary for Hunan to develop a manufacturing industry, increase the proportion of industry in economy, and gradually improve the industrial processing degree to realize industrialization. During the developing process of a manufacturing industry, it is necessary to not only combine international and domestic industrial development trends, but also to rely on local dominant industries. Equipment manufacturing industry, the mainstay of the national economy, plays an important role in renovating the traditional industry relying on advanced technology. It is the basis for the development of high-tech industry and information industry, and it ensures national economic and military security. Moreover, it is important to promote employment. To speed up the renovation of traditional industry and optimize the industrial structure, the equipment manufacturing industry should take priority. Energy and raw materials industries are still the leading industries of the PRC. But excess capacity in energy and raw materials industries seriously affects the economic development of the PRC and even the East Asia. Structural adjustment and optimization will be inevitably carried out in the future. With the promotion of urbanization and modernization in the PRC, the new wave of urban construction and infrastructure construction will help the equipment industry to develop rapidly, and mechanical and electrical industry will be the leading industry of the PRC instead of energy and raw materials industries. Equipment manufacturing industry, serving as one of the mainstay industries in Hunan, is the largest industry regarding the production and sales over CNY200 billion. In addition, three competitive industry clusters have been established, and some of them lead in the PRC. Therefore, it is essential for Hunan to strengthen equipment manufacturing to promote the new industrialization.

In the industrialization of Hunan, manufacturing industry will come to cover a larger proportion. With the sustainable development of manufacturing industry, logistics—the advanced producer in service industry—will inevitably come into being. Affected by traditional concepts, systems or technology, manufacturing and logistics in Hunan will develop, so manufacturing in Hunan will cover a smaller proportion of the regional gross product than the national average level, while the cost on logistics will cover a larger proportion than the national average level. Therefore, it is important for Hunan to solve problems related to taking the location and transportation advantages, adopting advanced logistics theory and technology, learning from developed countries, effectively integrating logistics and manufacturing, harmoniously developing them and gaining a win-win situation to promote the new industrialization and enrich citizens and the province. In this way, harmonious
The development of logistics in Hunan plays an important role in realizing the new industrialization in Hunan.

The research has made following achievements:

1. The main report *New Industrialization Strategy of Hunan Province*, based on the current state of industrialization in Hunan Province in combination with the development and trend of the PRC’s industrialization, also learned from related international experience.

2. Related to the development target, key points, strategic measures and affiliated policies are raised and form the first subreport *Strategy for Equipment Manufacturing Industrial Development of Hunan Province*, Subreport 1 of this report, as to fully explore the development potential of equipment manufacturing industry of Hunan Province, speed up the process to grow and strengthen the equipment manufacturing industry and provide strong support for the new industrialization strategy.

3. According to the current state and problem of logistics and interior requirements for further development of industrialization of Hunan Province, coordinating strategies for the development of logistics and new industrialization in Hunan Province are settled down. This is the topic of the second subreport *Strategy for Coordinated the Development of the logistics industry of Hunan Province*, Subreport 2 of this report.

4. Top-level design, affiliated policies and action projects for environmental protection are accomplished providing important support for the new industrialization strategy of Hunan Province, in line with the requirements of new industrialization for “low energy consumption and less environmental pollution” in Hunan Province, based on the conception of recycling economy and sustainable development and in reference to latest theories and practices in the PRC and foreign countries. Thus, the third subreport *Strategy of Energy Conservation and Environmental Protection in Hunan Province*, Subreport 3 of this report, is drawn out.

IV Assignment of Responsibility

(I) Responsibility of local government

The project has been completed with strong support of and full cooperation with Hunan provincial government.

A leading group for boost of new industrialization of Hunan Province was established in February, 2007, led by leaders of the provincial government and composed of head of various functional departments. It was assigned the responsibility to instruct and coordinate the work concerning new industrialization, make general plan for the boost of new industrialization of the province and carry it out, coordinate the construction of major projects, investigate and make policies for related industries. The leading group strengthened instruction, communication and coordination of this TA project and provided information on the new industrialization
from time to time. The advisory team of this project timely provided consulting results to the leading group (including interim results) for information.

In addition to convening 3 seminars regarding opening report, interim report and final report in Hunan Province, what’s more important is that EA shall help the advisory team to carry out investigations in Hunan Province, mainly to organize and contact departments, regions and enterprises for investigation, provide documents, information and data on the economic and social development of Hunan Province needed by the advisory team and arrange meeting rooms and offices for free.

(II) Responsibility of group members

The consulting team consists of international and Chinese consultants as well as individual consultants, among whom two individual consultants take charge of financial & tax policies. See table 1-1

Table 1-1 Responsibilities among the Group Members

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Firm Acronym</th>
<th>Responsibilities</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Chen Xinnian</td>
<td>IER, NDRC</td>
<td>Team leader, with tasks including (i) presiding over the main report; (ii) reviewing the subreports and providing subreports; (iii) guiding and supervising integration of the main report and the subreports; (iv) coordinating and monitoring the team’s work; (v) recommending roles for government involvement; and (vi) summarizing the lessons learned from this TA project and providing advice and recommendations that can support policy dialogue with the government.</td>
</tr>
<tr>
<td>2</td>
<td>Liu Shan</td>
<td>HNIPSR</td>
<td>Deputy team leader, with tasks including (i) preparing inception report and designing the analytical framework for the study; (ii) coordinating and monitoring the work of the consultants; (iii) preparing a midterm main report and a final main report; and (iv) reviewing the subreports. (v) Reviewing the status of energy conservation and the environment in the PRC, the central region, and Hunan; (vi) analyzing energy conservation and environmental protection in Hunan; (vii) formulating targets for energy saving and renewable energy; (viii) recommending regulations and policies; and (ix) preparing midterm and final reports on energy and the environment.</td>
</tr>
<tr>
<td>3</td>
<td>Chen Langnan</td>
<td>International consultant</td>
<td>Assisting the team leader with the following tasks (i) designing the research framework and preparing the inception report; (ii) identifying international experience and cases in equipment manufacturing and logistics relevant to Hunan; (iii) proposing strategic policy recommendations to improve equipment manufacturing and logistics in Hunan from international perspective; (iv) preparing midterm and final sector reports; (v) reviewing, editing and polishing the English Version of the final report.</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Affiliation</td>
<td>Main Activities</td>
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<tr>
<td>4</td>
<td>Klaus Ritter</td>
<td>International consultant, EITEP</td>
<td>(i) identifying opportunities to advance energy efficiency, renewable energy, environmental protection and identifying international experience in energy development relevant to Hunan; (ii) commenting on and polishing the English version of the reports produced by the national consultants; (iii) identifying and contacting government agencies, academic institutions, and experts in the areas of the field studies; and (iv) transferring knowledge to the Executing Agency through presentations, case analysis and other means.</td>
</tr>
<tr>
<td>5</td>
<td>Zeng Zhize</td>
<td>IITE, NDRC</td>
<td>(i) analyzing challenges and opportunities in equipment manufacturing industry in the PRC; (ii) suggesting targets and indicators for restructuring and upgrading equipment manufacturing sector; (iii) analyzing the potential for integrating equipment-manufacturing with production-oriented service sectors; (iv) studying foreign trade opportunities; (v) identifying international experiences and cases in manufacturing and optimizing relevant to Hunan, with focus on equipment manufacturing sector; (vi) recommending regulations, policies and action plans; and (vii) preparing the midterm and final sector reports.</td>
</tr>
<tr>
<td>6</td>
<td>Sun Xuegong</td>
<td>IER, NDRC</td>
<td>(i) analyzing the role of logistics in provincial development; (ii) identifying issues, challenges and advantages for Hunan becoming a logistics hub in the PRC; (iii) proposing strategic policy recommendations and action plans for integrated development of railways, highways, waterways, and airways; (iv) proposing policies an incentives to encourage logistics development; (v) identifying international experience and cases in logistics development relevant to Hunan; and (vi) preparing midterm and final sub-report 2.</td>
</tr>
<tr>
<td>7</td>
<td>Luo Boyang</td>
<td>HNASS</td>
<td>(i) identifying challenges to financing in the three sectors listed in paragraph 16 of the main text, and proposing solutions; (ii) reviewing banking and securities policies and regulations as they relate to the three sectors in paragraph 16 of the main text; and (iii) preparing an investment financing component for the inception, interim, and final reports.</td>
</tr>
<tr>
<td>8</td>
<td>Zhou Zhenhong</td>
<td>HNDRC</td>
<td>Same as Luo Boyang</td>
</tr>
<tr>
<td>10</td>
<td>Liu Shangxi</td>
<td>RIFS, MOF</td>
<td>Same as Liu Shangxi</td>
</tr>
<tr>
<td>11</td>
<td>Zeng Jianguang</td>
<td>HNIPSR</td>
<td>Same as Zeng Jianguang</td>
</tr>
</tbody>
</table>
(III) Responsibility of international & national experts

International & national experts shall work closely together for reference and supplement. On the one hand, international experts shall, in combination with the current state of Hunan Province, introduce some international experience and cases of new industrialization, optimization and restructuring of equipment manufacturing industry, harmonious development of logistics and energy conservation and environmental protection; on the other hand, national experts shall try their best to absorb experiences and lessons of other nations introduced by international experts, so as to fix the development plan of Hunan Province on new industrialization, equipment manufacturing industry and logistics and strategies of energy conservation and environmental protection.

V Inputs and Schedule

This project was intended for a period from October 6, 2008 to December, 2009, while actually the project started on October 6, 2008 and will end in April, 2010, see Table 1-2, wherein the report encloses a main report and three subreports mentioned in Section (III) ‘Research Scope and Achievements’.

<table>
<thead>
<tr>
<th></th>
<th>Planning Date</th>
<th>Actual Date</th>
<th>Place</th>
</tr>
</thead>
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<tr>
<td>Inception Report</td>
<td>Starting</td>
<td>October 6, 2008</td>
<td>October 6, 2008</td>
</tr>
<tr>
<td></td>
<td>1st draft inception report</td>
<td>November 14, 2008</td>
<td>November 4, 2008</td>
</tr>
<tr>
<td></td>
<td>Inception workshop</td>
<td>November 24-25, 2008</td>
<td>November 24-25, 2008</td>
</tr>
<tr>
<td></td>
<td>Final inception report submitting</td>
<td>December 10, 2008</td>
<td>December 10, 2008</td>
</tr>
</tbody>
</table>

Table 1-2 Inputs and Schedule
**VI  Research Purpose**

(I) **To provide reference for decision-making by the Party committee and the government of Hunan Province**

A scientific, contemporary and prospective development plan will be the guideline for the Party committee and government of Hunan Province to make an overall arrangement of work. The study tries to come up with a report in good stance, coverage and extent by catching the overall situation, making general plans and decisions from a view of globalization, in recognition of full development of the whole nation and scientific outlook of its development. The report aims to be a practical, useful and reliable platform for action of the Party Committee and government of Hunan Province and functions in the following aspects:

1. **Guiding the drawing of 12FYP and 13FYP by Hunan Province**

To expedite industrialization, urbanization and modernization vigorously will be the basic task for the economic and social development of Hunan Province for a long time in the future, with industrialization being the core task. Under the condition that the knowledge economy & recycling economy are speeding up in the world and the development pattern is required to be transformed by Chinese government, it is inevitable for Hunan to follow the new way to promote industrialization and it will be a long way to go on the road to new industrialization. No matter if industrialization is successful in the 12th Five-year period or the 13th Five-year period or even a longer period of time afterwards, to promote new industrialization is of top priority among
all jobs in Hunan Province. To guarantee the continuity and compatibility of all work for new industrialization to be under the guidance of unifying ideology, 12FYP and 13FYP and later plans shall be made under the guidance of a well-accepted strategy for new industrialization. To form such a new industrialization strategy is the main task for the study of the project to complete as well as a target that all members are pursuing. The consulting team has consulted with the Hunan Provincial 12FYP and the strategy for the three focused areas 12FYP drafting team for several times, the research output has been used for the preparation of the provincial 12FYP, providing great reference value for Hunan province to formulate 12FYP in a scientific manner. Basic ideas and strategic measures presented in the research output will constitute an important basis for decision making during 12FYP for Hunan province.

2. Leading and boosting the construction of a pilot area for overall coordinated reform of a “Bi- Pattern” society of Chang-Zhu-Tan city clusters

Substantially, the fundamental way to build up the pilot area of Chang-Zhu-Tan city clusters for an overall coordinated reform of a “Bi-Pattern” is to take a new road to industrialization. Therefore, the studies of the project have paid great attention to the connection with the general plan of Chang-Zhu-Tan city clusters for construction of a pilot area for an overall coordinated reform of a “Bi-Pattern” society and will influence, guide and assist the construction process.

3. Supporting Hunan’s strategy to reinvigorate the province and the strategy framework “New Industrialization & Infrastructure, Basic Industry and Basic Work”

The strategy of reinvigorating Hunan Province and “new industrialization and infrastructure, basic industry and basic work” is centered on new industrialization. The study of the project will elaborate and explain in detail the “new industrialization and infrastructure, basic industry and basic work”, and uphold the whole strategic framework.

(II) To drive the central part of the PRC and other provinces to work out a scientific and reasonable development strategy through demonstration

Six provinces in the central part of the PRC include Henan, Jiangxi, Shanxi, Anhui, Hunan and Hubei Province, with a population of 28.1% of the nation. They share many characteristics, e.g. being inland, being big agricultural provinces with weak industrial bases and a large populations, with a low urbanization rate and weak drive of industry to agriculture and, eventually, with great employment pressure. The study of the project will try to work out a new industrialization development mode for Hunan Province from the point of view of strategy, which undoubtedly has certain significance for other provinces in the central part. The project aims to combine 6 provinces as a whole for study in order to make the result more valuable for promotion, have greater effects, play a bigger role and unite the 6 provinces to make and take coordinated strategies to boost the advancement of the central part jointly.
(III) To actively place positive effects on the establishment of new industrialization policies of the PRC

The PRC has a vast territory but shows apparent multilayer and asymmetrical development from the east to the west due to the influence of location, nature, history and culture. The industrialization level varies a lot. In this way, the nation shall make a difference between the eastern, mid and western part in taking measures to boost up new industrialization. The study tries to bring forward the national supporting macro-policy by analyzing the start point and the phases of development of new industrialization of Hunan Province and comparing the requirements for advancement for the eastern and central part, to actively influence the framing of the new industrialization policy.

VII Methodology

(I) Deskwork to collect and analyze information

- Review of government policies and strategies relevant to the economic development of Hunan Province, especially the implement situation of 11FYP.
- Comprehensive review of past and current situations of energy use and environmental protection in manufacturing, logistics, agriculture and other fields.
- Assessment of position and potential of manufacturing, agriculture, logistics, tourism and energy resources of Hunan Province in the development program of the nation.

The files include the following 6 aspects:

1. Theory on new industrialization and practical experience of the national level, as well as related important documents on the economic and social development released by the Chinese government (including the documents of the 16th and 17th National Congress of Communist Party of the PRC), plans (11FYP and other special plans) and policies related to the new industrialization strategy. Through collection and analysis, we could transfer knowledge about related policy background to the new industrialization strategy of the PRC and Hunan Province. As the development of Hunan is one of the subsystems of the big system of the PRC, it cannot be viewed independent of the Chinese macro social and economic condition and shall accept the guidance of the nation.

2. Policies and documents on economic and social development (mainly includes new industrialization, Bi-Pattern society, equipment manufacturing industry, resource-saving and environment protection, and logistics development etc.) released by Hunan Province and plans (11FYP and other special plans). Through collection,
analysis and review, we could transfer knowledge about related policy background to the new industrialization strategy of Hunan Province.

3. Study results of 12FYP of Hunan Province from governmental institutes, academic research and other social communities, providing reference for the formulation of new industrialization strategy.

4. Collection of statistical documents. Mainly includes the PRC’s latest annual statistics and professional annual statistics, such as annual statistics on mechanical industry and annual statistics of Hunan Province and industry. All studies on the development strategy of Hunan as well as the opinions brought forward shall be made on the basis of the statistical data.

5. Collection and digestion of international experience. Stones from other hills may serve to polish the jade of this one. Mainly collect and digest successful experience and unsuccessful lessons of other nations during the process of industrialization, especially the successful experience of those nations or regions that have similar resources, locations and phase conditions to those of Hunan Province, including the experience on improvement of manufacturing, harmonious development on logistics as well as experience on energy conservation and environmental protection. These experiences can be referred to when studying the new industrialization strategy of Hunan Province.

6. Collection and review of past and current international cooperation projects involving Hunan Province.

(II) Field study to obtain first-hand materials

We plan to comprehend the social & economic development condition of Hunan, especially its industrial development situation, through symposia and field investigations. By researching and analyzing, we can identify problems and reasons, especially the main problems during 11FYP of Hunan Province. Symposia shall be attended by many governmental departments, such as leading groups of new industrialization, EA, Provincial Financial Bureau, DRC (Development and Reform Commission of Hunan), Bureau of Statistics, Transportation Bureau and Bureau of Environmental Protection, who will introduce the current situation and problems as well as their opinions to the future development. In this way, macro economic development data and material of Hunan Province will be obtained. In addition, field studies on key industries and enterprises are necessary, in order to gain profound knowledge and get the first-hand material.

The investigations can be carried out in following ways:

1. Symposium

(1) Attendants: leaders of the provincial and municipal government of Hunan Province, functional departments of the province and cities (mainly refers to the economic and social departments, such as DRC, economic committee, Bureau of Statistics, provincial and municipal Financial Bureau, Bureau of Taxation,
Transportation Administration (bureau) and Bureau of Environmental Protection, Bureau of Urban Construction, Agricultural Administration (bureau), Forestry Administration (bureau), Water Resources Department (bureau), education committee, Scientific and Technical Administration (bureau) and the People’ Bank etc., related associations, such as the people’s congress, policy department of the government, economic research center, scientific association of Hunan Province, Mechanical engineering academy of Hunan and administrative offices and key enterprises etc..

(2) Content of symposium: related functional departments, regions and enterprises embrace the development, problems, contradictions, obstacles or restrictions as well as reasons fields related to their own fields, and put forward the future plan and requirement to support a policy on new industrialization to focused fields, regions, industries and enterprises.

2. Field Studies

(1) Industrial park: including a high-tech industrial development park, an economic and technical development park, an industrial park and a biological industry park etc..

(2) Key enterprises: understanding of development, problems of enterprises and requirement to policies.

Engineering equipment manufacturing industry: Zoomlion, SANY, Sunward and Hunan Jianglu Machinery Group Co., Ltd etc.;


(3) Main market, road transportation and biological environment investigations: Carry out field studies on storage and logistics enterprises, wholesale market, transportation and biological environment etc, to increase consolidated knowledge.

3. Questionnaire

We will design a questionnaire and carry out the paper investigation through modernized communication ways (fax, phone or internet), post or field interviews. It will be a complementary way to collect the opinions of enterprises and individuals to industrial development, opinions on policies as well as feedback on the new industrialization strategy of Hunan.
See the questionnaire on equipment manufacturing of Hunan in Subreport 3.

(III) Systematic analysis

According to System Theory, Hunan is a subsystem of the Chinese system, or it can be seen as a subsystem of the system of the central part. As a result, to frame new industrialization strategies, the following three aspects shall be considered:

First is the road to new industrialization with the background of the general economic and social strategy of the PRC and economic globalization;

Second is the rising strategy of the central part. It is necessary to determine the strategy of Hunan Province to enter the road to new industrialization, in combination with its position in the strategy for the rising of central part, to fully exert Hunan’s important function in the central part;

Third is Hunan’s general strategy on economic and social development. It is to say that the new industrialization strategy of Hunan shall be considered under the frame of the general strategy on Hunan’s economic and social development; to realize the whole development on economy and society through new industrialization strategy.

If possible, key points or conclusions brought in the project shall be based upon three comparisons, enabling the strategy to be more solid and convincing:

1. Comparison with the central part
2. Comparison with similar regions
3. Comparison with the same industry of the nation

(IV) Comparison and selection of proposals

The proposal shall be settled after comparisons with many other proposals for advantages and disadvantages, so as to ensure scientific, effective and reasonable principles. Before fixing the proposal, it is necessary to filter the possible results of varied proposals that may appear, and finally select the one with the least risk and the best profitable interest and target.

(V) Introduction of international experience, especially the development experience of similar regions in the world

There are two ways to introduce successful experience while prevent failure:

One is to introduce international experience and provide reference for the project. As the research goes further and further, especially the research on Hunan’s condition, we will find out what is suitable for Hunan and what is not. When working out the policies, the suitable ones shall be adjusted on the basis of real conditions of Hunan Province.

The other is to comprehend Hunan’s conditions at first, then select the international experience that is most suitable for Hunan Province.

Two international experts are invited by the project team, an international industry specialist and an international energy specialist. They will introduce the development experience of similar regions in the world. Besides, officers and experts
plan to go abroad to Japan and Korea to gain experience of new industrialization, and this will benefit the new industrialization development of Hunan.

(VI) Learn lessons from the ADB TA-projects

Guidance from ADB must be strengthened. ADB project officials are experienced after successfully guiding Hebei, Inner Mongolia, Xinjiang and Gansu in long-term strategy projects. The ADB Task Manager’s comments about key research points, strategy logic and rationality, policy maneuverability are very helpful for this project. Even the work schedule was very important for the team during the project process.

The ADB Task Manager advised at the inception review workshop previous ADB support suggested that there are a few ingredients for a success of this kind of TA. The consulting team has to assess those three points from their experience working on this project so far.

1. Strong ownership from the EA

In addition to convening 3 seminars regarding an opening report, interim report and final report in Hunan Province, what’s more important is that EA help the consulting team to carry out investigations in Hunan Province, mainly to organize and contact departments, regions and enterprises for investigation, provide documents, information and data on the economic and social development of Hunan Province needed by the consulting team and arrange meeting rooms and offices for free.

2. Support and involvement of high-level officials

The support, instruction and involvement of senior officers of the local government guarantee the success of ADB Projects. Hunan province has attached great importance to the ADB Project. For this reason, the provincial government established an SC panel with the governor Mr. Zhou Qiang as the chief; Mr. Xiao Jie, a previous member of the standing committee of the provincial committee of CPC, deputy governor of Hunan province, current secretary of SAT, discussed and defined research subject and focus with ADB officers; Mr. Li Youzhi, governor assistant and director general of DOF, has made reports to the MOF for many times; the provincial Policy Research Office and DOF strengthened leadership listing the project as an important item in work schedule; DRC, Economic Information Research Center, Academy of Social Sciences cooperated by vigorously recommending excellent experts to ADB to take part in the subject research. The leading panel met for workshops and talks with the Team many times giving important instructive opinions in kick-off, start-up, inception, mid-term and final report of the project.

3. Sufficient consultations with stakeholders

Opinions from stakeholders are heard in all-around manners. To bring forward a strategy for mid-term and long term development of a region and supporting polices and measures will inevitably involve many stakeholders, so to listen to their opinions matters for the pertinence and feasibility as well as for the success of implementation
of the strategy. As a result, the consulting team has consulted with the DOF, DRC, ETC, DEP, MIAO and other stakeholders, hearing their opinions on the basic ideas of Hunan province for mid-term and long term development, selection of predominant industries and financing modalities, polices and measures on fiscal and tax reforms.

(VII) Brainstorming

Brainstorming has been adopted. To ensure the project quality, a project advise group had been specially established. This advice group is composed of superior experts from the PRC (including experts at the national level and the local level). The consulting team also heard opinions of experts of NDRC, e.g. Liu Fuyuan, Fan Hengshan, Chen Dongqi, Ma Xiaohe, Chang Xiuze, Zhang Yansheng and Guo Xiaopei, and experts of Hunan province, e.g. Liu Maosong, Wu Jinming and Dai Leping during research. The instructions given by those experts have broadened the research mind of the consulting team and ensured the quality of the project.

VIII Main Theories in Documentation

1. There are mainly three reasons for different understandings of the meaning of industrialization: first, the industry will advance the modernization of agriculture and the service sector as it develops, that is, the industry development is not isolated, but in supplement with agriculture and the service sector. From the point of view of economic development, it is the industrialization and specialization process of various economic activities. Second, with the process of dualistic structure of city and countryside in developing countries, the difference of industry and agriculture is brought under the spotlight. Many economists start to attach importance to the significance of industrialization in the agricultural field. Third, the presenter and follow-up researchers of the term “industrialization” mostly are from western countries. The Chinese counterpart derives from the English word “industrialization” and it has different translations or interpretations.

2. The road to new industrialization with Chinese characteristics mainly consists of the following five features: high technological content, good economic benefits, low resource consumption, less environmental pollution and the full play of the human resource advantages.

3. In April 2006, the State Council issued the document “Advice on Advancing the Rising of the Central Part”, stating expressly that it is essential to construct the central part into a grain production base, energy and raw material base, equipment manufacturing and high-tech industry base and general traffic hub of the nation.

4. “The Enforcement Regulations for Speeding up Vitalizing Equipment Manufacturing Industry”, issued by the State Council, states expressly that the key equipment manufacturing enterprises who are pivotal in manufacturing of major
technical facilities shall be supported in their multi-industrial, multi-regional and cross-ownership restructuring under the premise of warranty of control capacity and dominant power of the nation. Incorporation and restructuring of equipment manufacturing enterprises, associated enterprises, enterprises and institutes shall be encouraged so as to create large enterprise groups in multiple ways. It is necessary to take advantage of the market orientation and policy support to establish multi-industry and multi-regional engineering companies with the integration of system design, system integration, a general contract of engineering and full-range service engaging in construction and management of major projects of the country and explore the oversea market vigorously.

5. Thoughts on promoting the development of equipment manufacturing industry of Hunan Province: to promote the cluster development and establish advantageous region of equipment manufacturing industry of Hunan with international competitiveness; to advance a internationalization development strategy and establish advantageous equipment manufacturing enterprises of Hunan with international competitiveness; to advance an innovation alliance strategy and establish advantageous equipment manufacturing products of Hunan with international competitiveness. (Huang Donghong, 2008)

6. As for the function of finance in new industrialization, the existing documentations stress the industrial projects and hi-tech parks. As for the function of finance in Hunan’s new industrialization, the existing documentations stress tax revenue, especially on the local tax administration, a lack of the research on the existing tax policies, and the research on macro issues such as the fiscal system or the intergovernmental fiscal relationship. As for the scope and sector of the function of finance, the existing documentations stress how to support industrialization by finance itself, a lack of the research on regional integration closely related to industrialization, interaction of industry and agriculture and service industry, an increase of material wealth and the comprehensive improvement of people’s abilities, and even not mentioning how to stimulate the development of new industrialization under the current economic situation.
Chapter II Background and Basic Requirements for the Proposal of New Industrialization

I Background for the Proposal of New Industrialization

The PRC is confronted with many contradictions in the course of industrialization, such as the contradiction between upgrading of industrial structure and expansion, the contradiction between the demand for upgrading of industrial structure and insufficient labor supply and also the contradiction between the rapid growth of industrial departments and their environmental and social responsibilities. The new industrialization road is a new thought presented in terms of the PRC’s actual situation and the world development trend of industry, and there is no special research in foreign countries. The new industrialization is in essence an industrialization mode selected in our country making use of modern technologies and propelled by economic globalization under with background of high population pressure, resource constraint and environmental restriction, in view of the catch-up strategic objectives.

In 2002, the 16th National Congress report of the Communist Party of the PRC proposed “to drive industrialization by informationization and boost the informationization with industrialization so as to walk a new industrialization road with high technology content, high economic returns, low resource consumption, low environmental pollution and full play of HR advantages.”1 In the report of the 17th National Congress of the Communist Party of the PRC, the general requirements on new industrialization with distinct Chinese characteristics are further put forward, pointing out new industrialization shall change the development mode of economy and boost economy through transformation from being driven by investment and export to good coordination of consumption, investment and export; from being driven by the secondary industry to coordinated development of the primary, secondary and tertiary industries; and from an increase of material consumption to the advancement of science and technology, improvement of workforce quality and management innovation. The new industrialization is not only a hot issue discussed in theoretical circles but also a new development mode for the government at different levels to promote industrialization and it is also provided with relevant development strategies and a series of strategic measures as well as supporting policies.

The Chinese government has made policies regarding the transformation of the economic development mode, boost of high tech industry and enhancement of

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1 Report of the 16th National Congress of CPC.
development of service industry one after another. For example, in order to save energy and protect the environment, a series of industrial policies, fiscal and tax policies, price policy, market access qualification and energy efficiency standards for energy saving and emission reduction have been carried out, and the *Recycling Economy Law* to encourage and protect the development of recycling economy has been in legislative procedure. The State Council has issued *The Enforcement Regulations for Speeding up Vitalizing Machine Building Industry Issued by the State Council*, and *Opinions of the State Council concerning Accelerating the Development of the Service Sector* and NDRC has made *Interim Measures for the Administration of High-tech Industry Development* to encourage upgrading of industrial structure. 11FYP presents objectives and measures of quickening the development of the high tech industry, revitalizing the equipment manufacturing industry, optimizing the energy industry, adjusting the structure and layout of the raw material industry, improving the standards of the light and textile industries, actively improving informationization, expanding producer service industry and expanding the consumption service industry etc..

In 2006, the 9th Congress of Party representatives of Hunan Province established the strategic objective of rapidly enriching the citizens and the province together with all-roundly building the well-off society. The Hunan provincial government proposed to promote new industrialization and infrastructure, basic industry and groundwork; to accelerate transforming from generally well-off to all-roundly well-off and transforming from an agriculture-driven province to an economically strong province; to build an economically strong, cultural and educational province; to follow the farmland protection, ecological environmental protection, energy conservation and emission reduction and improvement of people’s living standards. On the meeting, the provincial government proposed “to take new industrialization as the first cause of rejuvenation of Hunan Province”\(^5\), to change the state of being “a giant agricultural province, a weak industrial province and a have-not province” and to lead and drive sound and fast economic development of the province.

### II Basic Requirements of New Industrialization Mode

According to the meaning of new industrialization, the new industrialization mode requires at least the following functions: first the employment has to be increased based on people’s orientation for full play of human resource advantages. Second energy and resource consumption needs to be reduced. Third is to reduce environmental pollution for friendly eco-environment. Fourth is to improve economic benefits and the last is to improve technology content for optimization and upgrading.

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\(^5\) Documents of the 9th Party Congress of Hunan Province in 2006.
of industrial structure. In summary, of the above five functional objectives, the new industrialization shall basically include following four aspects:

(I) A “people-oriented” industrialization requiring dealing correctly with the relation between human and material

In the course of industrialization, developed countries care too much about “substance” such as the mechanization and automation, which results in mass unemployment. New industrialization requires full exertion of human resource advantages, which essentially reflects the “people oriented” idea of development, making the best of people’s involvement and improving people’s professional quality. In this case, correct handling of the relation between capital & technology intensive industry and labor intensive industry, as well as of high-tech industry and traditional industry and virtual economy and real economy is required. On the one hand, we shall greatly develop a labor intensive industry to reduce the employment pressure and expand employment for people to participate in the industrialization as much as possible and get more tangible benefits in the process. On the other hand, we shall have good knowledge that new industrialization is mainly driven by scientific and technological advancement and characterized in capital and knowledge intensive industry, in which talent lies in the core of science and technology and economic competition. The lack of highly qualified laborers limits the development of industrialization in the PRC. Therefore, we shall pay attention to the full use of HR and, more importantly, to the cultivation and development of HR at the same time. We should increase investment in human capital for higher level of HR advantages, develop capital and technology intensive industry and improve traditional industry.

(II) Adhering to sustainable development strategies, requiring emphasis on the quality of the economic growth

The economic growth mode is consists of extensive growth style increasing input of production factors and intensive growth style improving the use efficiency of production factors. The main costs of the realization of industrialization of developed countries are energy consumption and environmental pollution, especially in the rapid development period. The traditional industrialization of the PRC was also an extensive economic increase. At present, the PRC is the second largest energy consumption country in the world. The consumption of energy, raw material and water per unit GDP is much higher than the world average. Since 1949, the GDP of the PRC increased by 10 times, but the consumption of mineral increased by 40 times, so the energy problem has become a rigid restriction to the sustainable economic and social development. New industrialization regards reducing the energy and resource consumption and reducing environmental pollution as its target. It especially stresses the protection of biological construction and environment in the course of realization, and dealing with the relationship between economic development and population, resources, environment. It requires transforming the increase mode. In industrial
production, the output standard per unit resource input and the economic profit can be improved by improving management and the level of production technology, allocating productive resources rationally. Furthermore, the government should actively guide enterprise’s production mode changing into recyclable & re-using form, reduce environmental pollution and promote the harmonious economic and social development.

(III) Reforming traditional industry with high technology and advanced applicable technology and requiring improvement of the technologies used in traditional industry

Traditional industry has been the base of our current industry system for quite a long period, and it will still be the main support for the sustainable economic development of the PRC. With the marketization, globalization of the economy, the competition will be more serious. Technology will play an increasingly important role in the course of the industrial production process, so the economic competition will be largely decided by the level of technology and equipment. Consequently, to actively use high-tech and adaptable technologies to reform traditional industry, improve the technology proportion, and enhance the industrial competitiveness the necessary requirement is to realize new industrialization.

(IV) Industrialization boosted by informationization and requiring great-leap-forward development of production capacity

Informationization is the result of industrialization of certain phase, and also is the fruit of human civilization. New industrialization pays great attention to the use of this fruit of human civilization and highlights the function of information technology to industrialization. Now, developed nations have entered the post-industry society of information. The fast development of high tech and information technology bring opportunities for the Chinese industrialization, which we can introduce and apply for. It is possible to overlap some of the phases that the developed countries passed within shorter period of time and less cost. It is required to promote the informationization in the course of industrialization and lead the industrialization in a flexible and high-valued direction with informationization. It is also required to realize the industrial informationization in the course of industrialization. On the base of new industrialization, we should strengthen the construction of infrastructure, and the research in information technology, speed up the information industry; improve the informationization level, and perfect industrialization in the course of informationization. It will be a good chance for the PRC to fully exert later-coming advantages, boost up the good mutual action between informationization and industrialization, and realize the leap-forward development of the productivity.
Chapter III  Basic Condition Analysis for New Industrialization of Hunan Province

I  Current Status and Characteristics of the Economy Development of Hunan Province

The total land area of the whole Hunan Province is about 210,000 square kilometers. In the end of 2008, the total population of the whole province was about 68,452,000, in which the employed labor force was 39,100,000, taking up 57% of the whole population. In the recent years, Hunan has developed rapidly on economy and society, but compared with the whole country, it is still in the medium or lower level. Hunan remains to be “a strong province of agriculture, a weak province of industry and a poor province of finance”. The gross regional product of 2008 was CNY 1,115.6 billion, ranking 11th of 31 provinces (autonomous regions and municipalities) all over the country, and 4th of the six provinces of central region of the PRC. The local fiscal revenues were CNY 72.27 billion, ranking 13th in the whole country and 4th of the six provinces of central region of the PRC. The per capita gross regional product was only CNY 17,521, which was only 73% of national per capita GDP, and ranking 21st in the whole country and 4th of the six provinces of central region of the PRC. The three strata industrial structure was 18.0: 44.2: 37.8 (The whole country is 11.3: 48.6: 40.1.), the agricultural proportion was 6.7 percent points higher than that of the whole country, and the industrial proportion was 4.4 percent points lower than that of the whole country. The urbanization rate was 42.15%, 3.53 percent points lower than the level of the whole country. The urban dweller’s disposable income was CNY 13,821, CNY 1,960 less than that of the whole country, and the Engel Coefficient was 39.9%, 2 percentage points higher than that of the whole country; the rural per capita net income was CNY 4,513, CNY 248 less than that of the whole country, and the Engel Coefficient is 51.2%, 7.5 percent points higher than that of the whole country. (See Table 3-1)

Hunan is an agricultural province. The agricultural gross output of 2008 was CNY 323.67 billion and the value-added of the primary industry was CNY 200.7 billion, ranking No. 6 in the whole country. At the end of 2008, the rural population was 39,599,500, taking up nearly 58% of the whole population. The value-added of the primary industry takes up 18% of the three-industry. The rural employed persons of the whole province of 2008 was 27,620,000, taking up 70.6% of the employed
persons of the whole province in that year, and the employed persons of the primary industry take up 44.9%, that is, 44.9% of the population have produced 18% of the added value, which shows that the agricultural productivity is low and there are many rural surplus labors.

The structure of the agricultural province makes the local fiscal revenue not high, the total GDP not large, and the peasant income level lower than the average level of the whole country.

**Table 3-1   Implement Situation of Eleventh Five-Year Plan (2006-2008)**

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>Annual increasing rate % of 2006-2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP(CNY100 million)</td>
<td>7,508.9</td>
<td>9,200</td>
<td>11,156.6</td>
<td>13.2</td>
</tr>
<tr>
<td>Per capita GDP</td>
<td>11,950</td>
<td>14,492</td>
<td>17,521</td>
<td>12.5</td>
</tr>
<tr>
<td>Local fiscal revenue (CNY100 million)</td>
<td>477.9</td>
<td>606.6</td>
<td>722.7</td>
<td>22</td>
</tr>
<tr>
<td>total investment in fixed assets in the province (CNY100 million)</td>
<td>3,175.5</td>
<td>4,154.8</td>
<td>5,474.7</td>
<td>30.2</td>
</tr>
<tr>
<td>Total retail sales of consumer goods (CNY100 million)</td>
<td>2,834.2</td>
<td>3,356.5</td>
<td>4,119.7</td>
<td>18.8</td>
</tr>
<tr>
<td>Urban per capita disposable income (CNY)</td>
<td>10,504.7</td>
<td>12,293.5</td>
<td>13,821.2</td>
<td>13.2</td>
</tr>
<tr>
<td>Per capita net income of rural residents (CNY)</td>
<td>3,389.6</td>
<td>3,904.2</td>
<td>4,512.5</td>
<td>13.2</td>
</tr>
<tr>
<td>Energy consumption decrease per unit of GDP %</td>
<td>-</td>
<td>3.39</td>
<td>4.3</td>
<td>6.72</td>
</tr>
</tbody>
</table>

Source: sorted out according to 2009 *China Statistical Abstract* of National Bureau of Statistics of the PRC and 2009 *National Economy and Social Development Statistics Handbook of Hunan Province*. If there are variances on data, take the data of national bureau of statistics as standards.

**I) Accelerated industrial development and apparently improved quality of economic growth**

In the earlier period of open-up, the development speed of Hunan was far behind
the national level. Since the middle of the 1990s, the increase speed began to quicken evenly, exceeding the national level, see Figure 3-1. Especially in these three years of the implement of 11FYP, the economy continues increasing rapidly, and the economic strength is gradually enhanced, and some main indexes such as regional total output value, fiscal revenue, the living standards of both urban and rural residents, fixed asset investment, and total retail sales of consumer goods finish in advance or over-fulfill the struggle target put forwarded by *Eleventh Five-Year Plan Outline of Hunan* (see Box 3-1, and Table 3-1). The regional total output value of the first three years of the 11FY annually increased by 13.2%, breaks through CNY1,000 billion in 2008, reaching CNY1,115.66 billion, and realized the target of 11FYP 2 years in advance, and total GDP rose from 13th to 11th rank in the whole country and ranks No. 3 in central region of the PRC. The economic structure has been improved noticeably, economic growth mainly benefits from the growing pulling of the secondary and tertiary industries. The secondary industry develops rapidly, especially industries like the machining industry: the secondary industry annually increased by 16.5% in the first three years from 2006 to 2008, and the industry annually increased by 17.8% (see Table 3-2, Figure 3-2). The GDP of the first half of 2009 increased by 12.8%, 5.7 percentage points higher than that of the whole country, and the increment ranks No. 5 in the whole country and No.1 in central region of the PRC. The added value of the industry above designate size of the whole province increases by 17.4%, the increment ranks No. 4 in the whole country and No. 1 in central region of the PRC, and the economic structure has been improved noticeably.

![Figure 3-1 Comparison of the GDP growth rate of Hunan with the Nation](image)

Economic benefit has considerably increased, economic growth quality has been noticeably improved. The decreasing range energy consumption per unit of GDP
expanded to 6.72% in 2008 from 3.39% in 2006 and 4.43% in 2007, stably ranking No. 2 in the six provinces of central region of the PRC; and compared to 2005, the energy consumption per unit of GDP of Hunan accumulatively decreases by 13.8%, finishing 66.85% of the 20% progress.

**Box 3-1:** The struggle targets put forward by the *Eleventh Five-Year Plan Outline of Hunan* are: to realize an annual increase of the total output value by more than 10%, and, compared to 2000, strive to double the total and the per capita output value in 2008, and exceed CNY1,000 billion in 2010; to reduce energy consumption per thousand CNY GDP by 20%; and to make the urban per capita disposable income and per-capita net income for rural residents increase at an annual average rate of 7% and 6% respectively; to reduce the registered urban unemployment rate to 4.5%, and to control the population natural growth rate within 7.5‰.

Table 3-2 Changing of the Three Strata Industries of the Four Years
(from 2005 to 2008)

<table>
<thead>
<tr>
<th></th>
<th>2005 Absolute value (CNY100 million)</th>
<th>2006 Growth rate %</th>
<th>2007 Growth rate %</th>
<th>2008 Growth rate %</th>
<th>The annual average of 2006-2008</th>
<th>The whole country of 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional total output value</td>
<td>6,511.34</td>
<td>11.6</td>
<td>12.2</td>
<td>14.5</td>
<td>12.8</td>
<td>13.2</td>
</tr>
<tr>
<td>Primary industry proportion of GDP %</td>
<td>19.3</td>
<td>17.6</td>
<td>17.7</td>
<td>18</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Secondary industry proportion of GDP %</td>
<td>39.9</td>
<td>41.6</td>
<td>42.6</td>
<td>44.2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tertiary industry proportion of GDP %</td>
<td>33.6</td>
<td>36.7</td>
<td>36.7</td>
<td>38.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Growth rate % of industry proportion of GDP %</td>
<td>13.3</td>
<td>18</td>
<td>19.5</td>
<td>16</td>
<td>17.8</td>
<td>9.5</td>
</tr>
<tr>
<td>Growth rate %</td>
<td>13.4</td>
<td>11.7</td>
<td>15</td>
<td>13.3</td>
<td>13.3</td>
<td>9.5</td>
</tr>
</tbody>
</table>
Figure 3-2 Comparison of the driving roles of the three strata industries in GDP of Hunan Province

(II) The economic development of Hunan being in the mid-stage of industrialization

At present, judged by H. Chenery standard matrix\(^2\), the per capita GDP and the employment structure of Hunan Province apparently lie in the mid stage of industrialization. From looking at the production value structure, the industrial structure (including the construction of infrastructure) of Hunan has the character of the second phase of industrialization; from looking at the proportion of agriculture and services, the output structure has the character of the initial term of medium industrialization stage. Comparing the industrialization level with that of the nation, the per capita GDP, the production value structure, the employment structure and the urbanization level are all under the average national level (see Table 3-3, Figure 3-3). As a result, from general point of view, Hunan’s industrialization still lies in the mid-stage.

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\(^2\) At present, the academic judgment on industrial standard of certain region mostly follows the standard 3 development phases and 6 development times upon the average income brought forward by H. Chenery. The first phase is the premier product manufacturing phase, and the average income ranks from $364 to $728 (exchange currency rate in 1982, the same in the following). The second phase is industrialization phase, which includes premier, middle and senior industrialization phases, with the average income ranks from $728 to $1,456, $1,456 to $2,912, and from $2,912 to $5,460. The third phase is the developed phase, which includes premier and senior developed phases, with the average income ranks from $5,460 to $8,736, $8,736 to $13,104.
Table 3-3 Related Indicators Compared with the National Average in 2008

<table>
<thead>
<tr>
<th>Items</th>
<th>Per capita GDP (CNY)</th>
<th>GDP structure %</th>
<th>Employment structure %</th>
<th>Urbanization rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Nationwide</td>
<td>22,698</td>
<td>11.3</td>
<td>48.6</td>
<td>42.9</td>
</tr>
<tr>
<td>Hunan Province</td>
<td>17,521</td>
<td>18.0</td>
<td>44.2</td>
<td>38.4</td>
</tr>
<tr>
<td>Deviation</td>
<td>-5,177</td>
<td>6.7</td>
<td>-4.4</td>
<td>-4.5</td>
</tr>
</tbody>
</table>

Note: (i) I = Primary industry, II = Secondary industry, III = Tertiary industry; (ii) Data for employment structure is in 2007.


Figure 3-3 Changes of Industrial Structure in Hunan Province (1978-2008)

(III) Industrial structure with characteristics of heavy industry

Judged from the interior structure of industry (see Table 3-4), heavy industry takes 60% of the total output value of the industry, among which 70% is raw material mining, having small promotion to other industries and employment. The ‘heavy structure’ of industrialization and its resource intensive characteristics are apparent. From the point of view of light and heavy industries, the industry in Hunan is clearly oriented towards the heavy industry. In 2008, the value-added of heavy industry is CNY242.6 billion and only CNY114.5 billion in light industry. In addition, the growth of heavy industry is more rapid than the growth of the light one. From 40
industrial sectors, arranged in order of location entropy$^3$ (see Table 3-5), industries of Hunan that take a certain proportion in the PRC are following: the tobacco industry, nonferrous metal smelt and rolling processing industry, special equipment manufacturing industry, non-metal mineral product industry, agricultural food processing industry, coal mining and washing industry, ferrous metal smelting and rolling processing industry, generating and supply of electricity and heating industry etc.. The common equipment manufacturing industry also has a good growth trend but cannot be compared with the above industries.

### Table 3-4 Output Value and Proportion of Main industrial Sectors in Hunan Province (2007)

<table>
<thead>
<tr>
<th>Main sector</th>
<th>Gross industrial output value (current price) (CNY 100 million)</th>
<th>Proportion of industry %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal mining and washing</td>
<td>228.79</td>
<td>2.70</td>
</tr>
<tr>
<td>Processing of petroleum, coking, processing of nucleus fuel</td>
<td>421.77</td>
<td>4.98</td>
</tr>
<tr>
<td>Manufacture of chemical raw material and chemical products</td>
<td>650.01</td>
<td>7.68</td>
</tr>
<tr>
<td>Manufacture of non-metallic mineral products</td>
<td>435.92</td>
<td>5.15</td>
</tr>
<tr>
<td>Manufacture and processing of ferrous metals</td>
<td>833.71</td>
<td>9.85</td>
</tr>
<tr>
<td>Manufacture and processing of non-ferrous metals</td>
<td>864.84</td>
<td>10.22</td>
</tr>
<tr>
<td>Manufacture of general purpose machinery</td>
<td>290.77</td>
<td>3.44</td>
</tr>
<tr>
<td>Manufacture of special purpose machinery</td>
<td>425.56</td>
<td>5.03</td>
</tr>
<tr>
<td>Manufacture of electrical machinery and equipment</td>
<td>277.06</td>
<td>3.27</td>
</tr>
<tr>
<td>Production and supply of electric power and heat power</td>
<td>608.5</td>
<td>7.19</td>
</tr>
<tr>
<td>Total</td>
<td>5,902.24</td>
<td>59.51</td>
</tr>
<tr>
<td>Hunan gross industrial output value</td>
<td>8,464.08</td>
<td>100</td>
</tr>
</tbody>
</table>

---

$^3$ Location Entropy refers to the industry distribution of certain region within the nation, which can be counted upon the formula (total industrial output value of certain industry of the region/total industrial output value of the region)/total industrial output value of the industry within the nation/total industrial output value of the nation).
### Table 3-5 The Location Entropy of Main Industrial Sectors of Hunan Province (2007)

<table>
<thead>
<tr>
<th>Main sector</th>
<th>Location entropy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal mining and washing</td>
<td>1.19</td>
</tr>
<tr>
<td>Processing of food agricultural products</td>
<td>1.39</td>
</tr>
<tr>
<td>Manufacture of tobacco</td>
<td>4.52</td>
</tr>
<tr>
<td>Processing of petroleum, coking, processing of nucleus fuel</td>
<td>1.13</td>
</tr>
<tr>
<td>Manufacture of chemical raw material and chemical products</td>
<td>1.16</td>
</tr>
<tr>
<td>Manufacture of non-metallic mineral products</td>
<td>1.34</td>
</tr>
<tr>
<td>Manufacture and processing of ferrous metals</td>
<td>1.18</td>
</tr>
<tr>
<td>Manufacture and processing of non-ferrous metals</td>
<td>2.30</td>
</tr>
<tr>
<td>Manufacture of general purpose machinery</td>
<td>0.76</td>
</tr>
<tr>
<td>Manufacture of special purpose machinery</td>
<td>1.92</td>
</tr>
<tr>
<td>Manufacture of electrical machinery and equipment</td>
<td>0.55</td>
</tr>
<tr>
<td>Production and supply of electric power and heat power</td>
<td>1.10</td>
</tr>
</tbody>
</table>

### (IV) Highly concentrated mainstay industries

The whole economy mainly gathers in the regions of Chang-Zhu-Tan and Yueyang, which is “3+5” city clusters, where average per capita GDP is higher than the provincial level apparently.

According to the geographical distribution of the ten mainstay industries of the province, the regional concentration of these industries of the province in 2006 is shown in Table 3-6, calculated on the basis of the mainstay industry proportion of 14 cities (at prefecture level) in the province. The ratio of most industries in prime regions (that is, the region with the largest ratio) is higher than 33% (exceeding one third of the province), with only resource-based industries and labor-intensive industries such as metal smelting, rolling and processing industry, textile industry and foodstuff manufacturing industry having relatively wide distribution. Approximately, there are 7 industries in two regions with the largest ration accounting for 50% (paper manufacturing industry is slightly lower than 50%), among which the most concentrated industry is the tobacco manufacturing industry, followed by industries with local features and advanced technology, like telecommunication device, computer and other electronic device manufacturing industries, as well as the non-ferrous metal mining industry. The geographical concentration of advanced equipment manufacturing industry and newly emerging equipment manufacturing industry is also high, mainly distributed in the region of Chang-Zhu-Tan. The industries with lower geographical distribution mainly cover the metal smelting, rolling and processing industry, agriculture by-product processing industry and textile industry, mainly of labor-intensive industries. The geographical distribution of main product industries is similar to that of mainstay industries, with some differences.
### Table 3-6 Geographical Concentration of Gross Industry Output of Mainstay Industries of the Province in 2006

<table>
<thead>
<tr>
<th>Item</th>
<th>Prime region</th>
<th>First two regions</th>
<th>Regions with relatively high concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ratio %</td>
<td>City</td>
<td>Ratio %</td>
</tr>
<tr>
<td>Advanced equipment manufacturing industry and newly emerged equipment manufacturing industry</td>
<td>38.84</td>
<td>Changsha</td>
<td>53.07</td>
</tr>
<tr>
<td>Metal smelting, rolling and processing industry</td>
<td>23.12</td>
<td>Loudi</td>
<td>37.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petroleum and chemicals industry</td>
<td>49.44</td>
<td>Yueyang</td>
<td>64.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural by-product processing industry</td>
<td>33.94</td>
<td>Yueyang</td>
<td>48.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tobacco manufacturing industry</td>
<td>49.63</td>
<td>Changde</td>
<td>90.68</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textile industry</td>
<td>25.11</td>
<td>Yueyang</td>
<td>45.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food processing industry</td>
<td>30.59</td>
<td>Changsha</td>
<td>55.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper manufacturing and paper product industry</td>
<td>34.42</td>
<td>Yueyang</td>
<td>49.53</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-ferrous metal mining industry</td>
<td>58.13</td>
<td>Chenzhou</td>
<td>75.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telecommunication equipment, computer and other electronic equipment manufacturing industry</td>
<td>69.66</td>
<td>Changsha</td>
<td>79.26</td>
</tr>
</tbody>
</table>


“3+5” city circle around Chang-Zhu-Tan becoming the industry concentrated region of the entire province

Most industrial industries and almost all modern industries of the province are concentrated in the “3 + 5” City Circle around Chang-Zhu-Tan. The “3+5” City Circle mainly involves 8 cities directly under the administration of Hunan Province, namely Changsha, Zhuzhou, Xiangtan, Yueyang, Changde, Yiyang, Loudi, and Hengyang, also including 12 cities at county level, 28 counties, and 617 townships in total. Basically, the circle is taking the city cluster of Chang-Zhu-Tan as the center and one and a half hour distance by vehicle as the radius. The region covers 99,600 square kilometers, accounting for 45.8% of the area of the province, with a total population
of 40,489.9 thousand, accounting for 59.8% of the total population of the province. Within the cluster, the labor division of industries and their complementary development begins to become clear. Changsha boasts its prominent advantage in hi-tech, engineering and mechanics, and electronic products, as well as Chinese patent drugs, bio-drugs and new materials. Xiangtan’s industrial advantages are mainly steel, mechanical and electrical, and construction materials. Meanwhile, communication equipment manufacturing, non-ferrous metal smelting and chemicals are the advantageous industries of Zhuzhou. Yueyang, the largest industrial base of petroleum, chemicals and newsprint production in the middle-south of the PRC, is an ever growing power and energy base and an advanced manufacturing base with a complete system being formed. The machinery industry and agricultural product processing industry are well supported in Yiyang. Changde is an industrial city and a logistic center in north-west of Hunan, with developed tobacco industry, textile industry and agricultural product processing industry. The steel industry of Loudi is leading other cities in the province and it is also a heavy and chemicals industry base and a raw material base for energy. Hengyang attaches great importance to the development of steel, transformation, chemicals and non-ferrous metal smelting.

Chang-Zhu-Tan is not only the core of “3+5” city circle, but also of the gathering areas for both economic development and modern industrial development of the whole Hunan Province. Chang-Zhu-Tan includes Changsha, Zhuzhou and Xiangtan, and the administered 4 cities, 8 counties and 181 center towns, the area is 28,000 square kilometers, the population is 13,200 thousand. The regional total output value of 2008 took up 40.9% of that of the whole province, the industry added value took up 47.9% of that of the whole province, the added value of the industry above designated size took up 44.6% of that of the whole province, the general budgetary fiscal revenue accounted for 39.1% of the whole province, the country’s fixed asset investment accounted for 46.4%, and the added value of high-tech industry accounted for 55.9% of that of the whole province. In 2008, 50 major projects, with a potential investment of more than CNY1 billion, were under construction in Chang-Zhu-Tan, in which, four were more than CNY5 billion, and one was more than CNY10 billion, so the major projects had obvious advantages in the whole province. At present, it boasts 23 industry clusters, accounting for 46% of the total in the province. There are 18 industrial parks within this region, accounting for 24% of the total in the province. In 2007, the added value of industry in this regions accounted for 39.7% of the entire province, and added value of scale industry 37.7%. The industrial structure advances, and the ratio of mechanical and electrical industry in all industrial enterprises above a designated size is far leading other industries, becoming the core concentrated region of modern enterprises in the province. In 2006, the equipment manufacturing industry and electronics industry of Chang-Zhu-Tan accounted for 69.34% of the gross output of enterprises above
designated size in the province, and “3+5” City Circle 92% (See Table 3-7).

Table 3-7   Ratios of Equipment Manufacturing and Electronics Industry of Each City or Prefecture and the Gross Output of Scale Industrial Enterprises

<table>
<thead>
<tr>
<th>Region</th>
<th>Changsha</th>
<th>Zhuzhou</th>
<th>Xiangtan</th>
<th>Hengyang</th>
<th>Changde</th>
<th>Yueyang</th>
<th>Yiyang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio (%)</td>
<td>45.42</td>
<td>13.51</td>
<td>10.41</td>
<td>8.68</td>
<td>5.10</td>
<td>3.93</td>
<td>3.33</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>Yongzhou</th>
<th>Shaoyang</th>
<th>Chenzhou</th>
<th>Loudi</th>
<th>Huaihua</th>
<th>Zhangjiajie</th>
<th>Xiangxi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio (%)</td>
<td>3.22</td>
<td>2.02</td>
<td>1.73</td>
<td>1.68</td>
<td>0.68</td>
<td>0.25</td>
<td>0.04</td>
</tr>
</tbody>
</table>


(V) SOEs and collective enterprises taking up a large proportion among the ownership structure

SOEs and collective enterprises still take up a large proportion of the ownership structure of enterprises. In 2008, the proportions of the state-owned enterprises and the state-holding enterprises further decreased from 42.28% (in 2007) to 39.2%, and the proportion of the collective enterprises in the added value of the designed size enterprises was about 41.6%, so the developing vigor of these enterprises is obviously weaker than that of the joint-stock enterprises and foreign-owned and Hong Kong, Macao and Taiwan enterprises, and the year-on-year growth rate of joint-stock enterprises was 21.1% in 2008. See Table 3-8.

Table 3-8   The Main Classification of Industrial Added Value above Designate Size (2008)

<table>
<thead>
<tr>
<th>Item</th>
<th>Added value of industry (CNY100 million)</th>
<th>Proportion (%)</th>
<th>Growth rate of Industrial added value over the previous year (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial added value above designated size</td>
<td>2,655.97</td>
<td>100.00</td>
<td>24.3</td>
</tr>
<tr>
<td>State-owned or controlling share hold enterprises</td>
<td>1,122.96</td>
<td>42.28</td>
<td>16.4</td>
</tr>
<tr>
<td>Collective-owned enterprises</td>
<td>64.76</td>
<td>2.44</td>
<td>23.6</td>
</tr>
<tr>
<td>Joint-stock enterprises</td>
<td>1,463.51</td>
<td>55.10</td>
<td>26.9</td>
</tr>
<tr>
<td>Enterprises funded by foreigners and Hong Kong, Macao and Taiwan</td>
<td>199.64</td>
<td>7.52</td>
<td>27.7</td>
</tr>
</tbody>
</table>
(VI) The economy driven mostly by investment

Hunan’s economy is driven mainly by investment. Since entering the new century, the total fixed assets investment in Hunan Province has maintained its strong momentum. See Figure 3-4. During 10FYP, the fixed assets investment of Hunan Province totaled CNY 866.875 billion; when entering 11FYP, Hunan Province increased its investment in fixed assets and made more contributions to economic growth, for example, the fixed assets investments from 2006 to 2008 were CNY 324.239 billion, CNY 429.436 billion and CNY 564.997 billion respectively. The total fixed assets investment during the period from 2006 to 2008 was 1.52 times that during 10FYP. In the year 2008, the fixed assets investment stimulated the economy of Hunan Province to increase by 8.6% and its contribution rate to the economic growth increase to 67%.

![Figure 3-4 The Fixed Asset Investment in Hunan Province during 2001-2008 (CNY 100 million)]

II Comparative Advantages and Favorable Conditions of Hunan Province

(I) Human resources advantages

Hunan Province has a weakly qualified workforce with certain differences compared to the rest of the nation. In 2006, the college education personnel density of Hunan was only 43.8 persons/million, which is far lower than the national mean level 52.9 persons/million. In particular, there is a lack of professional technicians. At the end of 2007, the density of professional technicians was 29 persons/million in the province, with a large gap to the national level 32.3 persons/million in 2000. But in recent years, there has been fast development. At the end of 2007, the gross amount of HR reached 3.7 million in Hunan, increasing by 92.3% compared to 1996, and the talent density reached 54.4 persons/million, increasing by 49% than that in 2000. As for the talent distribution in Hunan, about one third of professionals gather in
Chang-Zhu-Tan. High-tech products are mainly distributed in Changsha city whose output value of high-tech products take up 1/3 of the total of Hunan Province, while that of Chang-Zhu-Tan areas takes up about 1/2 of the province in total. In terms of industries, professionals are mainly distributed in manufacturing, scientific research, education, health, social insurances and social welfare, etc. and they are the foremost important foundation for the development of modernized industry of Hunan. It is proved that professionals play a great role in supporting industrialization. Large equipment manufacturing enterprises are developed mostly under the guidance and support of scientific research academies and institutes, colleges and universities like the Central South University. By 2007, there were 11 national technical centers of enterprises and 2 national engineering and technological research centers in the equipment manufacturing industry of Hunan Province, whereas only 4 national technical centers of enterprises in Hubei Province which is No. 1 of the central part in the gross output of the equipment manufacturing industry, and 5 in the No.3 Anhui province.

(II) Location and transport advantages

Compared with other regions in the central part of the PRC, Hunan Province has distinct location and transport advantages. Hunan Province is adjacent to the developed Pearl River Delta in the south and provinces of the vast south-western part in the west and is the junction of south-east coastal regions to mid-west regions of inner land; it has great geographical advantages in undertaking industrial transfer. As for transport condition, at present, the province has basically completed a multi-level traffic system dominated by railway and highway and supported by civil aviation and water transport. Hunan Province is connected to the Beijing-Zhuhai Expressway, with well developed highways. There are 4 vertical and 3 horizontal national highways passing through the province, connected with more than 70 provincial highways and various county and township level roads. The railway transportation system has been optimized, resulting in south-to-north Beijing-Guangzhou Railway and Jiaozuo-Liuzhou Railway, east-to-west Zhegan Railway and Shimen-Changsha Railway running through the province. There are 5 airports in the province. As for the water transportation, at the end of 2007, Hunan has built up more than 60 thousand ton berths, and the navigable mileages were 11,398 kilometers across the province. Furthermore, the Chang-Zhu-Tan region has accomplished urban integration, laying a solid foundation for rapid development of the equipment manufacturing industry and the logistics industry. As Yueyang, Changsha and other regions are in the vicinity of the Yangtze River Delta, and Chenzhou and Changsha lie close to the Pearl River Delta, it is very convenient to transport and connect with the traffic of Pearl River Delta. Changsha lies on the large artery of the south to north passage of the PRC, directly connected with Guangzhou and Shenzhen by the Beijing-Guangzhou
Expressway and Beijing-Zhuhai Expressway respectively, accordingly with prominent transportation advantages. Especially, after the opening of the Wuhan-Guangzhou high-speed railway, it takes only about 2 hours from Changsha to Guangzhou, and it shortens the journey by about 7 hours. Therefore, these regions have advantageous transportation conditions to introduce labor-intensive enterprises, see Table 3-9.

Table 3-9  Comparison of Accessibility to Shenzhen Between Some Regions of Hunan Province and Competing Cities for Attracting Business and Investment

<table>
<thead>
<tr>
<th>O/D</th>
<th>Railway</th>
<th>Highway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changsha - Shenzhen</td>
<td>Through route</td>
<td>9.2 hours</td>
</tr>
<tr>
<td>Chenzhou - Shenzhen</td>
<td>Through route</td>
<td>8 hours</td>
</tr>
<tr>
<td>Nanning – Shenzhen</td>
<td>Through transit</td>
<td>12 hours</td>
</tr>
<tr>
<td>Nanchang – Shenzhen</td>
<td>Through route</td>
<td>10 hours</td>
</tr>
</tbody>
</table>

For details, see Subreport 2 Coordinated the Development of the logistics industry of Hunan Province.

(III) Industrial Advantages

There’s a solid base for the development of the equipment manufacturing industry in Hunan Province with the distinct leading advantages in the industry of the PRC and some industries even take the lead. The engineering machinery industry in Hunan, for example, has undergone rapid growth, with outstanding comparative advantages and competitive advantages. Zoomlion Group Co., Ltd., Sany Heavy Industry Co., Ltd., and Hunan Sunward Intelligent Machinery Inc. etc., have already become leading enterprises in the industry in the PRC, of which Zoomlion and Sany have been listed in the top 50 engineering machinery enterprises of the world for two consecutive years. In this way, it leads Hunan to be the most competitive ‘Capital of Engineering Machinery’ in the south of the PRC. Zhuzhou is branded with the title of ‘Capital of Electric Locomotive in the PRC’ and about 60% of the electric locomotives of the PRC are manufactured in Hunan Province. The equipment manufacturing industry has become the biggest industry with over 200 billion turnover and one of mainstay industries in Hunan, resulting in the three major competitive industry clusters, (in 2008, the 1,790 enterprises above designate size of the equipment manufacturing industry in Hunan achieved a total industrial output value (current price) of 211.493 billion, increasing by 45.62% based on last year; main business income of 171.8 billion, increasing by 46% based on last year; industrial added value of 57.6 billion, accounting for 13.5% of the total of the province and 5.2% of GDP).

(For details, see Subreport 1 Strategy for Equipment Manufacturing Industrial
New energy industry is developing rapidly. Solar-powered water heating is mature in Hunan Province’s renewable energy technologies, has a higher degree of marketization and a relatively complete industrial chain. It is the first project that has formed the industrialization scale of renewable energy in Hunan Province. Until the end of 2007, Hunan Province’s solar-powered water heaters have had a hold volume of 798.5 thousand square meters, accounting for 0.7% of the total hold volume in the PRC. The PRC has listed Hunan as one of the inland provinces taking priority to start nuclear power development. At present, the preliminary work of Taohuajiang Nuclear Power Project in Hunan has been formally launched. No. 1 unit power of Taohuajiang Nuclear Power Project will be put into operation in 2015; after all the four units have been built and put into operation, the annual capacity will be predicted to reach 28 billion degrees. In 2008, there were a total of 27.2 million KWh of wind power; in 2009, the preliminary investment in the wind power industry has exceeded CNY1.2 billion. Yang Tianhu Wind Farm in Chenzhou City is expected to be put into use in December 2009, and the annual generation capacity is expected to reach 77.44 million KWh after the completion of the project. Remarkable results have been achieved in the development and application of biomass energy. Until the end of 2008, the province's total rural production of high quality biogas has been 905.4177 million cubic meters and the straw gasification gas has been 2.2341 million cubic meters. In Hunan, relevant industrial clusters of new energy automotives have been formed, with the electric automobile power as the drive, and AC drive control system and key components as the core. It is expected that by 2012, Hunan CSR Times Electric Vehicle Co., Ltd. (CTEV) will realize an annual sales scale of more than 1,000 vehicles, more than 10,000 sets of electric drive systems, more than 20,000 key components, and more than CNY1 billion of annual sales income, to become the PRC's largest specialized R & D and manufacturing base of electric vehicles.

(For details, see Subreport 3 Strategy of Energy Conservation and Environmental Protection in Hunan Province)

(IV) Natural resource advantages

With superior natural conditions, moderate climate, ample rainfall and adequate sunshine, Hunan Province is suitable for growth of corps. Additionally, it has abundant water resources, eco-tourism resources and other resources (such as some mineral resources).

As a large agricultural province, Hunan is abundant in agricultural products. Hunan’s rice output ranks the first place in the PRC and other main agricultural products, such as swine, ramie, flue-cured tobacco, tea, fresh water products, oil products and sugar, are also in top rank of the PRC. These agricultural products play a

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very important part in the PRC, providing the basis for the development of further processing.

The 21st century is a century of building eco-civilization when human beings follow the law of harmonious development between man and nature to boost social, economic and cultural development. The Chinese government claimed expressly to build an eco-civilization to create energy, save resources and create an ecosystem friendly industry structure, growth mode and consumption pattern. In the future, the PRC will stress more on the protection of the ecosystem in developing industries and ecological products for consumers, which brings favorable opportunities for regions with a good ecosystem to develop ecological industries. In Hunan Province, especially in the Dongting Lake circle and Xiangxi region, as with favorable natural conditions, agriculture, fishing, husbandry, forestry, minorities’ crafts, gardening and medicine will emerge new growth points of regional economic development.

Hunan is abundant in water resources. Dongting Lake is the second largest freshwater lake in the PRC, with vast waters, providing favorable conditions for the development of agricultural irrigation, water transport, aquatic products and relevant industries. The exploitable hydropower resources of Xiangjiang River, Zijiang River, Yuanjiang River and Lijiang River are almost 11 million KWh, which will help to develop clean energy, namely hydroelectricity.

Hunan Province boasts its abundant unique tourism resources. The entire province is covered by thick forest at the rate up to 56.43%, ranking fifth in the PRC and second in Central region of the PRC. There are 15 tourist resorts, more than 100 tourist attractions and beyond 180 key protected cultural relics. The unearthed relics from Mawangdui Han Tomb, Yueyang Tower, Hengshan Mountain, Taohuayuan, Emperor Yan’s Mausoleum and Mao Zedong’s Residence are well-known all over the world. What’s more, Zhangjiajie (Wulingyuan Scenic and Historic Interest Area) can be rated as a top natural wonder of the world and it is included in the World Heritage List. The favorable ecological environment paves a good foundation for accelerated development of new industrialization in Hunan Province.

Hunan Province is famous for being the home of non-ferrous metal and non-metal. Among the 141 mines detected in Hunan, 25 mines rank the first three places in the PRC for the reserve volume. Furthermore, stadium and tungsten have the largest reserves in the world and bismuth, realgar and fluorite rank the first places in the PRC for reserves, which will facilitate the development of relevant industries in Hunan Province.
Chapter IV  Opportunities and Challenges for Hunan Province in Promoting New Industrialization

I  The International Economic Environment has Undergone Profound Changes, Presenting both Opportunities and Challenges

(I) Impact of the International Financial Crisis

The international financial crisis triggered by America’s sub-prime mortgage crisis in 2007 is still impacting the global economies. It is obvious that the crisis also affects the PRC's economic development. The influence of the crisis is mainly represented by the following three aspects:

1. The shrinking of overseas market demand has a remarkable impact on the economy of the PRC.

   The PRC’s economy is highly dependent on the outside world. In 2008, the external dependence was 67%, almost twice the one in 1998 with 31.8%. The international financial crisis triggered by US sub-prime crisis is far from being over. The consumption market of developed countries, the US for instance, is seriously affected and real economy is impaired through the international financial crisis. The over-consumption pattern of developed countries will be transformed to a moderate consumption pattern, and this will result in big changes in the consumption structure and production structure. Another change which should be noticed is the rise of trade protectionism. Thus, all of these will have great impact on the PRC’s coastal export-oriented economy and export-oriented enterprises, forcing the PRC to transform from an external demand dependent pattern to a domestic demand-led economy.

2. As a result of reduced liquidity in the financial markets financing difficulties has increased and financing opportunities has decreased.

   The crisis causes the investment risk to increase largely in all markets including capital market. Affected by economic depression, the credit of global enterprises and financial institutions degenerated generally, assets depreciated rapidly, many enterprises and financial institutions close down, and international and domestic credit risks rise prominently. The rise of credit risk makes financial institutions more cautious in releasing loans. Generally, credit shrinks and complicated fundraising for enterprises and consumers.

   According to Global Development Finance: Charting a Global Recovery, issued
by WB on June 22, 2009, the net inflow of private capital in developing countries in 2008 decreased to 707 billion US dollars from 1,200 billion US dollars in 2007. WB predicts that the number mentioned above will further decrease by 48% in 2009, down to 363 billion US dollar.

3. The employment pressure is aggravated in Hunan Province.

As the east part of the PRC is highly external dependent, it is influenced remarkably by the international crisis. In this case, many enterprises were closed up and a great number of laborers returned to their homeland, which brings more employment pressure to the not so well developed Hunan Province. There’s an export of nearly 10 million laborers to the east developed regions in Hunan.

(II) New opportunities and space to the upgrading of Hunan’s industrial structure provided by the adjustment of international economic structure

In the adjustment of international economic structure, the international industrial transfer and structure adjustment are the fundamentals and the cores. During the 80s of the last century, the transfer of simple labor-intensive industries from developed countries and newly emerging industrialized countries to developing countries was completed. Since the 90s of the last century, developed countries have actively adjusted their industrial structure, in order to further improve their labor productivity and enhance their international competitiveness. They transferred resource-intensive traditional heavy industries (automobile, steel, ship building, for instance) and some complicated and mature technology-intensive industries, non-core technologies and external processes and assemblies with high labor-intensity in hi-tech industries to developing countries.

The further development of economic globalization provides the PRC with opportunities to participate in international labor division by exerting comparative advantages at all aspects. After 30 years of accumulation and development since the reform and opening up, the comparative advantage of the PRC has changed significantly. The resource of labor force still remains an advantage of the PRC, but mainly in Midwest region of the PRC. The advantage of land cost transferred from national level to Midwest region of the PRC. The advantages of Eastern the PRC have transformed to potentiality of the development of service industry well supported by huge economic volume. Therefore, the possibility of all regions in the PRC to participate in economic globalization is greatly improved for a period in the future. See Table 4-1.

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9 Including industry structure, trade structure, structure of international payment and balance, and pattern of capital flow.
Table 4-1  Changes of the PRC’s Comparative Advantages and Regions Participated in Economic Globalization

<table>
<thead>
<tr>
<th></th>
<th>1978-2008</th>
<th>2008-2038</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative advantages</td>
<td>Labor force, land</td>
<td>Labor force, land</td>
</tr>
<tr>
<td>Advantage distribution</td>
<td>Nationwide</td>
<td>Midwest region of the PRC</td>
</tr>
<tr>
<td>Suitable industries</td>
<td>Labor-intensive industries</td>
<td>Labor-intensive industries</td>
</tr>
<tr>
<td></td>
<td>Mainly of Eastern region of the PRC</td>
<td>Midwest region of the PRC</td>
</tr>
</tbody>
</table>

The increase of labor-intensive industries in Eastern region of the PRC has been lasting for over 20 years, far beyond the average period of 10-15 years of the rest of world. Currently, it requires accelerating the industrial transfer. The transfer scale of labor-intensive industries in Eastern region of the PRC is large. It is estimated that by 2010 the industrial output to be transferred by Guangdong, Shanghai, Zhejiang and Fujian is up to CNY1,400 billion. The lasting development period of export and processing industries and labor-intensive industries in east coastal regions is about 10 years. By the end of 12FYP, the industrial transfer of eastern region of the PRC will be finished. Eastern region of the PRC is likely to become a region of concentrated global capital- and technology-intensive industries and Midwest region of the PRC may become concentrated in labor-intensive industries.

(III) Opportunity for Hunan to develop strategic emerging industries forming with new technology revolution and industrial revolution directed by new energies

It can be observed in developed countries that the effect of information revolution is fading away. The level of informationization of the US, Japan and the EU is up to 75%, becoming stable. South Korea indicates in its Development Strategy and Planning of New Century's Economy that the effect of information technology is withered. New energy technology is conceiving a new breakthrough. From about the year2000, developed countries initiated large-scale research on new energy technology. In 1999, the US started the SPI (Superconductivity Partnership Initiative) research plan, largest scale in the world. SPI mainly stresses on superconductive cable, superconductive transformer, flywheel energy preservation of superconductive magnetic suspension and superconductive current limiter. The present economic crisis accelerated the research and application. While all countries are selecting new growth points to drive their economies, developed countries, represented by US, initiated a
transcending and trans-industry new technology revolution and new industrial revolution directed by energy (See Box 4-1). Against the background of global climate change, the countries decided to concentrate on carbon emission reduction. Promoting CDM (Clean Development Mechanism) and developing low-carbon economy are affecting the economic development of all countries through the limitation and guidance of the rules of international trade.

**Box 4-1**

On January 25, 2009, the White House of US issued the Progress Report of Economic Recovery Plan. It stresses that the major investment directions and anticipated effect of the recovery plan include: stimulating clean energy economy – to double the output of renewable energy within three years in order to serve 6 million American families; paving or upgrading 3,000 miles of American power grid and installing “smart electric meter” for 40 million American families; and revamping 2 million residential houses and 75% federal buildings, in order to improve their heat preservation.

In the first three quarters of 2008, the US invested over 6.6 billion US dollars on renewable energy.

On the one hand, the new round of technology revolution and industrial revolution will consolidate the existing international order; on the other hand, they will also cause local changes. Judging the structure of energy production, Hunan lacks electricity, coal, petroleum and gas, and is thus an energy inputting province, with relatively low ratio of various energy productions in the PRC. With the acceleration of industrialization and urbanization in Hunan and the constant increase of the total economy, the energy demand will remain on a high level on the long term. The gap between the demand and supply of energy in Hunan will be larger and larger. During the formation of technology revolution and industrial revolution directed by new energy in the world, the PRC will also increase its effort to follow the new wave of the technology revolution for exploiting new energy. Hunan should take the opportunity to exploit new energy, seek alternative energies, fully exploit and utilize the abundant clean and renewable energies, such as methane, biomass, solar energy and wind energy.

II Domestic Environment Is Supportive for New Industrialization of Hunan, Providing More Opportunities than Challenges

(I) New opportunities for development of domestic demand economy of
Hunan Province brought by the long-term strategy of Boosting domestic demand of the PRC

The international financial crisis inevitably exerts profound influence on the PRC’s economy. The PRC transforms challenge into opportunity to avert the adversity of the international financial crisis from the PRC’s economic development. The Chinese government, by taking into account the overall situation, took expanding the domestic demand as a long-term development strategy, and issued a series of policies and measures to expand the domestic demand, including adjusting the macroeconomic policies and implementing proactive fiscal policy and moderately loose monetary policy.

The domestic market of the PRC is huge. In 2008, the per capita GDP was above 3,000 US dollars and the per capita annual income of farmers approximated 1,000 US dollars. The consumption level and structure will undergo tremendous changes and the effective demand of consumer durables will increase rapidly. The combination of tremendous internal demand and the construction of comprehensive infrastructure will serve as a momentum for the PRC’s industries to develop faster than other industries, and that also strongly supports the industrial development of Hunan.

1. To increase investment

The PRC increases governmental investment, expanding investments in the fields of infrastructure construction, technology reconstruction, new energy, and environmental protection; these will facilitate for Hunan to be financially supported by the nation and it will bring new opportunities for Hunan’s industries. Since 2008, the PRC increased its investment to CNY4 trillion, to become one of the important measures for the expansion of domestic demand, stabilizing market confidence, adjusting economic structure and stimulating economic growth. (See Box 4-2)

2. To boost consumption

Directed by the development strategy of expanding internal demand, the State Council announced various policies for boosting consumption. Under these policies, consumption will gradually become the dominant force in driving economic growth. The upgrading of personal consumption structure will be accelerated. The consumption structure of urban citizens transforms from developable consumption to enjoyable consumption, and the upgrading of rural consumption structure will also be accelerated, the proportion of basic living expenditure compared to the total expenditure will decrease remarkably. The proportion of the expenditure for telecommunication, entertainment, medical treatment, and transport to improve the living standard will increase significantly, and the proportion of the of TV sets, mobile phones, computers and automobiles owned by rural families will increase year by year.
Box 4-2 Composition of CNY 4 Trillion Investment for Expanding Internal Demand

<table>
<thead>
<tr>
<th>Key Investment Fields</th>
<th>Amount (CNY100 million)</th>
<th>Ratio %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>40,000</td>
<td>100</td>
</tr>
<tr>
<td>Security housing such as low rent houses, reconstruction of shanty town</td>
<td>4,000</td>
<td>10</td>
</tr>
<tr>
<td>Infrastructures such as rural water and power supply, and road</td>
<td>3,700</td>
<td>9.25</td>
</tr>
<tr>
<td>Key infrastructures such as railway, road, airport and water conservation and reconstruction of urban power grid</td>
<td>15,000</td>
<td>37.5</td>
</tr>
<tr>
<td>Social development such as medical and healthcare, education and culture</td>
<td>1,500</td>
<td>3.75</td>
</tr>
<tr>
<td>Energy-saving and emission reduction, and ecological construction</td>
<td>2,100</td>
<td>5.25</td>
</tr>
<tr>
<td>Independent innovation and industrial structure adjustment</td>
<td>3,700</td>
<td>9.25</td>
</tr>
<tr>
<td>Recovery and reconstruction for Wenchuan after earthquake</td>
<td>10,000</td>
<td>25</td>
</tr>
</tbody>
</table>


(II) New opportunities for the development of relevant industries of Hunan Province provided by the revitalization scheme for ten major industries

Before and after 2009, the nation has announced the revitalization scheme for ten major industries, including steel, automobile, shipbuilding, petrochemical, textile, light industry, non-ferrous metals, equipment manufacturing, electronic information and logistics industry, aiming at increasing input and policy support to industrial restructuring. This will provide new development opportunities for related industries in Hunan Province.

These ten industries play important roles in national economy. According to statistical data, the total value-added of these ten industries exceeds a third of national GDP, the value-added of these industries accounts for about 80% of the total industrial value-added, the annul tax revenues from these industries account for almost 40% of the total fiscal revenues, and the labor force employed in these industries accounts for 30% of the total employment population. Therefore, the revitalization plans for these industries are not three-year action plans only for settling with the present international financial crisis, ensuring the stable development of industries and stimulating the comprehensive countermeasures for industry upgrade, but also the
important stimulus to the transformation from a large economy into a strong economy.

(III) Rapid growth of the equipment manufacturing and hi-tech industry and substitution of energy and raw material industries with mechanical and electrical industries as the leading industry in the recent future

We can see from the measurement of the proportion of the energy raw material industry and the mechanical & electrical industry to the industrial sectors (see Table 4-2) that in 2007 the former one was still the leading industry, compared to 2000. Judging from the ratio of total industry value, the difference is enlarged with the difference of the ratios of industrial value-added and industrial assets reduced. From the view of the growth, though the ratios of total industrial output value, value-added and the total assets of these two industries increase to some extent, the function of energy raw material industry is strengthening. However, the growth rate of the mechanical and electrical industry is remarkably faster than that of the energy raw material industry, especially in the industrial value-added and industrial assets. At present, the PRC and even entire East Asia are suffering from the excess production of the energy raw material industry. According to a survey conducted by the National Development and Reform Commission in 2008 on the excess production of some industries, the excess production of steel, electrolytic aluminum, alloy, coking coal, calcium carbide, copper smelting, automobile, textile are remarkable and will inevitably enter into the period of adjustment and optimization in the future. Meanwhile, the equipment manufacturing and hi-tech industries will grow rapidly, and the mechanical and electrical industry will take the place of the energy raw material industry as the leading industry.

<table>
<thead>
<tr>
<th></th>
<th>Energy raw material industry</th>
<th>Mechanical and electrical industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of total industrial output (%)</td>
<td>41.06</td>
<td>43.78</td>
</tr>
<tr>
<td>Proportion of added industrial output (%)</td>
<td>46.28</td>
<td>47.05</td>
</tr>
<tr>
<td>Proportion of total assets (%)</td>
<td>52.23</td>
<td>51.14</td>
</tr>
</tbody>
</table>

(IV) The perspective of central region as the center of economic growth in PRC with the significant change of regional economic structure of the PRC

Facing the international financial crisis, Hunan as an important province in Central region of the PRC faces more opportunities than challenges. The international financial crisis mainly impacts the industrial development of Eastern region of the
PRC featured by export-oriented economies. It shrinks the international market and the external demand. In order to offset the impact of the international financial crisis and seize the opportunity of new round economic growth, Chinese government increased the support to adjust economic structure and some enterprises in the Pearl River Delta and the Yangtze River Delta start to adjust the export-oriented development mode and the direction of investment, as well as to transfer production sector, of which some abandoned general processing industry and expanded manufacturing industry, shifted from the resource dependent, energy dependent and capital intensive industries to the ones with low consumption of energy and hi-tech industries. The adjustment cannot be completed in a single day. The industrial structure of Midwest region of the PRC is mainly internal demand-oriented. Supported by strong policies and the advantage of industrial structure, the regional economic structure is likely to witness a significant transformation. The center of The PRC’s economic growth may be shifted to Central region of the PRC, which is the opportunity for Hunan to achieve a great-leap-develop.

It is indicated that the developed coastal provinces and cities in South-Eastern region of the PRC are seriously affected by the international financial crisis are still in the adjusting period regardless of increasing growth and the investment and trade in Central region of the PRC are active with increasing economic growth. Judging from the growth of investment on fixed assets in the first quarter of 2009, Eastern regions, Central region and Western region of the PRC are 19.8%, 34.3% and 46.1% (including the reconstruction of Sichuan after earthquake) respectively; as for GDP growth, the first 5 are provinces (excluding Tianjin) in Midwest region of the PRC, grew by almost two digits; for fiscal revenue, the growth rate in Midwest region of the PRC is higher than that in Eastern region of the PRC and higher than the average performance of entire nation.

(V) The more rigorous requirements of energy-saving and environmental protection supplying both challenges to and opportunities for Hunan’s new industrialization

So far, the economic growth mode of the PRC is not fundamentally changed, still having the problem of “high input, high consumption, high emission, disharmony, circulating difficulties and low efficiency”. The environmental sustainability, economized exploitation of resources and transformation of the economic growth mode are the priorities in the future development. Energy-saving and environmental protection are constraint factors and conditions in economic growth and also conceive a huge opportunities for developing industries. Since the national per capita GDP exceeds 3,000 US dollars, automobile and electronic appliance will be gradually popularized, which will bring huge market demand for new energy and new materials. The development of the energy industry and reserve of energy technology are equipped with certain of foundations. The PRC has partial technology advantage over
the exploitation and utilization of atomic energy, hydrogen energy and solar energy and becomes one of leading countries in safe utilization of atomic energy, with a preliminary cost advantage in solar energy, but relatively lags behind in biological energy.

In addition to the revitalization plans for ten industries, the development plan for new energy is in the pipeline. In 2009, the PRC increased its support to new energy enterprises. The supported capital will break through CNY3.8 billion in 2008, in which the support for energy-saving and new energy automobile, power generation by solar energy and by wind are the three key points.

III Strategic Opportunities for the Rising of the Central Region of the PRC

The implementation of the rising strategy of Central region of The PRC will give support to the central region including Hunan in policies, capital and layout of important constructions that provide new opportunity for Hunan to develop.

The Several Opinions on the Facilitation of the Rising of Central Region of the PRC (Zhongfa [2006] No. 10) issued by the State Council in April, 2006 states “build Central region of the PRC as the national base for corps production, energy, raw material, equipment manufacturing and hi-tech industries and the comprehensive transportation junction”. In May, 2006, the General Office of the State Council issued the Notice of the Implementation of Relevant Policies and Measures of the Several Opinions of the State Council on the facilitation of the Rising of Central region of the PRC (Guobanhan [2006] No. 38), requiring the National Development and Reform Commission, Ministry of Science and Technology, the Commission for Science, Technology and Industry for National Defense and the Ministry of Railways to formulate and implement relevant policies of the Opinions. At the beginning of 2008, the Scope of Six Central Provinces for the Implementation of the Relevant Policies with the Reference of the Policies for Revitalizing the Old Industrial Bases of North-Eastern and Western Development (Guobanhan [2008] No. 15) of the General Office of the State Council further ensured the implementation of the police support. The plan for facilitating the rising of Central region of the PRC is in the pipeline. After its issuance, it will serve as a guideline document for the rising of Central region of the PRC. The implementation of the rising of Central region of the PRC provides a series of favorable conditions for the base construction of equipment manufacturing industry and hi-tech industry, energy raw material industry, the development of logistics industry and the development of city cluster.

On September 23, 2009, the State Council discussed and principally passed the Plan for Accelerating the Growth of the Middle Part of the PRC (hereinafter referred to as the “middle plan”), which becomes the programmatic document for the rising of the middle part. It is expressly pointed out in the plan that all efforts shall be made to
achieve the objectives that the economy will develop remarkably and improve further in vitality in the middle part of the PRC until 2015 and it shall be improved remarkably in sustainable development capability and new progress have been achieved in construction of harmonious society. In this respect, first emphasis shall be placed on consolidation in construction of a grain production base and aggressive development of modern agriculture. It is essential to boost adjustment of agricultural structure, carry forward vigorously industrialized agricultural operations, strengthen agricultural and rural infrastructure construction to improve overall productivity in agriculture constantly, increase farmers’ income continuously and change the presence of rural areas effectively. Second, important energy and raw materials bases shall be consolidated and improved under the principle of optimized layout, concentrated development, efficient utilization, intensive processing, safety and environmental protection; meanwhile, it is essential to accelerate the construction of large coal mines, electrical power and power grid and develop intensive processing of raw materials vigorously. Third, with the priority of research and development of core and key technologies, modern equipment manufacturing industry and high-tech industrial bases shall be constructed. Independent innovation capability and the overall standard and strength of equipment manufacturing industry shall be improved. The high-tech industry shall be boosted by modifying the traditional manufacturing industry with high and new technologies and advanced appropriate technologies. Fourth, the distribution of transportation resources shall be optimized by consolidating the position of composite transpiration junctions, speeding up the construction of a railway network and airport, improving highway network and water and pipeline transportation capacity. Fifth, it is essential to boom the “two-horizontal & two-vertical” economic belt along Yangtze River, Long-Hai (Lanzhou - Lianyungang), Jingguang (Beijing - Guangzhou) and Jing-Jiu (Beijing - Kowloon) railway and nurture vigorous city clusters; furthermore, the old industrial base shall be revitalized and the city with resource-based economy shall be transformed to developing county economy and accelerating development of old revolutionary base areas, ethnic minority regions and poverty-stricken areas. Sixth, it is inevitable to spare no efforts to develop a circular economy to improve energy saving and multipurpose use level. It is necessary to strengthen protection of cultivated land and to improve overall performance of utilization of water resources. Seventh, with priority to develop education, cultural and sports events shall be boomed and basic medical care and public health service capability shall be improved, employment shall be expanded by all means and the social security system shall be improved. Eighth, beginning with the weakest points, efforts shall be made to advance reform and opening and innovation of system and mechanism, enhance development motion and vitality without stop and improve the policy system supporting the rising of the middle part further.
Implementation of strategies for the rising of the middle part has provided a series of god-given favorable conditions of opportunities for construction of equipment manufacturing and high-tech industrial base and energy and raw materials base and development of logistics and city clusters in Hunan Province.

IV Strategic Opportunities for the Construction of “Bi-_pattern” Society

In Dec. 2007, approved by the State Council, the National Development and Reform Commission of PRC ratified the Chang-Zhu-Tan city cluster and Wuhan megalopolis to be the pilot areas for the overall coordinated reform of a resource saving & environment-friendly (Bi-pattern for short) society. This is a new round of major planning for innovated and regional development of the PRC. Main targets for constructing such a pilot area are to boost up transformation of economic mode for coordination among social and economic development and population, resources and environment, and practically to walk out a new road that is different from traditional industrialization and urbanization. This new road will lead to a better and quicker development of the province and accumulate experience for system reform and scientific development of the nation. The development priority relies on building the Chang-Zhu-Tan city clusters a demonstration plot for the construction of a Bi-pattern society, the growth pole of the rising central part, a leading zone for new industrialization, new urbanization, and new rural construction of the province and a modern ecological group of international quality. Substantially, the fundamental way to build up the pilot area of Chang-Zhu-Tan city clusters for overall coordinated reform of a “Bi-pattern” is to take a new road to industrialization. Apparently, the way that the Chang-Zhu-Tan city clusters take shall coincide with the way that Hunan is going to take and be subject to the development strategies for new industrialization of Hunan Province. As a result, Hunan Province at a large extent shall rely on the Chang-Zhu-Tan city clusters to promote the provincial new industrialization strategy.
Chapter V  Major Restrictions and Difficulties Faced by Hunan in Promoting New Industrialization

All circles of Hunan Province have agreed in vigorously developing new industrialization, and Hunan itself possesses the foundation and conditions for the development of new industrialization. However, compared with the basic requirements of new industrialization, Hunan is confronted with some problems and contradictions.

I  Insufficient Innovation Ability

First, R&D input is low, and Hunan highly relies on external technology. In 2008, R&D expenses only took up 1.03% of GDP, nearly a half of the target of the prosperous society level 2.5%, having accomplished 41.1% of the objective and being the lowest one among the 23 indicators. Although the percentage of original innovation of equipment manufacturing enterprises of Hunan Province is high, internal research and test development (R&D) input is relatively low. In 2006, the internal R&D funds collected by surveyed equipment manufacturing enterprises were CNY1.5 billion, accounting for 43.3% of the innovation expenses, 3.5% lower than the average national level. The average R&D expenditure of enterprises was CNY2.583 million, only equivalent to 55.2% of the average national expenditure.

Secondly, the capitals owned by enterprises make up a large proportion, and the channels for fund collection are yet to be explored. In 2006, funds for technological innovation jointly collected by equipment manufacturing enterprises of the entire province was CNY3.47 billion, among which the capitals owned by enterprises were CNY2.28 billion, accounting for 65.7%; government capital input CNY460 million, accounting for 13.2%; exempted and reduced taxes CNY480 million, accounting for 13.9%; loans from financial institutions CNY180 million, and policy loans CNY20 million, absorbed foreign capitals CNY10 million, 2.3%, 0.4% and 0.9% lower than the average national level, respectively.

Thirdly, the innovation system is incomplete. Enterprises, science and technology, education, governments and other subsystems are out of line with each other. State ministries and departments and local governments are separated, which causes the inability to allocate new resources reasonably throughout the entire province, and many problems exist between science & technology supply and demand, between intellectual innovation, technological innovation and application spread, and between
advantages and cooperation. The integration efficiency of innovation subjects is low.

II Severe Situation of Energy Conservation and Environmental Protection

The total of the natural resources of Hunan is abundant but the per capita resource is insufficient. Recently, with the rapid economic development and acceleration of industrialization and urbanization, increasing demand of energy and extensive utilization of resources, Hunan is under a big pressure of resources and environment, with severe a situation of energy-saving and environmental protection.

There are two reasons for the lack of energy resource and environmental deterioration:

There is a big gap in energy supply. In 2008, the per capita energy production of Hunan province is 0.88 ton standard coal, far less than that of the whole nation, i.e. less than 50% of national level; per capita generated energy is 1,320.96KWh, also much less than that of the national level. As a whole, the energy production of Hunan province remains at the lower-middle level in the whole country and per capita energy production is appropriately equivalent to half of the national mean level. In 2008, there’s deficiency of up to 50.83 million tons standard coal in energy supply, increasing by 18.53 million tons standard coal than in 2005, at the rate of 16.31% annually. In 2008, 76.57 TWH power is purchased in Hunan province, increasing by 48.79 TWH compared to 2005, at the rate of 40.2% annually; 40.1735 million tons coal is imported, increasing by 21.7524 million tons, at the rate of 29.7%; 9.305 million tons oil is imported, increasing by 0.7246 million tons; meanwhile, 823 cubic meters gas is transported in Hunan province, increasing by 7.23, at the rate of 101.89%. That is, 40% of the energy needed by Hunan's economic development and residents’ consumption need to be supplied by other provinces.

The industry is dominated by high consumption and high emission sectors, which deteriorates the conflict between supply and demand of energy and also brings pressure for environment protection. Hunan Province is in the early term of the mid-stage of industrialization and shows a clear trend of better development of heavy industry, as among the top 100 enterprises, 60% are of heavy industry and among the 10 advantageous industries, 5 industries including steel nonferrous, food processing, petroleum & chemical, building material and paper industry are industries with high energy consumption and high pollution. 60% of the enterprises in the industries are high energy consumption enterprises, taking up 90% of the provincial energy consumption. In 2008, secondary industrial energy consumption is 79.7836 million tons standard coal, accounting for 98.33% of the industry and 70.26% of gross consumption of the society. To calculate with equivalent value, in 2008, the industrial energy consumption was 79.7836 million tons standard coal in Hunan province, in which the heavy industry consumes energy up to 72.3059 million tons standard coal,
accounting for 90.63% of gross industrial energy consumption and 63.67% of the whole society. Under such a structure, it is very difficult to fulfill the national index. As a result, to boost up energy conservation and pollution reduction, Hunan needs to reform the overall development strategy and stick to a way of high technology content, high benefits, low investment, low consumption and low pollution to new industrialization and strengthen industrial structure adjustment and technology promotion for energy conservation and environmental protection.

III City and Countryside Disparity Is Unfavorable to New Industrialization Process

In Hunan, the disparity between cities and countryside is obvious, the urbanization is lags behind, and the city and countryside relation is uncoordinated, all of which will directly impede the new industrialization. Firstly, urbanization is lagging behind. At present, Hunan has entered the mid-term phase of industrialization, but in 2008, the urbanization rate was 42.15%, 3.53% lower than the national level, 9.2% lower than the average global urbanization level in 2000. Although the three strata of industrial structure of the entire province is 18.0: 44.2: 37.8, among which the proportion of primary and secondary industries raises 0.3% and 1.6% respectively, the lagging urbanization level restricts the upgrading process of the structure of tertiary industry. The industrial structure of Hunan is in a virtually high status. Secondly, the city and countryside relation is uncoordinated. The system of city and countryside separation in Hunan Province has not been changed to the essence, but has directly caused inequality in education and employment of city and countryside residents and many restrictions still exist in employment, education, residence registration and social insurance, all of which cause slow shift of agricultural population and hinder the rapid promotion of urbanization level.

IV Low Labor Quality and Huge Employment Pressure

The new industrialization requires high technology content, so how to deal with the relationship between improvement of technology content and arrangement of employment for full play is one of major difficulties arising in the new industrialization in Hunan Province. In the future, there will be 1 million incoming laborers demanding employment in the province every year in addition to nearly 1 million non-reemployed or registered laid offs due to enterprise reform and nearly 10 million unemployed in the countryside. On the other hand, the real estate industry offering more jobs has been in adjustment & downturn in recent years, which reduces the demands of labors in the
market largely. In 2008, more importance was given to structural adjustment of over-capacity industry and rectification and shut-down of some high energy consumption and high pollution enterprises, in this way jobs were reduced further. In addition, the global economic crisis triggered by American sub-prime crisis is spreading all over the world and also shows influence on Hunan Province. One typical case is hardship and bankruptcy of external oriented exportation & processing enterprises and labor intensive enterprises of Yangtze River Delta Region as the employment pressure develops further, resulting in huge decrease of labor employment and forced return of Hunan civilian workers, making the employment situation worse in such a low industrialized province as Hunan.

Besides, because of the low qualification of employed population, the employment situation is more severe. The results of the fifth census reveals that in every 100 thousand people of Hunan, the population with education background of universities and colleges were only 2,926, and the population with education background of senior high schools and technical secondary schools were only 11,177. In a survey conducted in 2006, among the shifted employed labor force of rural areas of Hunan, most were graduated from junior high schools, accounting for 55.2%, followed by senior high schools, accounting for 20.5%, and then primary schools and illiterates, 9.2% and 5.6% respectively. People with the education background of technical secondary schools and universities only accounted for 7.5% and 2%. And those who had received specialized training only accounted for 21.7%. Although it seems that low quality of employed population only has impact on employment competitiveness, and narrowed down the employment scope It has tremendous restrictions on the new industrialization. Confronted with the severe employment situation and under the overall concept of ‘stability first’ and ‘employment priority’, a large number of industries and enterprises have to maintain the current situation, and try to launch no or fewer new technologies and projects; low-qualified employed population has no obvious support for the intelligence of new industrialization, all of which to some extent will defer the pace of the new industrialization.
Chapter VI  Basic Ideas of New Industrialization Strategy of Hunan Province

I  Guiding Thoughts

New industrialization is an important way to realize an affluent ‘Bi-Model’ society other than an objective. The general guiding thoughts of new industrialization strategy are the following: new industrialization in Hunan should take resource-saving and environment-friendly as the conditions, take scientific and technological progress as the guide, and take improvement of human capital as the entry point, in order to promote industrialization and urbanization, to achieve comprehensive development of human and social progress.

(I) Resource-saving and environment-friendly

Recently, with the acceleration of industrialization and urbanization, Hunan witnessed rapid economic growth with huge achievement on various constructions but also paid tremendous cost of resources and environment with increasingly sharp conflicts between economic development and resource environment. Hunan is short of energy resources with large demand of energy and high consumption that caused many environmental issues with the emergence of insufficient energy and environmental pollution. It is directly related to the unreasonable economic structure and extensive growth mode. If we do not accelerate the structure adjustment and growth mode transformation, the resources, environment and a ‘Bi-Model’ society cannot sustain the consumption and the economic development cannot be continued. Only by persisting to economized, clean and safe development, Hunan’s economy and a “Bi-Model” society can be developed fast and well.

In essence, the construction of resource-saving and environment-friendly (namely a “Bi-Model” society) accords with new industrialization. Because of the essential features of new industrialization being high content of technology, favorable economic benefit, low resource consumption, less environmental pollution, full exertion of human resources, new industrialization it also requires to save resources and reduce pollution. With the different focuses, there are some differences between a ‘Bi-Model’ society and new industrialization. New industrialization not only concerns about the impact on the environment and resources but also the factors of development, that is, to stimulate the industrialization by informationization, specialization and the comprehensive utilization of various resources. A “Bi-Model” society is more concerned with the factors of environment and resources. On the one hand, a “Bi-Model” society confines new industrialization; on the other hand, the construction of a “Bi-Model” society is also the course of development resource
industry and environmental protection industry. By saving energy and protecting the environment, it creates favorable external investment environment and market environment and also further facilitates the development of Hunan’s new industrialization.

(II) Taking scientific and technological progress as the guide and holding up the people-orientated development concept

The strategic objective of building a moderately prosperous society in all respects by 2020 proposed in the 16th National Congress of Communist Party is the concrete demonstration of the people-orientated development concept. A county or a region’s development, GDP growth is not an end, only a means, ultimately embodied in human development. Hunan, with a huge rural population, accords with the entire Central region of the PRC and even whole country in its economic and social transformation. The employment structure of Hunan does not synchronize with the growth structure. The three strata industrial structure and the employment structure are seriously asymmetric. At the present stage of economic development, the industrial development without increasing employment is not a complete industrial development. Under the condition that almost 58% population are employed by the small-scale agricultural production, the adjustment and upgrade of economic structure should be on the basis of increasing employment. The people-oriented scientific outlook on development should create jobs for people and increase the income of urban and rural citizens so as to improve the comprehensive development of people. We should modify the development mode of existing industries.

It is difficult for the new industrialization strategy of Hunan to develop leading industries under the premise of provision of adequate jobs. We believe that the basic concept of new industrialization strategy of Hunan should ensure adequate jobs at first, since no single industry development can support the industrialization and urbanization of Hunan. The new industrialization of Hunan should be supported by multi-development of industries. We should develop and reconstruct traditional industries with high technology and advocate the aggregation of labor-intensive industries and high-tech industries. This requires high qualification of labors, therefore, it is necessary to continuously improve the quality of labors, enhance human capital, and transform the labor advantages to human capital advantages. So, we should develop new industrialization that facilitates the employment of labor force and the all-round development of people.

(III) Principle of coordinated development of industrialization, urbanization and marketization

For development, the issue faced by the PRC is to eliminate “dual structure” and realize the economic and social transformation. Hunan faces the same problem. To eliminate the “dual structure” is fundamentally to stimulate the industrialization, urbanization and rural industrialization. 60% population in Hunan is rural population
and Hunan is still at the stage of transforming from an agricultural society to industrial society, which determines its development and is a comprehensive and systematic project. New industrialization of Hunan must achieve the coordinated development of industrialization, urbanization and marketization.

Industrialization, urbanization and marketization are dependent to one another. Without urbanization and marketization, there is no industrialization. Without industrialization, there is no revolution of production mode. The object of industrialization is the self-supported small-scale production. To enable agriculture reaching the production as enterprises, industry should absorb surplus labor force of agriculture and all raw materials supplied by agriculture and the industry should develop and expand increasingly. New industrialization is a new form of eliminating the small-scale agricultural production, is a course of doing so by high technology, information technology and the method of saving resources and not destroying environment. Industrialization solves the adjustment and upgrade of industrial structure and urbanization solves the carrier of the adjustment and upgrade of industrial structure. Industrialization is the modernization of production mode and urbanization is the modernization of exchange mode and living pattern. The objective of industrialization is the production mode and the combination of production elements. The objective of urbanization is the geographic combination of industrial and commercial industries. The course of urbanization is also the course of geographic assembly of industrial and commercial industries. The economic essence of urbanization is to exchange time by space, is to deepen the labor division of the agglomeration of industries and population so as to reduce cost and improve benefit. The agglomeration of industrial and commercial industries and population into cities reduce farms and farmers. This can create conditions for enterprise agriculture. Marketization is the modernization of exchange mode. Its objective is labor force at the current stage of economic development of the PRC, is to make labor as commodity, is to enable the assemblance of production materials for enterprise operation. The main task for the current marketization of the PRC is to translate the surplus rural labor force as commodities so as to improve the agricultural commodity rate.

II Basic Ideas of New Industrialization Strategy of Hunan Province

In the 16th National Congress of the Communist Party of the PRC, to build a moderately prosperous society in all aspects was set as the strategic target to be achieved by 2020 and more new requirements on building a prosperous society in all aspects were placed in the 17th National Congress.

Subject to the Statistic Monitoring Scheme for Building a Moderately Prosperous Society in All Aspects by the National Bureau of Statistics of the PRC, as
shown in the monitoring outcome for prosperous society process of Hunan Province in 2008, the total accomplishment of Hunan in building a moderately prosperous society in all aspects was 76.3%, increasing by 2.2% than that in the last year and 18.1% than in 2000, i.e. annually 2.3% in 8 years. However, the per capita GDP of the whole province was CNY17,521, and according the constant price of year 2000 was calculated as CNY13167, only completed a comprehensive well-off target of 41.9%, less than a half of the target value. Moreover, the income gap tends to expand and the coverage rate of social security is low, represented as follows: first, the income gap between citizens of different groups in city and rural areas tended to expand as the Gini coefficient increased from 0.38 in 2000 to 0.414 in 2008, above the security line of 0.4; the income ratio of urban and rural residents increased from 2.83 in 2000 to 3.06 in 2008. The well-off accomplishment level of those indicators is basically on a declining curve, reverse to the economic and social development. Second, the income of residents is still low, which has restricted the improvement of people’s living standard. In 2008, the well-off accomplishment level of annual per capita disposable income for residents was only 44.1%, thus making all efforts to increase income of urban and rural residents is still an important problem in building a well-off society. Third, the coverage rate of social security is not high. In 2008, the well-off accomplishment level of the coverage rate of basic social insurance was 58.3% in Hunan Province, despite 47.3% higher than that in 2000; it was still very difficult to accomplish the target value for building a well-off society. Additionally, in these years, though, the energy consumption per unit of GDP is controlled to some degree; the economic growth mode still shows extensive features as energy consumption and pollution remain high.

In 2006, in the 9th Congress of Party Representatives of Hunan Province, the strategic objective boosting reinvigoration of the province and building a prosperous society in all aspects was settled and strategic ideas promoting new industrialization, infrastructures, basic industry and foundation work, speeding up ‘two transformations’ (transform from overall well-off to all-round well-off and from a large agricultural province to a economically developed province), constructing a three-developed province (developed in economy, culture and education) and keeping the four base lines (protection of cultivated land, eco-environment, energy saving and emission reduction, improvement of people’s livelihood) were proposed. In the congress, it was proposed to make the new industrialization the first driving force for reinvigorating the province and its people to change the state of a large agricultural province, weak industrial province and depressed financial province and drive the whole province to develop sound and fast and in economy and society.

The years from 2010 to 2020, are an important period for building a prosperous society in all aspects. The 12th five-year period is the key five-year period for

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accomplishment of the strategy building a prosperous society in all aspects in 2020 and as the government and Party committee of Hunan Province instructed, it is essential to pave solid and firm foundation for accomplishment of the goal building a prosperous society in all aspects by centering on reinvigorating the people and the province, driving industrialization, urbanization and industrial management of agriculture with the new industrialization, continuing to consolidate basic industries, infrastructures and foundation work and further accelerating economic development in making planning outline for 12FYP for Hunan Province. Planning shall be reinforced for its function in directing economic and social development and building a prosperous society in all aspects. The index system to build a prosperous society in all aspects shall be set as an important basis and reference for the objective, task and focus of 12FYP’s economic and social development.

As a large agricultural province in the middle part of the PRC, Hunan Province is an important grain production base in our country, with simple industrial structure and relatively weak industrial base and with few funds, unable to accomplish the task that industry nurtures the agriculture. Here the urbanization rate is lower than the average level of the whole country, whereas the capability of industrialization to accommodate employment is low. As a result, it is hard to transfer surplus rural labors, there’s a very huge employment pressure.

There is a large population and large scale of surplus labor force in the rural areas of Hunan. The reason they have nowhere to go is that the industrial development is lagging behind, which causes low ability to absorb surplus labor force of rural areas and which to a large extent restricts the development of agriculture, especially plantation. Domestic and foreign practice fully proves that where there is developed manufacturing, there is permanent economic and social prosperity, and that the development of the service industry is based on the advancement of the manufacturing industry. From now on, the traditional approach of focusing on agriculture should be changed. Efforts should be exerted to vigorously develop industries, especially manufacturing. To reduce the number of farmers, change agricultural production mode, and increase the incomes of farmers through industrialization. While among the industries, only the in-depth development of manufacturing is more favorable to the joint development of agriculture and commerce, and organically combines industrialization with urbanization and marketization.

The previous industrialization doesn’t bring corresponding urbanization, the employment structure shows no change synchronized with the growth structure, the three strata of industrial structure are severely asymmetric with employment structure, economic aggregate and industry mainly concentrates in the city while labor forces are mainly distributed in counties and villages. In this circumstance, the primary task for medium and long term development of Hunan Province shall be to ensure full
employment under the premise creating numerous job opportunities. It is a common issue faced by traditional agricultural regions and undeveloped areas and will be solved by promoting industrialization. It is the only way to achieve employment and accomplishing modernization by implementing aggressively the industrialization. And it is also a long lasting difficult historic task. In this course, as the industry develops, especially the manufacturing industry develops and industrial output increases drastically, the employment ratio will be driven to increase in the entire economy, urban population will increase, service industry will expand continuously and the agriculture will be modernized gradually.

However, it is not allowed to continue the traditional extensive operation style of industrialization with large investment, high consumption, high pollution and low output in the current domestic and international environment; furthermore, as a national grain production base, Hunan Province is placed with more and stricter restrictions on water and cultivated land resource. In this case, we have to promote a new industrialization with high technology content, good economic benefits, low resource consumption, low pollution and in full play of human resources.

Reduction of energy and resource consumption and environmental pollution is the key symbol of modern industrialization for the purpose of highlighting protection of eco-construction and environment in the course of industrialization and deal well with the relationship between economic development and population, resource and environment.

Therefore, it is vital to center on low-carbon economy to develop advanced equipment manufacturing industry and high-tech industry aggressively and drive Hunan Province for great-leap-forward development with the new economy. On the one hand, continue to restrict high energy consumption and high pollution industry and eliminate backward productivity industry and reinforcing pollution control using advanced technology to rebuild traditional industry; meanwhile, in respect with cultivation of new industry, high-tech industries of new energy, new material and new medicine and producer service industry – logistics in the range of low-carbon economy and green economy shall be developed and nurtured vigorously. Regarding the growth volume, it is essential to increase the ratio of low carbon economy and green economy in the economic aggregate to form an economic structure dominated by low-carbon economy and green economy eventually.

In the present stage of economic development, there are many difficulties for achieving great-leap-forward development form high-carbon to low-carbon economy. Hunan Province was once an old industrial base in the PRC, as an inland province in relatively unfavorable location and with people in relatively backward mind, where the industrial and urban development shows insufficient capacity in driving employment. There are neither prime private enterprise groups nor concentrated sustainable foreign investment whereas the present industrial base is very weak and it
lacks of technology, system and mechanism advantages. To break the balance and the backward development for great-leap-forward development in such a relatively backward region, external forces shall be introduced and relied on. Consequently, an all-round opening pattern shall come into shape soon.

The new industrialization requires full play of human resources. With a large population, Hunan Province shall change the advantage of labor forces into the advantage of human capitals by in-depth development of human resources and strengthening training, especially vocational training to provide support for the new industrialization. To take the way to the new industrialization and improve self innovation capability, beside large quantities of scientists, engineers and economic management professionals, thousands of hundreds of highly professional talents and highly qualified labors are demanded of. At present, compared with developed countries and region of the PRC, there’s a huge gap regarding the production technology and management level of the manufacturing industry in Hunan Province, for which one important reason is that the employed personnel is in low quality and there’re few highly qualified professionals. Therefore, we shall start at the right beginning by taking various measures to speed up development of vocational education, improve labor quality and advance the transformation of the province with a large population to a province with most human resources\(^7\). We may apply for great financial support from the central government for the contribution to the national grain security as a main grain production area.

Hunan Province is a large agricultural province, with abundant agricultural products and resources, so it is essential to change the advantage of agricultural resources into the advantage of agricultural product processing and perform in-depth development of agricultural resources and industrialized operation, increase financial input, introduce advanced processing technologies and strengthening marketing and sales. Fiscal and taxation preferential policies and credit and loan support policies may be applied for in the name of contribution to the national grain security as a main grain production area; meanwhile, a good development environment shall be created to introduce technologies, capitals and professionals from advanced regions to invest in deep processing of agricultural products in Hunan Province.

In conclusion, new industrialization strategy of Hunan Province shall be made in pursuance with the provincial situation and also for enormous leap-forward development. Based on the situation and inherent requirements of industrialization of Hunan Province the basic ideas of New Industrialization Strategy of Hunan Province can be summarized in this way:

“Three promotions and one construction” strategy: “to promote self-innovation, to promote green low carbon economic development, to promote industrial clusters

\(^7\) See ADB TA 4868-PRC: Current Development of Vocational Education in Hunan Province and Countermeasures.
and agglomeration and to construct powerful and harmonious system and mechanism”. That is, Hunan should always focus on the main line of transformation of development pattern; focus on improving the self-innovation capability; promote adjustment and optimization of industrial structure, product structure, organizational structure and technological structure of enterprise; foster strategic emerging industries focusing on developing the low carbon industry and low carbon economy so as to develop a low carbon industrial system of Hunan’s characteristics; improve traditional industries and develop consumer goods industry aggressively orienting to improvement of local supply rate of industries and added value of products; further integrate and improve various industrial parks with achievement of intensive operation of land as the breakthrough; thus eventually develop and expand the influence of Chang-Zhu-Tan core growth pole; and in order to construct the system and mechanism for new industrialization by fostering market vigorously and improving market competitiveness.

It is embodied in the following six aspects:

(I) To promote self-innovation with greater emphasis on scientific and technological progress and improvement of the quality of laborers

With the marketization and globalization, the economic competition will be more serious. Technology will play an increasingly important role in the industrial production, so the economic competition will depend largely on the level of technical level of production. Technological innovation and human capital will become the most important endogenous variables and driving forces. New industrialization is mainly driven by scientific and technological progress and characterized by capital and knowledge intensive industries. It demands the economic growth to transform from mainly relying on increased material consumption to technological progress, improvement of the quality of labors, and management innovation. Human capital and technology should be the core of economic competition. Therefore, it is necessary to pay attention to the full use of HR; at the same time it is of great necessity to emphasize on the cultivation and development of HR, to increase investment in human capital for higher level of HR advantages, and to promote self-innovation and scientific and technological progress as the leading and supporting force for the new industrialization.

(II) To promote the development of green, circular and low-carbon economy and strengthen the capacity for sustainable development

Hunan should speed up the pace of comprehensive transformation of development pattern of Hunan energy conservation and environmental protection as well as the entire economic and social development pattern, according to the status of energy saving in Hunan and the world’s economic and social future direction. That
is,(i) to change the development concept of achieving a fast GDP growth and carrying out scientific development, view and advocate low carbon economy and circular economy; (ii) to foster the new economic growth point of low carbon emission, recycling characteristics; (iii) to construct an industry, a building and a transportation system of low carbon emission and recycling characteristics; (iv) to promote to form the resource-saving and environment-friendly production mode, life style and consumption mode, so as to achieve the general objective of realizing the first construction of low carbon economy, circular economy province in the PRC.

(III) To improve the local matching rate and increase the value-added of products, so as to establish the highly specialized industrial clusters

At present, the local matching rate of parts and components in the equipment manufacturing industry of Hunan Province is less than 40%, which not only seriously restricts the further development of the equipment manufacturing industry in the province, but also prevents the increase of employment opportunities and the improvement of the urbanization level. In accordance with the goals to make the leading enterprises stronger and improve the supporting ability of small and medium enterprises and by taking large backbone enterprise groups and name-brand products as the leading elements, it is required to take the market-based measures, such as to extend the industrial chain, increase the supporting ability and supporting radius of large/small and medium enterprises, and cultivate and establish the highly specialized industrial clusters. Hunan should take a full advantage of mineral resources by intensifying the policy support degree, developing in the direction of deep, complicated and advanced resource industries (or products), putting great efforts on the deep-processing of resource-based industries and lengthening the chain of industrial development to take the way of development by combining the upper and lower stream industries. The main objective is to increase the value-added of products and change the advantage of mineral resources into the advantage of mineral resources processing.

(IV) To coordinate development of light and heavy industries as well as labor-intensive and capital-intensive industries

In structural adjustment, we should first adjust and optimize the light and heavy industries, because for a province that just entered into the medium-term industrialization, the obvious heavy industrialization is contrary to the order of industrialization. Besides, compared with light industry, heavy industry is an industry with large investments, long cycles, and it is an industry that takes effect slowly and causes serious destruction of the environment. Again, in terms of employment opportunities provided by industry, heavy industry is generally a capital-intensive industry while light industry is a labor-intensive industry. Light industry has a high output ratio, takes a fast effect and makes large contributions to fiscal revenue. Meanwhile, it is easy for light industry to form the industrial chain, to strongly drive
agriculture and to provide a wide employment scope for the society. In the process of
the industrialization in Hunan, what lack most is fund and what needs to be solved
most is the employment problem. Therefore, Hunan must intensify the development
of light industry. Hunan should pay attention to the development of industries that can
promote agricultural development and its industrialization. For example, Hunan
should develop the featured food processing industry. Despite the further process of
the agricultural and sideline products, Hunan could form such a development mode
for the agricultural industrialization that the market promotes the process, the process
brings about crop and plant cultivation, and crop and plant cultivation gives an
impetus to agricultural economics to transfer the advantage of agricultural resources
into agro-product processing with a view to increasing the income of the farmers and
improving employment in the rural labor force.

(V) To promote the spatial concentration, to increase economic first degree
and to form the core growth pole

It is a contradiction between cluster development and balanced development
that Hunan should stress spatial concentration on regional development at the present
stage. Over 70% cities of Hunan are medium and small cities. Only Changsha, the
capital, is an extra-large city with over 1 million people. There is no super-large center
city with strong radiating effect in the province. In other words, Hunan, as an
underdeveloped inland province, lacks a core growth pole that can drive economic
development of the entire province. Chang-Zhu-Tan are significant zones of economic
and social development of Hunan. The advantages within the province are obvious,
and the economic development level and input and output benefits of the three cities
are leading in the province. However, because of the scattered distribution, the similar
industrial structure, insufficient integration of resources, the lack of composite force,
and limited driving and radiating influence over other cities and regions, the scale
effect and aggregation effect of Chang-Zhu-Tan cannot be brought into full play. The
economic strength of the Chang-Zhu-Tan City Cluster is still far behind second-class
city clusters of the PRC. Compared with first-class city clusters of the PRC such as
Yangtze River Delta, Pearl River Delta and Jing-Jin-Ji, the disparity is much more
substantial. To realize prosperity, Hunan has to further intensify the development of
Chang-Zhu-Tan and facilitate for the Chang-Zhu-Tan City Cluster to take the lead in
development in order to form a core growth pole. The formation of a core growth pole
in Chang-Zhu-Tan would not only substantially enhance the economic role and
comprehensive competitiveness of Hunan, but is also likely to play a greater radiating
and driving role in the development of Central or Southwest region of the PRC.

(VI) To construct powerful and harmonious institutional mechanisms

The long-term planning economy system and its concepts are beyond
imagination for most citizens of Hunan, whose market awareness is not sufficient for
the demand of market economy. Quite a number of enterprises are highly dependent
on the government other than market. The non-governmental economy is still weak and the ability of the government to mobilize economic resource remains strong. It is necessary to form a new system and mechanism through continuing to emancipate the ideas and deepen reform and opening. Therefore, Hunan should actively cultivate market, combine the government planning with the market mechanism, gradually develop enterprises as the mainstay of economy, develop industry and other industries according to the market demand and enable the market to exert the basic function of configuring resources in a wider range and to the greater extent.

III Overall Objective, Implementation Process and Strategic Focus

(I) Overall Objective

From now on, the provincial government should try to transform Hunan Province into a developed industrial province with dominant low-carbon economy and fully optimized industrial culture under preliminary accomplishment of industrialization, with the urbanization rate of 60% and low energy consumption and environment pollution in 15 years.

(II) Implementation process and strategic focus

It can be implemented in three stages:

Stage 1 (2010-2015): medium stage of industrialization. In this state, the strategic focus shall be placed on improvement of labor quality, aggressive cultivation of human capitals and adjustment of industrial structure to build a prosperous society in all aspects. In line with the orientation of industrial structure adjustment, more efforts will be made to strengthen vocational training. In this stage, elimination of backward productivity will be consolidated. In the course of reforming traditional industry with high-tech and development of emerging industry, e.g. new energy, new material and new medicine, as well as development of low-carbon economy, a number of high quality labors are needed. To improve labor quality is demanded by upgrading of the industrial structure and also by expansion of employment. As human capitals are enhanced, the consumption capacity is improved too and thus the driving function of consumption to economy is improved and so is the overall economic strength.

Stage 2 (2015-2020): transition of medium-stage to later-stage of industrialization and also the stage of structural optimization. As with the adjustment of industrial structure and full improvement of labor quality in the first stage, the industrial structure is optimized remarkably and the characteristic of low-carbon economy is shown initially. In this state, focus is on cultivation of emerging strategic industry to make it become the dominant industry.

Stage 3 (2020-2030): preliminary accomplishment stage. The industrial structure is completely optimized and low carbon content economy is achieved.
Chapter VII  Industry Revitalization and Development

I  Selection Principles of the Dominant Industries in Hunan Province

The development and revitalization of the dominant industry is an important force of economic growth in a region or country. The dominant industry refers to the industry that is linked with a certain stage in the future development of the economy with an expected high innovation rate in which it is able to introduce technological innovation rapidly. Furthermore, it has a significant key direction and driving effect on the upgrading and transformation of technological advancement and upgrading of industrial structure, with good growth potential and excellent driving force and expansion capacity. In industrial construction and economic development, the dominant industry has higher economic growth rate and labor productivity due to its own special position and proper features. The dominant industry shares strong direct or indirect links with other industrial divisions in economy and technology and its development always drives the formation and development of scores of industries.

(I) Principle of Comparative Advantage. In market economy, the development of an industry or the production option of a product depends on whether such industry or product is competitive in the market. In turn, market competitiveness depends on whether the elements of productivity have comparative advantages, including resources advantage, capital advantage, technical advantage, management advantage, advantage of professionals and workforce advantage, and any combination of the foregoing. Under the same conditions, the industry or product with certain comparative advantages will be competitive in the market or industry, and will be developing and growing in fierce market competition. Hunan Province boasts its own advantageous resources and has established advantageous industries. For example, Hunan Province is obviously advantageous in agricultural and mineral resources and rich in workforce. All these are rare favorable conditions for the development of industry, and industrialization will convert such resources advantage into economic advantage, which is the best shortcut to further wealth collection in Hunan Province. Meanwhile, Hunan has formed advantages in equipment manufacturing, and has certain advantages in new energy industries such as wind power and biological power generation. Hunan should rely on the existing advantageous industries and resources to nurture or revive dominant industries and rapidly upgrade the industrialization level of the entire province to a new level, and lay solid material foundation for its

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prosperity.

(II) Principle of Industrial Linkage. Industrial linkage is represented by vertical up/downstream industrial chains and horizontally related industrial clusters. The development of an industry in strong industrial linkage, or the development of an industry with a long industrial chain will drive the development of its up/downstream industries, drive the development of related industries, and thus produce the effect of industrial agglomeration or industrial cluster. The formation of industrial agglomeration not only enhances the industrial competitiveness of the industry greatly, but also increases the competitiveness of the industry’s location. Industrial agglomeration is a common phenomenon in the process of industrialization. This is proven by the industrialization of Zhejiang, Guangdong and other regions in the PRC. Therefore, the industry with industrial linkage will have advanced industrial competitiveness. Many resource-based industries in Hunan Province are linked with industries, although the industrial chains under development are short, and it is necessary to prolong the industrial chains and develop related industries, in order to produce the effect of industrial agglomeration, and enhance the advantages of Hunan Province in industrial competition.

(III) Principle of Leapfrog Development. Leapfrog development refers to a mode of development in which undeveloped countries or regions make use of the technologies or experience of developed countries to develop as a latecomer, leap over some stages of development and catch up with or surpass the development level of developed countries. With the fast progress of science & technology and economic globalization, this is completely practicable nowadays, serving as a development approach for undeveloped countries to realize the surpassing strategy. Hunan Province is less industrialized than national average level, so it is required to implement the leapfrog development strategy to accelerate its industrialization process to catch up with and even surpass the national average level. To enter the road of leapfrog development, it is necessary to closely follow the development trend of world technical & industrial development, to grasp the opportunity that Chinese government is positively culturing strategic emerging industries, to encourage the development of new energy, energy-saving and environmental protection, electric vehicle, new material, new medicine, bio-breeding and IT industries and to seek for key breakthroughs in some fields, some industries, or even some products.

(IV) Principle of Sustainable Development. Hunan is in a dilemma in promoting the industrialization process: on the one hand, smaller economic volume, lower level of industrialization, lower income per capita, lagged urbanization, populated countryside, and redundant rural labor have exerted huge pressure on economic development; on the other hand, structured pollution heavily burdens on urban environment imposed by energy / raw material industry featured by resource development and ecological weakness. Besides, conflicts between population,
resource and environment are intensified. Therefore, in choosing the leading industries that drive the industrialization, we have to consider the principle of sustainable development, must abandon the past plundering and destructive paths of industrialization, and instead, we shall follow the new path of development based on sustainable development. In other words, we shall transform the economic growth pattern, and implement resource utilization, ecological construction and environmental protection. We shall insist on the guideline of ‘development in protection, protection in development’ in choosing the leading industry development, carry out the principle of reasonable utilization, saving and protection of resources and high economic, social and environmental benefits of resource utilization, and do our best to choose those downstream processing industries and hi-tech industries, with energy-saving methodologies and less consumption, less environmental pollution and higher technical content.

II Choice of Dominant Industries and Development

We believe that the main choices of leading industries that promote the new industrialization of Hunan are “four main industrial clusters and six main industry chains”, according to the principle for the choice of leading industries in Hunan Province, through comparing and analyzing various aspects of industries in Hunan including market growth, economic efficiency, specialization, competition, resources in industry-intensive areas and comparative advantage, linkage, pollution and other factors.

The four main industrial clusters should: (a) mainly develop the advanced equipment manufacturing industry with comparative advantage and the strategic emerging industrial clusters, in order to transform Hunan into a main production base with advanced manufacturing industry and high-tech industry; (b) powerfully support the light industrial cluster that enjoys resources superiority and beneficial characteristics including green industry, wide linkage, extensive involvement, more employees and taking agricultural products as raw materials to change Hunan into a featured agricultural product processing base; (c) actively develop quality steels and nonferrous metal materials and related deep-processing industrial cluster, in order to change Hunan into a leading raw materials and deep processing industry production base in the PRC; (d) mainly develop a modern logistics industrial cluster that provides manufacturing industries with supporting services, in order to change Hunan into a regional logistics center as a connecting link between East and West region of the PRC.

The six main industry chains are as follows:
(I) Advanced manufacturing with emphasis on the modern equipment manufacturing industry

The equipment manufacturing industry is an important pillar of the national economy, with advanced science and technology to transform traditional industries, which is an important link and carrier, basis of the high-tech industry and information industrial development, important guarantee for the nation's economic security and military security as well as an important means to absorb labor employment. The equipment manufacturing industry is the most powerful industry in Hunan Province. It has been one of mainstay industries of Hunan Province. The total industrial output value, main business income, added value and gross profit of equipment manufacturing respectively account for 16.12%, 16.44%, 15.76% and 25.48% of the total of the industry in the province. In 2008, industrial value-added of CNY57.6 billion, accounted for 5.2% of the total of the industry in the province, and a profit of CNY17.4 billion, becoming the first industry with production and sales over CNY100 billion and profits and taxes of more than 10 billion in Hunan Province. The equipment manufacturing industry of Hunan Province has developed three major advantaged industrial clusters. The first is focused on the Changsha engineering mechanical manufacturing industry as represented by construction mechanical and pavement construction mechanical products. The second is mainly distributed in the rail traffic equipment manufacturing industry of Zhuzhou as represented by trunk line electric locomotive vehicles, urban rail vehicles (subway). The third cluster is mainly distributed in the electric equipment manufacturing industries of Xiangtan and Hengyang as represented by 1000KV ultra-high-voltage power transmission/ transformation equipment.

Development ideas:
1. Developing high-end equipment and semi-finished products and improving the local matching rate

The term “high-end equipment” means the high-tech key equipment to which the government should increase input and give more support. In Hunan Province, the sectors including track traffic equipment and electric equipment are technically advanced, and more efforts will be made to develop high-end products in construction machinery, automobile and components thereof in the future, so as to form the industrial structure which takes technology/knowledge-intensified high-end equipment manufacturing industry as core. In particular, breakthrough should be made in the high-tech key equipment which will not be transferred by foreign countries to the PRC, so as to cultivate the major technical equipment with independent intellectual property rights.

At the same time, the situation of technically advancement of only one single product should be avoided. It is required to center on the improvement of local
matching rate to develop the relevant semi-finished product industry. The semi-finished product industry is mainly composed of labor-intensive small and medium enterprises, and is the core of basic equipment and the foundation for the whole equipment manufacturing industry. At present, the local matching rate of parts and components in the equipment manufacturing industry of Hunan Province is less than 40%, which not only seriously restricts the further development of the equipment manufacturing industry in the province, but also prevents the increase of employment opportunities and the improvement of urbanization level. Therefore, Hunan Province should, by means of introduction, joint venture and reconstruction, optimize the organizational structure of enterprises, enlarge the industrial scale of those semi-finished products which enjoy good market demands, improve the level of technologies, and develop a batch of small and medium component manufacturing enterprises and specialized manufacturing bases, so as to supply high-quality parts and components for complete equipment and main machines in this province, other provinces and even foreign countries and form a new growth point.

In this way, great efforts should be made to develop the industry of high-end equipment and semi-finished products, and obtain the pushing effect, so as to realize the rapid development of large/medium-sized capital-intensified equipment.

2. Accepting transfer, cooperating with enterprises owned by the central government, and enlarging industrial scale

Seize the opportunity arising from the structural adjustment and transfer of equipment manufacturing industry in the world and in eastern coastal areas of the PRC, actively accept the transfer. Make efforts to strengthen the cooperation with multinational companies and enterprises owned by Central Government which have strengths in technology and capital, to accelerate merger and reorganization of enterprises, to improve the production technologies, processes and management which stay at lower level, and to cultivate more advantageous enterprises and products; accelerate the introduction of R&D institutions at home and abroad which have rich strength, continuously consolidate and perfect the technical innovation system, and develop series of new products. Therefore, accelerate the expansion of the existing output and the increase of value-added, so as to increasingly enlarge the scale of equipment manufacturing industry in Hunan Province.

3. Optimizing industrial organizations and developing enterprise groups and creating world-famous brands

In accordance with the principle of specialized labor division and scale economy

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9 The semi-finished product industry means the manufacturing industry for parts, components, elements and intermediate materials which is between raw material manufacturing industry and final product manufacturing industry, wherein the key and highly-functional parts, components, elements and intermediate materials enjoy huge profit room.
and rule of market economy, accelerate the adjustment in organizational structure of enterprises. By taking assets as the connecting element and by means of equity participation, shareholding, acquisition, reorganization, joint venture and specialized cooperation, drive various resource elements to concentrate on competitive enterprises. Furthermore, promote the reasonable allocation of the resources and the optimization and reorganization of the system to develop a batch of major technical equipment manufacturing enterprise groups which have outstanding main business, have certain scale in the industry and enjoy core competitiveness into “aircraft carrier” enterprises. Hunan should create an opening and advanced organization mode with high efficiency, information sharing and flexible structure, so as to facilitate the transition of industrial structure from the mode of small and medium enterprise intensive competition to large enterprise-dominated mode of network oligopoly, and form a lot of backbone enterprises which participate in the competition at home and abroad in the equipment manufacturing industry of the province.

Meanwhile, it is necessary to cultivate a batch of “small giant” enterprises which have unique advantages, realize the change of industrial structure from “olive type” to “dumbbell type”, in order to constitute the new industrial organization structure system for the equipment manufacturing industry of Hunan Province. On this basis, depend on “carrier type” and “small giant” enterprises. According to the organization principle of a virtual enterprise and the principle of functional compensation, core competitiveness of each is brought into full play, and the industrial dynamic coalition is formed to realize higher, wider and more effective cooperation. Finally, it is required to take the cultivation of name brands as the core and strengthen the adjustment of product structure. On the one hand, it is required to accelerate the development of a batch of name-brand products with independent intellectual

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10 A virtual enterprise consists of two or more resource-compensatory advantageous enterprises which make use of the information integration technology and bring their own core capabilities into full play so as to form dynamic and temporary network type economic organization (known as the virtual enterprise) on a basis of cooperation. According to virtual enterprise theorists, firstly, a virtual enterprise does not need to reinvest in HR, production field or production equipment or set up any organizations in real sense, and it is simply a project-oriented virtual enterprise union; secondly, a virtual enterprise emphasizes very much the technical coalition, and the members, based on core capabilities, preconditioned by technical cooperation and communicating through know-how information, undertake equally the technical risks, with a final aim on sharing the high-tech industrialization interest; and finally, a virtual enterprise adopts the parallel work mode of the partners and can greatly shorten the input-output period by performing interaction between research-based production and market development. Meanwhile, members of the virtual enterprise are in the short-term cooperation relationship. Once their aim is achieved, the organization is dismissed. Therefore, compared with other modes of corporation coalition, a virtual enterprise is more flexible and can quickly capture an instant market opportunity and adjust the constitution of the members in the network according to the latest change of the market demand. For this reason, the virtual enterprise is a dynamic, self-adaptive and random coalition.
property rights, high technical contents, high added value and high market share. On the other hand, it is required to emancipate the minds and introduce a batch of famous brands at home and abroad, so as to realize the development based on name brands.

4. Developing the industrial chain vertically and industrial clusters horizontally and improving self-innovation ability

Depending on high-tech industrial development zones, economic & technological development zones and various industrial parks, take advantageous industries as the key points promote the disintegration thereof and set up several specialized parks or sub-bases. New projects of investment promotion and capital attraction as well as the new construction/reconstruction engineering must be in line with the re-integration and layout of the existing equipment manufacturing industry throughout this province. In addition, it is required to, in accordance with the goals, strengthen the leading enterprises and improve the supporting ability of small and medium enterprises and by taking large backbone enterprise groups and name-brand products as the leading elements, take the market-based measures, so as to extend the industrial chain, increase the supporting ability and supporting radius of large/small and medium enterprises, and cultivate and establish the highly specialized industrial clusters. In addition, it is required to cultivate a lot of social intermediary service institutions (industry, including industrial associations, financing institutions and consultation service institutions) for the equipment manufacturing, increase the industrial concentrating effect and self-innovation ability, and forge several industrial clusters which have unique features.

Development focuses:

The first focus is to accelerate the development of three advantageous equipments. (a) Construction machinery equipment needs to conduct backbone enterprises including Zoomlion, Sany Heavy Industry, Hunan Sunward Intelligent Machinery, Jianglu Machinery, XENC reshipment, and the like to divide into markets and develop with diversification, and needs to emphasized on further development and production of products of new-type earthmoving machinery, water construction machinery, logistics complete equipment, large-sized hoisting machinery, large-sized pavement construction machinery, large-sized strip mine fully-mechanized equipment, energy-saving and environment-friendly construction machinery, military construction machinery, and the like, to become bigger and stronger. (b) The track traffic equipment conducts accelerating technical innovation as well as restructuring and reorganization of Zhuzhou Electric Locomotive Co., Ltd., Zhuzhou Time Group, CSR Times Elec, Xiangtan Electric Group and Zhuzhou Vehicle Factory, and has an emphasis on developing products including large-power AC transmission goods traffic, passenger electric locomotives, motor train units, heavy-duty high-speed locomotives, AC transmission urban track traffic equipment, large-sized maintenance machinery, urban track traffic automobiles, train networked control systems, braking
systems, signal systems, and the like. (c) Power transmission/transformation complete equipment takes Henyang Tebian Electrical Apparatus as a leader, vigorously cultivates enterprises including Henyang South Transformer, Changgao Group, Hunan Switch, Xiangneng Electrical Industry, Lujing Electrical Porcelain And Electrical Appliance, Hunan Guangxin, and the like, strengthens industrial chain extension and industrial technical alliance. Furthermore, it has an emphasis on developing extra-high voltage current of 500KV or below, voltage transformators, breaker, combined electrical apparatuses, and AC/DC power transmission/transformation equipment of 1000KV or below, comprises products including AC transformers, DC convertor transformers, reactors, isolating switches, current transformers, fully-closed combined electrical apparatuses, and the like, and builds a complete system of Hunan power transmission/transformation equipment.

Secondly six newly-emerging equipments need to be vigorously cultivated. (a) New energy equipment needs to support Xiangtan Electric Group and Times Group to lead to establish wind power generation industry alliance; depending on the National Power Investment Corporation, solar photovoltaic cell manufacturing equipment is developed, and products including MW class wind power equipment, nuclear power pump valve equipment, solar photovoltaic cell manufacturing equipment, biological resource utilizing equipment, and the like are emphasized to develop. (b) Xiangtan Electric Group takes energy-saving and environment-friendly equipment as a core, vigorously supports small and medium enterprises including Yonker Group, Kaitian Environmental TECH, Wellington, Changsha Boiler, Changsha Motor, Keli Motor, and the like, and emphasizes on developing products including power station gas desulfurization, denitration and dust removing complete equipment, heat and power cogenerating equipment, refuse treatment complete equipment, energy-saving variable-frequency motors, new media energy-saving boilers, water treatment equipment, new energy urban environment-friendly equipment, environment monitoring instruments, and the like. (c) Aerospace equipment establishes production bases of medium/small-sized aero engines and undercarriages depending on undercarriages of South Airlines and Air China, promotes the industrialization of light-duty airplanes depending on Hunan Sunward Intelligent Machinery, and emphasizes on developing products including general aviation equipment, medium/small-sized aero engines, aero reduction and transmission systems, undercarriage systems, near space vehicles, satellite application products, satellite ground equipment, and the like. (d) Ship equipment needs to conduct Sino Shipping, Damen Shipyards, Sunbird Yachts and Changsha Shipyards to forge ship products with band characteristics, and emphasizes on developing products including engineering ships, special work ships, inland-river and coastal transport ships, new-type composite ships, and the like. (e) Numerical control equipment takes enterprises including Yuhuan Tongxin TECH, Huda Haijie, ZDCY, Hunan Hefeng,
and the like as the core, and emphasizes on developing products including high-grade numerically-controlled gear grinders, numerically-controlled gear milling machine tools, numerically-controlled twin surface grinders, high-speed and high-precision numerically-controlled crankshafts, horizontal processing centers, camshaft grinding machines, numerically-controlled slotting machines, functional parts of high-grade numerically-controlled machine tools, and the like. (f) Electronic information equipment emphasizes on developing products including integrated circuit key equipment, new-type element production equipment, electronic special equipment, tool and mould, and the like.

Thirdly, proactively develop re-manufacturing equipment industry. Establish research and development funds to support research in and development of key technologies for re-manufacturing and speed up the breakthrough in advanced self-repair and re-manufacturing key technologies which are based on information technology, micro-nanotechnology, biotechnology, etc. and which have independent intellectual properties. Also use these funds to invest in advanced material manufacturing technologies with self adaptability and self repair capability and in advanced intelligent self-repair detection and control technologies. Attach great importance to the reconstruction, upgrading and transformation of old-dated products such as waste and old construction machines, waste and old rail transportation equipment, waste and old vehicles, waste and old ships, waste and old machine tools and waste and old agricultural machines, for the sake of informatization.

See Subreport1 Strategic for Equipment Manufacturing Industrial Development of Hunan Province for details.

(II) The strategic emerging industries with focus on new energy, energy saving and environmental protection (EP), new materials, new medicines, bio-breeding and information industry

Development of the strategic emerging industries represents the major strategic choice for the realization of leapfrog development in the PRC, and concepts like new energy, energy saving and environmental protection, electric vehicles, new materials, new medicines, bio-breeding and information industries not only enjoy broad market demand prospects and sound economic and social benefits including favorable environment, low consumption of resources, more opportunities for employment, well comprehensive benefits, but also drive the emergence of numerous industries. These industries represent the leading industries which are undergoing globally technological revolution. As Strategic Planning for the Revitalization of Emerging Industries is being developed by the Chinese government, Hunan shall actively strive for policy supporting from the central government and seize development opportunities. We proposed to mainly develop the following five industries on the
back of existing technology advantage, R & D advantage, industrial development base in Hunan, and try to take the leading role in the field of core technologies for industrial development in the PRC or even in the world.

1. New energy and energy-saving and environmental protection industries

New energy is classified into the following three major categories by the United Nations Development Program (UNDP): large/medium-scale hydropower, new renewable energy sources including small-scale hydropower, solar energy, wind energy, modernized biomass energy, geothermal energy and ocean energy (tidal energy), and penetrative biomass energy. Generally, new energy causes less pollution, and consumes less limited resources than traditional energy, which is crucial for the solution to pollution and the exhausted resources (particularly fossil energy) in the world. Main characteristics of new energy are cleaness and renewability.

The environmental protection industry refers to all the activities that are conducted for the purpose of environmental pollution prevention, biological environment improvement, natural resources protection, such as technologic product development, commercial circulation, resource utilization, information services and project contracting, in the structure of national economy. It is a comprehensively emerging industry which connects different industries, different fields and different areas, and mutually intercrosses and penetrates other economic departments. The environmental protection industry under the board definition also comprises clean technologies and energy-saving technologies in production, recycling, safe treatment and reuse of products.

In the process of industrialization, Hunan's economy is still driven by high-carbon energy and accordingly large consumption of fossil energy into more and more serious energy and environmental problems. In Hunan Province, new energy industry and energy saving and environmental protection industry will be developed to an important industry in the new industrialization strategy. Renewable energy is relatively rich; hydropower, nuclear energy, wind energy, solar energy, and biomass take up a larger proportion. In Hunan, hydropower has large reserves, but strong seasonality. The province's total water reserves are 15.3245 million kilowatts, accounting for 2.27% of the national total water reserves, of which 10.8384 million kilowatts can be developed and used, accounting for 70.7% of the province's water reserves and 2.88% of the national total development and utilization quantity. Each year, the runoff from April to July usually accounts for 50-70% of the annual runoff, while the other eight months are dry seasons and water energy contribution is limited. In Hunan, nuclear energy and mineral resources are rich, 26,000 tons of uranium has been proven in the province, the grade is high and the reserves are among the largest in the PRC with a certain degree of mining and refining capacity. In Hunan, the total reserves of solar energy are about 1.25 trillion kilowatts, accounting for 1.7% of the country's total reserves. In Hunan, the total reserves of 10-meter-high wind energy
resources are 32.2203 million kilowatts; and wind energy resources are rich mainly in the area around Dongting Lake, Xuefeng Mountain, southern Hunan and western Hunan Mountain. New energy and renewable energy sources like the manufacturing industry cluster of wind-powered electricity equipment, the photovoltaic industry cluster represented by polysilicon material and solar battery have been rooted.

**Development ideas:** To speed up the pace of comprehensive transition of the development mode of Hunan, energy conservation and environmental protection as well as the entire economic and social development pattern: changing the development concept of achieving a fast GDP growth and carrying out scientific development view, advocating low carbon economy, circular economy, fostering a new economic growth point of low carbon emission, recycling characteristics, constructing industry, building a transportation system of low carbon emission with recycling characteristics, promoting to form the resource-saving and environment-friendly production mode, life style and consumption mode, we strive to achieve the general objective of realizing the first construction of a low carbon, circular economy province in the PRC by 2020.

Two basic points:

(1) **Development of green energy and encouraging low carbon economy.** Within the framework of sustainable development, low carbon development should be regarded as an important aspect of building a resource-saving, environment-friendly society and innovating Hunan, “Low carbonization” should be seen as one of strategic objectives of economic and social development. New energies like low carbon or carbon-free energies should be developed and the development of clean energies like solar, wind, biomass and nuclear energies should be accelerated to fulfill highly efficient and clean utilization of energy. It should also be advocated to promote low carbon economy, reduce carbon sources, increase carbon sinks, strengthen the efforts to achieve technical innovations in carbon neutral, carbon sequestration and carbon capture, and advance the idea of Green Consumption. Based on the market mechanism, through designing and innovating a system frame and policies, a clear, stable and long-term guide and a stimulating system should be built to push forward the development and utilization of energy-efficiency and energy-saving technologies, renewable energy technologies, and GHG emission reduction technologies. Thus, the whole social economy could be successfully transformed into a highly efficient one with low carbon consumption and emission.

(2) **Advocating clean production and developing circular economy.** Energy development and conservation should be conducted at the same time, energy conservation and emission reduction being placed on the top, and improve the efficiency of resource. Stay on the path of new industrialization and upgrade the industry level by combining the development of circular economy and adjusting or optimizing industrial structure. Keep balancing the development of urban and rural
areas, improving living and production conditions in rural areas and preventing agricultural area pollution. Keep on clean production, combining the development of circular economy with pollution prevention and realizing a sustainable economic and social development in the whole province.

Development focuses:

(1) **Optimization of industrial structure**

Optimize the industrial structure and the inner structure of the industrial sector, accelerate the development of tertiary industry, develop high-tech industry with high value-added as well as low energy consuming industry inside the industrial sector; reduce substantially the energy consumption and emission intensity. Develop low carbon industry to foster the new economic growth point. Raise the market entry standard, eliminate the disqualified energy production capacity, and reduce the carbon emission per unit of GDP, to realize low carbon development.

**Control of increment.** Strictly restraining the construction of new high energy consumption and high pollution projects, and limiting the growing of high energy consumption and high pollution industry. Stick to the two ‘strobes’ of land and credit, and the entry standard related to energy conservation and environmental protection. Introduce entry conditions for 13 industries such as steel, ferroalloy, coking etc., which are controlled by the government. Establish energy conservation evaluation, a check mechanism, as well as an estimation mechanism of environmental influence for newly started projects.

**Reconstruction of stock.** Accelerating the elimination of disqualified production capacity. Carry out plans of eliminating disqualified production capacity in industries such as electricity, steel, cement, coal, paper making etc., establish a mechanism of eliminating disqualified energy production capacity, improve and carry out corresponding policy measures on closing enterprises. Enterprises listed as disqualified energy production capacity which do not close voluntarily, should be closed by principal department of local government. The possibility of being closed but not rejected must be prevented, in case of the enterprises rising again. Improve local administrative rules and policy systems, establishing an efficient encouragement and restraint mechanism on rejecting the work complete mechanism, as well as an efficient management mechanism. Give stimulating rewards the rejection of energy production and punishment, otherwise. Increase the financial support to rejected energy production in less developed areas.

**Optimization of industrial structure.** Accelerate the development and construction of national and provincial new- and high technology industrial zones and centers; fasten the development of promising low energy consumption industrial groups such as service, electronic information, new material, biologic medicine and green new energy etc.; establish a set of new high-tech backbone enterprises, focusing
on developing modern equipment manufacture; promote the upgrade of industrial structure invested by foreign businessmen, focusing on absorbing the investment in optimization and upgrade of global top 500 companies; lift entry conditions for processing trade and optimize industrial links.

**Carrying out pilot work.** We will first experiment with high energy consuming and high pollutant industries such as power, transportation, building, metallurgical, chemical, petrochemical industries for exploring the major fields and exploiting a development for low carbon economy. Build actively “low carbon economy development zone”, “low carbon industrial park”, “circular economy park”, motivate the pilots in Changsha, Zhuzhou, Xiangtan and other cities, to stimulate the rapid development of low carbon economy of surrounding areas and the whole province.

(2) Optimization of energy structure and encouragement of development of new energy industry

Seen from the development trend of science and technology, the years from 2020 to 2050 will be a crucial period for transition from traditional fossil energy to new energy, therefore, Hunan shall define a transition period in its energy development strategy, increase science and technology input, speed up the structure adjustment, increase the proportion of new energy like nuclear energy, wind energy, solar energy etc., establish strategic measure to develop beyond relying on thermal power and petroleum. Accelerate the development of new energy industries, and take greater advantage of the industrial superiority and R&D capability of equipment manufacturing industries in Hunan; promote the development of components through the complete machine breakthrough of high-power wind generator; enhance the supporting capability in local areas to form local supporting systems; take mass production of solar polysilicon materials as a fulcrum to leverage the development of crystalline silicon solar cells and thin-film solar cells and the development of solar cell components and applications; take advantage of the opportunity of the constructed nuclear power plant in Yiyang city to accelerate the development of nuclear power supporting equipment.

(3) Development of circular economy

In accordance with the principle of “reduction, re-use, and resource-based”, build the recycling economic system covering three levels which are enterprises, parks, and society, and actively promote comprehensive utilization of the mineral resources and solid waste, recycling utilization of renewable resources and water resources, as well as resource-based utilization of trash.

(a) Deepening pilot and demonstration work of circular economy. Focus on the organization of the implementation of circular economy planning in three national circular economy pilot units covering the renewable resource market in Miluo, Zhu Ye, and Dacheng Chemical; define 20 enterprises, 5 industrial parks, and 2 cities (counties) in the key industries, key areas, key industrial parks, and central cities as the pilot
units for circular economy; grant policy support to those national and provincial circular economy demonstration pilot units; clarify one circular economy pilot county, city, and district in each city and sub-prefecture to make the pilots stimulate the development of circular economy, probe into the effective mode of circular economy.

(b) Fully implement clean production in the key industries. Fully implement clean production in the chemical industry, metallurgy, brewing, paper making, electroplating and other industries; implement mandatory audit of clean production for those enterprises which exceed the pollutant emission standard and those with still high total pollutant emission despite of reaching the standard, and publicize to the society. Provide favorable policies of priority application, clean production special funds and special funds for environmental protection, for those enterprises passing the audit of clean production, support a group of enterprises with better basic conditions to implement clean production in a continuous manner, and build up a group of “zero emissions” enterprises.

(c) Reduce pollution at the source. Ecological design and transformation should be conducted in industry and industrial parks to realize waste recycling, adopt improved design; use clean energy and raw materials; use advanced technology and equipment, improved management, comprehensive utilization and other measures; reduce pollution at the source, and improve the efficiency of resource. Meanwhile, improve the renewable resources recycling system to promote waste recycling.

As for details, see Subreport 3 *Strategy of Energy Conservation and Environmental Protection in Hunan Province.*

2. New material industry

New materials are those which are newly developed, or under R&D of superior performance, showing better performance than traditional materials. New materials are divided into four groups—metal materials, inorganic non-metallic materials (pottery and porcelain, gallium arsenide semiconductor, etc.), organic polymer materials and advanced composite materials. The output of many Chinese primary raw materials and industrial products is the top of the world, while the high-performance materials, core components and major equipments are heavily dependent on imports, and key technologies are controlled by others. During “the 11th Five-year Plan”, the new material industry in Hunan was in a strong growth period, enjoying obvious industrial advantage in the PRC and elementary formation of five featured new material industrial clusters including advanced energy storage materials, advanced composite materials, advanced hard materials, new metal materials and new energy-saving building materials, ranking the first place among high and new technology industries, with output value of CNY98.2 billion, accounting for 36.4% gross output value of high and new technology industry in
Hunan Province.

**Development ideas:** grasp the development trend of the world’s technology industry revolution, strengthen technological R&D capability, develop new varieties of independent intellectual rights and broad market prospects, actively cultivate a set of large leading enterprises of market competitiveness and strong impetus, improve the local supporting ability and continue to extend the industrial chain.

**Development focuses:** concentrate on development of high-power batteries, super capacitors and other energy storage materials for electrical tools and electrical cars; powder metallurgy airplane braking assemblage, C/C aviation braking disc assemblage and other advanced composite materials; carbide high-end products and tools, new diamond synthesis tools and other hard materials; novel aluminum materials, rare-earth permanent magnetic materials, and other new metal materials; and green energy-saving building materials.

3. **New medicine industry with concentration on modern traditional Chinese medicines**

With the ageing population, and especially the improvement of people’s living standards and enhancement of people’s health awareness, the national pharmaceutical market will rapidly develop and extend; the potential market for medicine in the rural population of 780 million will transform into a real market, which will definitely provide a vast market space for the development of the national pharmaceutical industry. Traditional Chinese medicine, an important component of the drug industry, is also one of the important and special weapons for prevention and treatment of disease and rehabilitation and health care, which is loved and broadly used by a vast proportion of the Chinese people and has been known and accepted by most countries and nationalities in the world, and is becoming more and more popular.

**Development ideas:** with concentration on traditional Chinese medicines (including ethnic medicines), vigorously develop the featured medicines economy of genuine materials and Chinese patent medicines (including ethnic medicines) in Hunan, take the road of modernization of traditional Chinese medicines, in order to nurture Hunan into a modern production base of traditional Chinese medicine in the PRC and cultivate the pharmaceutical industry into a new pillar industry in Hunan Province. Support a set of enterprises to develop new products and expand their production scales, in order to turn them into nationally preponderant enterprises among their type of industry, and promote medicine enterprises in Hunan to become large-scale and group-oriented enterprises. Optimize the organizational structure of enterprises, speed up technological improvement, improve the technological content of products, adjust product structure, establish a modern medicines sale network and
focus on the cultivation of key enterprises of genuine traditional Chinese medicinal materials and Chinese patent medicines of famous brands.

**Development focuses:** support Hunan Jiuzhitang Co., Ltd. and other key pharmaceutical enterprises with their technological reconstructions or constructions of new production lines and other projects, allowing them to improve their technological level and technological content of products through new processes, new formulations, new equipment and new materials, etc., in order to increase the added value of products. Promote the upgrading of industry and product structure, strengthen the development of new medicines and gradually increase their market competitiveness at home and abroad. Centering on the standardized planting and development of high-quality traditional Chinese medicinal materials and processing of Chinese patent medicines, focus on a set of traditional Chinese medicine formulations, famous and high-quality traditional Chinese medicinal materials and national medicines with promising prospects on markets at home and abroad, produce high-quality tablets and raw materials of traditional Chinese medicines, and expand the production capability of raw materials medicines of high added value.

**4. Bio-breeding industry**

The bio-breeding industry is the industrialization and the cultivation of excellent creatures and biological technologies. The bio-breeding industry in Hunan Province is in a leading position in the PRC.

**Development ideas:** on the basis of the current infrastructure and R&D advantages, speed up the progress of industrialization and scale expansion, strive for the breakthrough of key technology and research and production of important products, foster a set of large leading enterprises and famous brands, expand industrial scale, strengthen existing brands, and foster and form a cluster of preponderant brands.

**Development focuses:** mainly rely on several important enterprises including Longping High-tech, Jinjian Seed, Xiangyan Seed, Jinhao Camellia Oil, Gintoten Camellia, Dongting Aquiculture and other leading enterprises and focus on rice, rape, cotton and other high-yield, high-quality and multi-resistant hybrid products, livestock and poultry of outstanding advantages and featured aquatic hybrid products.

**5. Information Industry**

Global Internet is upgrading into the next generation, and Sensing Network and the Internet of Things are in the ascendant. Sensing Networks will be broadly used in infrastructure and services, and we will strive for the breakthrough of the key technologies for Sensing Networks and the Internet of Things, in order to make information network industry become the engine for promoting industrial upgrading and entering information society.

In 2007, the information industry in Hunan accomplished main business revenue of CNY32.7 billion, increasing by 30%. There are 2 enterprises with a sales income of
more than CNY1 billion and rank No.16 for sales income in the PRC in which the income of software business ranks no.12. At present, industrial clusters of information service industry represented by “Lazy Cat”, “Rainbow and Blue Cat” and other cartoon games and the manufacturing clusters of information product represented by CRT display, satellite television receivers, video product and communication equipment have been formed. It is essential to enhance independent innovation, actively integrate resources, foster industrial clusters and drive the development of supporting industries.

**Development ideas:** increase efforts to invite investors and innovation, actively integrate resources, and cultivate industrial clusters, in order to drive the development of supporting industries; breed industrial clusters and form the industrial system of obvious features and large scale and strong competitiveness.

**Development focuses:** with focus on the development of eight traditional preponderant fields, including consumer electronic computers, computers and network communication products, novel display devices, new components, numerical control apparatus and equipment, cartoon games, software services and outsourcing, electronic commerce, concentrate the efforts on enhancing research regarding the relevant key technologies of Sensing Networks and the Internet of Things, in order to strive for a breakthrough.

(III) **Agricultural product processing industry with focus on foodstuff processing**

“People regard food as their primary need”; foodstuff processing industry is an enduring industry with stable market demand. As living conditions are improving, urban and rural consumption structures have undergone great changes, and demand for featured food, such as fresh food, green food, healthy food, is growing. National integration and globalization trends of markets also require food product enterprises to show features and pay attention to brands. At present, general foodstuff is oversupplied in the market, while high-quality and featured products are in short supply. Foodstuff processing is a labor intensive industry, with the obvious advantages of absorption of labor force, small investment and fast effectiveness. The agricultural product processing industry can play a role in guiding the development of agriculture and promote industrialization of agriculture and improve farmers’ income. Hunan is an agricultural province, containing rich agricultural species. It is comparatively developed in agriculture, husbandry and fishery, is an important main grain producing area, and the main grain crops play an important role in the whole country. At present, the grain yield of the whole province takes up about 6% of that of the whole country, and its rice takes up 1/10 of national total yield. Its yields of rice, ramie and tea oil rank first in the whole country, the yields of live pigs, tea and citrus rank second, and the yields of cotton, flue-cured tobacco, sugarcane, oil and freshwater products all rank the leading place in the whole country. The food
processing industry of Hunan Province covers a full range and is a perfect system. In 2007, there were 1140 enterprises above designated size and the whole industry earned sales revenue of CNY160 billion, being the biggest advantageous traditional industry and also the mainstay industry of the province. In 2007, food industry was driven by planting, breeding, packaging, machinery and equipment industry, chemical industry, such as upstream and downstream industries, the output value was more than CNY200 billion.

**Development ideas:**

Hunan shall seize the opportunity of the country implementing strategies for the rising of the central part and construction of new socialist countryside, advancement of agricultural industrialization and modernization to increase the income of farmers and to carry out large group strategy and brand strategy on the basis of the large-scale base of raw materials. Hunan shall develop food processing and featured agricultural product processing simultaneously, by means of advanced technology, introducing intensive food processing technologies and consolidating marketing strategies, spread products overseas by taking full advantage of noted media and cultural events like HNTV and the Gold Hawk TV Art Festival and create name brands to improve market shares domestically and overseas as well as drive industrialized operation of agriculture with high standard food processing for better employment and benefits of farmers and change of their life style so as to change the large agricultural province of Hunan into a large food processing province.

**Development focuses:** to promote the development of Xiang wine, Xiang tea, edible oil, fruits and vegetables and grain, aquatic products, processed foods of livestock and poultry category, on the back of existing major enterprises and brand-name products by meeting market demand, to gradually form an industry chain of agricultural industrialization “planting—processing—packaging—sales” for featured food, and continue to expand urban and rural markets both in Hunan and other provinces for higher market share. Promote the construction of 6 main bases: (a) food processing base mainly including Changsha, Changde, Yueyang, Huaihua and other regions; (b) meat processing base mainly including Zhuzhou and Xiangtan and other regions; (c) grease processing base mainly including Changde, Yueyang, Huaihua and Yongzhou and other regions; (d) fruit and vegetable processing base mainly including Changde, Shaoyang, Yongzhou, Huaihua and autonomous prefecture and other regions; (e) dairy processing base mainly including Changsha, Changde, Zhuzhou and Shaoyang and other regions; (f) aquatic product processing base mainly including Changde, Yueyang,Yiyang and Chenzhou and other regions. Mainly support some major enterprises to promote technologic transformation, enhance production capacity, improve quality, create famous brands and enhance market competitiveness, in order to make them become the leading enterprises in agricultural product processing industry; also, nurture and develop a number of ‘little giant’ enterprises.
with different characteristics.

(IV) Raw material industry with focus on quality steel products, nonferrous metal materials and the deep processing industries

1. Quality steel industry

In 2007, the gross output value of the iron and steel industry in Hunan was CNY87.7 billion, accounting for 2.45% of the gross output value of the national iron and steel industry, and the industrial value-added was CNY22.486 billion, accounting for 8.5% of the gross industrial value-added in Hunan. Valin Group (industry leader) produced 11.12 million tons of steel in 2007, ranking the 10th in the PRC, recording sales revenue of CNY50.2 billion, and ranking 86th and 36th in Top 500 Chinese Enterprises and Chinese Top Manufacturing 500, respectively, in 2008.

Development ideas: speed up the adjustment of industrial structure, encourage enterprises to combine and reorganize, invigorate large enterprises while leaving minor enterprises to fend for themselves, support Valin Group, Xiang Steel, LY Steel, Heng Steel and other large enterprises, eliminate regional small steel plants, promote optimization and upgrading of product structure, vigorously develop high-end steel products, and extend the industrial chain, in order to greatly enhance the added values of products.

Development focuses: focus on optimization of product structure and vigorously develop quality steel products on the back of large enterprises; develop circular economy, increase the utilizations of waste water, waste gas and waste residue, and speed up the organic combination of iron and steel industrial chain and non-steel industrial chain, in order to achieve the development of industrial ecological chain.

2. Nonferrous metal materials and the deep processing industry

Nonferrous metal industry in Hunan Province has great comparative advantage in the PRC. (a) It has abundant nonferrous metal resources, where the reserves of stibium and tungsten rank first in the world and the reserves of bismuth, realgar, fluorite, etc. rank first in the PRC. (b) After years of development, nonferrous metal industry scale and comprehensive strength are among the best in the PRC, and in 2007, the gross output value of nonferrous metal industry in Hunan Province was CNY101.6 billion, accounting for 5% of the gross output of the same industry in the PRC, and in 2007, the gross output value of nonferrous metal industry in Hunan Province was CNY27.2 billion, accounting for 10.2% of the gross industrial value-added of large-scaled industry in Hunan Province. Hunan Nonferrous Metals Holding Group Co., Ltd. ranks No. 182 in the Top 500 Chinese Enterprises and No. 95 in Chinese Top Manufacturing 500. (c) Provincial energy structure is of unique advantage for complementary economy, and rich in electrical power resource, supplying the development of nonferrous metal industry in Hunan with sufficient electric power. However, the current development scale of the nonferrous metal industry in Hunan does not match the advantages at all, industrial structure and product structure are of very clear resource orientation and production of
elementary materials, there is seldom product deep processing, the industrial chain is very short, and there are “large and comprehensive” or “small and scattered” shortcomings in organizational structures of enterprises.

**Development ideas:** take the implementation of the strategy—Rising of Central region of the PRC as an opportunity to further increase the integration of preponderant resources in Hunan, focus on deep processing of preponderant resources, strengthen technological innovation, speed up structural adjustment, extend the industrial chain, increase the comprehensive utilization rate of resources, and turn resource advantages into industrial advantages and economic advantages, in order to promote the rapid development of the nonferrous metal industry in Hunan and make greater contributions to the promotion of new industrialization in Hunan.

**Development focuses:** focus on the fine and deep processing of the tungsten, stibium, bismuth, copper, aluminum, etc., establish an R&D base, in order to increase technological innovations, and improve the technological level and integrated resource recovery. Focus research and development of the field of new nonferrous metal materials, for example, focusing on development of metal alloys and compound materials, nonferrous metal powder and high purity materials, series of deep processing products of rare and expensive metals, series of deep processing products of tin and stibium, etc.

**(V)** **Light industry with focus on the processing of forest pulp paper and bamboo**

In 2007, the gross output value of processing industry of forest pulp paper and bamboo in Hunan was CNY39.2 billion, accounting for 3.3% of the gross output value in the PRC, where the output of paper and paper products in forest pulp paper industry was 2.24 million tons with output value of CNY13.9 billion, accounting for 3% of the gross output in the PRC, ranking the 8th; the output value of furniture manufacturing industry and the output value of bamboo processing industry were CNY4.3 billion and CNY15.6 billion, respectively.

**Development ideas:** make full use of abundant forest resources and current processing advantages, ands in accordance with the idea of ‘industrialization of ecological construction, ecological specialization of industrial development’, increase integration and adjustment, take the road of forest-paper integration, speed up the development of the paper industry and environment friendly boards, bamboo products, and other deep processing industries. Speed up the raw materials forest base construction, focus on cultivating large companies and large groups with integration of pulping, papermaking and forestation of raw material basis, accelerate resources integration and corporate restructuring, eliminate the backward and heavily polluting small paper mills, and improve the recycling rate of waste paper; create a large-scale, specialized and intensive bamboo processing and furniture manufacturing base on the basis of resource advantage and location advantage and undertaking the transfer of
furniture industry in Pearl River Delta.

**Development focuses:** focus on supporting Tiger Forest and Paper Group to speed up the integration of forest and paper, and speed up the constructions of five manufacturing bases—Yueyang, Yiyang, Changzhou, Yongzhou and Huaihua; emphasize support on the technological innovation and product upgrading of furniture leaders, develop the deep processing of wood, bamboo, vine, palm, grass, and other resources, gradually increase the product added value, and create the medium grade and high grade furniture manufacturing base.

**VI) Producer service industry with focus on modern logistics industry**

Logistics costs account for a higher proportion of local GDP than the national average level. In 2007, the total cost of social logistics was CNY173.7 billion in the province, increasing by 22.9%, 4.7% higher than the rate of the whole country. The ratio of total costs of social logistics and GDP increased from 18.68% of 2006 to 18.88%, 0.48% higher than that of the nation. Restricted by traditional concepts, systems, technology and other factors, manufacturing and logistics industry are still “doing things in their own way”, which is one of factors for the regional proportion of per capita GDP lower than that of the country. Therefore, learning how to use advanced logistics management theories and technologies, learning from experience from developed countries and developing a producer service sector for new industrialization and expedite organic combination and coordinated development of logistics and manufacturing industry, have become urgent issues to be solved for new industrialization and revitalization of the province.

In 2007, the General Office of the Provincial Government promulgated the Opinions on Further Acceleration of Development of Modern Logistics Sector (2007 No. 41), which became a programmatic document for vigorous development of logistics industry of Hunan Province into a pattern of large logistics and large industry, being a new chance for economic growth and ‘the third source of profits’ and achieving the ‘win-win’ situation of logistics and manufacturing industry so as to provide support to and lay the foundation for new industrialization strategy in Hunan Province. At the same time, make full play of location and transportation advantages of the province and integrate logistics resources for a large and strong logistics industry, make all efforts to make Hunan Province become an important logistics hub in the central part of the PRC, providing support for cooperation with these central regions.

**Development ideas:**

Adhere to the mainstay position of enterprise and take the market demand as orientation to mainly promote the coordinated development of the logistics industry and the manufacturing industry, taking Changsha, Zhuzhou and Xiangtan city group as a leader, to make Hunan a modern regional logistics center linking the east and the
west. Through the integration and penetration of the logistics industry and the manufacturing industry, it is necessary to promote joint collaboration among various types of enterprises on the basis of professional labor division, and to strengthen the synergy linkage of the regional logistics industry, and finally this will contribute to the overall coordination sustainable development of the logistics industry in Hunan.

**Developing Emphasis:**

1. **Accelerating construction of logistics infrastructure.** The well-built traffic facilities provide premise and base for the development of logistics in Hunan. Firstly, make a general plan for the transportation network of Hunan, optimize the allocation of transportation resources, and reduce repeated construction and resource waste. Secondly, realize the financing in different channels and ways, then invest in the construction of traffic and traffic networks, such as rebuild railway beds and highways and improve facilities like ports, harbors airports, and stations. Thirdly, speed up the construction of logistics nodal. Strengthen reconstruction and upgrade logistics nodal like cargo terminals, transfer stations and storage stations, especially multifunctional logistics centers and distribution centers, which are the important link in modern logistics, it’s necessary to build new multifunctional logistics centers and distribution centers around important commodity production bases and transport hubs.

2. **Developing the Internet of Things and establishing the logistics resources information platform.** The Internet of Things adopts ubiquitous network technology to connect all articles in a network, in order to facilitate the identification and management of articles. Development of the Internet of Things and establishment of a Hunan Logistics Resource Information Platform are to combine advantageous resources of logistics with internet advantageous resources, to accelerate the development of a modern e-commerce logistics network, to support modern logistics leaders to become bigger and stronger, and to achieve the organic integration of modern logistics preponderant resources and network resources. Through a logistics information platform, the logistics enterprise can strengthen cooperation with its upriver enterprise and downriver enterprises, to form and improve the supply chain. Firstly, form and widen the network of logistics communication in Hunan. Rely on the national communication network, Hunan communication network, national defense communication network, and the communication of major logistics enterprises cabling, program-controlled remote organization use satellite, and microwave as channels; secondly, form and widen the information network of logistics resources management in Hunan. If the information port in Hunan was built up, the logistics enterprises will have access to the network. Thirdly, establish a real-time source data collection system. Fourthly, establish an information standard system. Fifthly, establish a system and platform of technology.

3. **Optimizing the spatial distribution.** According to factors like market demand, industrial distribution, flow of commodity, environment of resource, traffic
conditions, regional planning and so on, Hunan shall develop the logistics industry with emphasis on the development of ‘one core, three cycles, three corridors’ to optimize the industrial spatial distribution.

**One Core:** construct Chang-Zhu-Tan city cluster as the growth pole for the logistics industry in Hunan. These three cities of great influence are the group leaders of economic development in Hunan Province, with the above advantages. More effort should be made to build provincial large-scale logistics distribution center, and develop third-party logistics; centering in Changsha, build Chang-Zhu-Tan as an important modern regional logistics center integrated storage with transportation, distribution and information service in the PRC. **Three Cycles:** surround Dongting Lake Logistics Ring centered by Yueyang, Xiangnan Logistics Ring centered by Hengyang, Daxiangxi Logistics Ring centered by Huaihua. During the construction of three logistic rings, the construction of a logistics system of node cities- Yueyang, Hengyang, Huaihua, are of utmost importance. **Three Corridors:** the north-south logistics corridor includes Beijing-Guangzhou Railway, Luoyang-Zhanjiang Railway, Beijing-Zhuhai Express, Beijing-Zhuhai Double Track, Erlianhaote-Guangzhou Express, 107 Motorway, Xiangjiang Waterway and so on. The east-south logistics corridor includes: Shanghai-Kunming Railway, Hunan-Guangxi Railway, Heng-cha-ji Railway, Shanghai-Ruili Express and so on. Northern Hunan- Northwest Hunan-Western Hunan logistics corridor includes: Jianzuo-Liuzhou Railway, Hangzhou-Ruili Express, Baotou-Maoming Express and so on.

(For details, see *Subreport 2 Strategy for coordinated development of the logistics industry of Hunan Province*)
Chapter VIII  Industry Spatial Pattern and Optimization

I  Problems in Industry Spatial Pattern

(I) Industrial division remaining vague all over the province
Division of mainstay industries is not obvious in all region of the entire province (as shown in Table 8-1). Particularly, in all regions, most industries are resource-based, with substantial overlapping, and ferrous metal smelting and rolling industry are the common mainstay industry of almost all regions, while chemical raw material and chemical processing industry is the common mainstay industry of Chang-Zhu-Tan region, around Dongting Lake region and South Hunan region. Besides, the industrial zone in Central and Southern Hunan and Western Hunan has not taken shape yet, and the mainstay industries are mainly resource-based industries and traditional industries, with small total economic volume and low technical contents.

Table 8-1 Distribution of Internal Mainstay Industry Types of All Prefectures and Cities of the Entire Province

<table>
<thead>
<tr>
<th>Changsha</th>
<th>Zhuzhou</th>
<th>Xiangtan</th>
<th>Changde</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing of special equipment (15.86), tobacco product industry (10.31), chemical raw material and product processing (9.93), manufacturing of transportation equipment (7.14), manufacturing of general equipment (6.20), manufacturing of communication equipment, computers and other electronic equipment (5.17), smelting and rolling of non-ferrous metals (5.10)</td>
<td>Smelting and rolling of non-ferrous metals (29.31), manufacturing of transportation equipment (21.97), chemical raw material and product processing (15.84), non-metallic mineral processing (9.39), electrical and thermal production and supply and processing of agricultural and sideline foodstuff (4.61)</td>
<td>Smelting and rolling of ferrous metals (36.55), manufacturing of electrical machinery and tools (10.89), manufacturing of general equipment (8.99), chemical raw material and product processing (8.51), electrical and thermal production and supply, and processing of leather, fur, feather (velvet) and their products (5.99)</td>
<td>Tobacco product industry (38.37), textile (8.69), processing of agricultural and sideline foodstuff (8.35), smelting and rolling of non-ferrous metals (6.62), papermaking and manufacturing of paper products (5.74)</td>
</tr>
<tr>
<td>Yueyang</td>
<td>Shaoyang</td>
<td>Hengyang</td>
<td>Zhangjiajie</td>
</tr>
<tr>
<td>Petroleum processing, coking and nuclear fuel processing (36.90), processing of agricultural and sideline foodstuff (13.41), chemical raw material and product processing (9.65), papermaking and processing</td>
<td>Timber processing and wood, bamboo, cane, palm and grass product industry (11.25), papermaking and processing of paper products (10.94), food</td>
<td>Smelting and rolling of non-ferrous metals (23.84), smelting and rolling of ferrous metals (15.22), manufacturing of electrical machinery and tools (10.87)</td>
<td>Processing of agricultural and sideline foodstuff (20.67), non-metallic mineral processing (16.69)</td>
</tr>
</tbody>
</table>
of paper products (5.83), textile (4.85)

production (10.56), chemical raw material and product processing (6.98), smelting and rolling of non-ferrous metals (6.04)

Huaihua
Smelting and rolling of non-ferrous metals (16.46), non-metallic mineral processing (12.03), smelting and rolling of ferrous metals (10.99), processing of agricultural and sideline foodstuff (10.69), chemical raw material and product processing (10.62)

Yiyang
Textile (14.10), chemical raw material and product processing (10.46), processing of agricultural and sideline foodstuff (9.46), smelting and rolling of non-ferrous metals (9.05)

Yongzhou
Manufacturing of special equipment (14.08), processing of agricultural and sideline foodstuff (9.56), non-metallic mineral processing (6.48), and tobacco product industry (6.31)

Chenzhou
Smelting and rolling of non-ferrous metals (46.34)

Loudi
Smelting and rolling of ferrous metals (72.57), smelting and rolling of non-ferrous metals (5.91)

Jishou
Smelting and rolling of non-ferrous metals (42.63), smelting and rolling of ferrous metals (32.52)

Note: Figures in the parentheses are the percentage of the industry accounting for among the manufacturing industry of the city.


In the “3+5” City Cluster, the industrial division is also vague. Except for the industrial division between some major cities such as Chang-Zhu-Tan, the development direction of five other cities is yet to be clarified. In terms of development status quo of major industries, metal smelting and manufacturing industry is the common mainstay industry of Hengyang, Yiyang, Changde and Loudi; tobacco product industry is the common mainstay industry of Changsha and Changde; in terms of future development, Yiyang, Yueyang and Hengyang compete fiercely over electrical industry, especially the development of nuclear power; Hengyang and Changsha have obvious competition over equipment manufacturing; and Zhuzhou, Xiangtan, Loudi and Changde have certain competition over resource industries.

(II) The “3+5” city cluster being very weak in general

Over 70% of the cities of Hunan are medium or small-sized cities. Only Changsha, the capital, is an extra-large city with over 1 million people. There is no super-large center city with strong radiating effects in this province. In other words, Hunan, as an underdeveloped inland province, lacks a core growth pole that can drive economic development of the entire province. Chang-Zhu-Tan, as significant zones of economic and social development of Hunan, have obvious advantages within the province, and the economic development level and input and output benefits of the three cities are leading in the province. However, because of scattered distribution,
similar industrial structure, insufficient integration of resources, lack of composite force, and limited driving and radiating influence over other cities and regions, the scale effect and aggregation effect of regional central cities cannot be brought into full play.

Although the overall economic scale of the “3+5” city cluster is increasingly expanding, the strength is not yet strong enough, and cannot meet the requirement for driving the realization of new industrialization in the whole province. The manufacturing ability and market exploration ability of enterprises in “3+5” city cluster are far behind that of Yangtze River Delta, Pearl River Delta and Jingjinji (Beijing, Tianjin and Hebei) City Cluster, with unobvious aggregation of mainstay industries, and a low percentage of high technology in industry added value. The industrial development has the obvious feature of being investment-driven at present, while the tertiary industry is not so developed, the internal structure is irrational, the percentage of traditional service industry is too high, and the producer service industry is still underdeveloped.

Table 8-2 Major Targets of Chang-Zhu-Tan City Cluster, Zhongyuan City Cluster and Wuhan City Circle

<table>
<thead>
<tr>
<th></th>
<th>Land area (10 thousand km²)</th>
<th>Total population (10 thousand)</th>
<th>GDP (CNY100 million)</th>
<th>GDP per capita (CNY )</th>
<th>Revenue within general budget of the treasury (CNY100 million )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chang-Zhu-Tan City Cluster</td>
<td>Absolute value</td>
<td>2.8</td>
<td>1,298</td>
<td>3,468.3</td>
<td>26824</td>
</tr>
<tr>
<td></td>
<td>Percentage in the entire province (%)</td>
<td>13.2</td>
<td>20.4</td>
<td>37.7</td>
<td>-</td>
</tr>
<tr>
<td>Zhongyuan City Cluster</td>
<td>Absolute value</td>
<td>5.87</td>
<td>3,955</td>
<td>8,610.5</td>
<td>21,778</td>
</tr>
<tr>
<td></td>
<td>Percentage in the entire province (%)</td>
<td>35.2</td>
<td>42.3</td>
<td>57.4</td>
<td>-</td>
</tr>
<tr>
<td>Wuhan City Circle</td>
<td>Absolute value</td>
<td>5.81</td>
<td>2,990</td>
<td>5,556.7</td>
<td>18,639</td>
</tr>
<tr>
<td></td>
<td>Percentage in the entire province (%)</td>
<td>31.3</td>
<td>52.5</td>
<td>60.2</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: Population refers to the total population at the year end.

It can be seen from table 8-2, that the economic strength of Chang-Zhu-Tan City Cluster is comparatively weak, and is still far behind second-class city clusters of the PRC. Its GDP in 2007 was CNY346.83 billion, CNY514.2 billion and CNY208.84 billion less than that of Zhongyuan City Cluster and Wuhan City Circle respectively.
The general budgetary revenue of Zhang-Zhu-Tan was CNY23.46 billion, accounting for 39.0% in Hunan, and ranking last in total volume and percentage among the three City clusters (circle). Compared with first-class city clusters of the PRC such as Yangtze River Delta, Pearl River Delta and Jingjinji, the disparity is much more substantial.

(III) Low level of county economy development

The development level of county economy in Hunan Province is low throughout. Economic volume and industries are concentrated in urban areas, while labor forces are primarily distributed in places below county level. Up to now, there are still 43 counties in the entire province whose proportion of the primary industry exceeds 30%, and 34 counties whose proportion of the secondary industry in GDP is below 30%. In terms of economic growth pattern, most counties rely on resources, dominated by resource industries, and the products are mostly primary, containing low technical content and are in structure. The development level of county economy of developed zones in Hunan such as Chang-Zhu-Tan economic zone is far behind that of Yangtze River Delta and Pearl River Delta. The development level of the county economy of most regions and autonomous regions of ethnic minorities are even below the average development level of autonomous regions of ethnic minorities nationwide.

(IV) Excessive development zones and similar industrial orientation

For a long time, the development zones in Hunan Province were in a disorderly development status and excessive in quantity. Besides, influenced by the different interests of local governments and departments, the development zones attach dominant importance to the extensive development featured by expansion in quantity. Most are low-level overlapping, and there are few specialized industrial parks, which cause similar industrial structure and vicious competition within the same trade, and vague aggregation effects of industries. No industry chain takes shape in peripheral regions, and the capability of investment attraction and export for earning foreign exchanges is weak. Therefore, the economic effect is poor. A substantial quantity of development zones has deviation in industrial development orientation, concentrated on real estate development, with poor sustainable development ability. At present, the total number of development zones in Hunan Province is 76, among which 3 are development zones at national level, and 73 at provincial level. In terms of type, there are 26 industrial parks, accounting for 34.2%; 5 high-tech industrial development zones, accounting for 6.6%; and 45 comprehensive development zones, accounting for 59.2%. In terms of regional distribution, 76 development zones are distributed in 14 cities and 70 counties in the province, among which the numbers of the top 3 development zones in Changsha, Binzhou and Hengyang are 9, 9 and 8 respectively.

Similar industrial structure and vague industrial division inevitably cause some development zones and their enterprises to face insufficiency in temporary land and capitals. Relevant survey in Binzhou shows that 52.5% surveyed enterprises have
difficulties and problems in basic production and operation environment such as electricity, water supply, land, and transportation, among which 16.5% complained about insufficiency in land use. According to the survey, development zones and their enterprises in some other cities face similar problems, for example, Liuyang Biological Medicine Park, Xiangtan High-Tech Industrial Park, Loudi Economic Development Zone, Chaling Economic Development Zone and Zhuzhou Lukou Economic Development Zone.

(V) Lack of close relation between enterprises and regional economy and the driving effect of enterprises on regional economy

Changsha, Zhuzhou, Xiangtan and Hengyang have obvious characteristics of ‘old industry’ bases, with solid foundations for industrial development and large quantities of heavy industry enterprises and state-owned enterprises. Zhuzhou is one of the eight cities under national key construction in the first and second five-year period, and is the cradle of the PRC’s electrical locomotives, mechanical industry, basic chemical industry, locomotive industry, electrical industry and nuclear research industry and forms the Qingshuitang industry concentration region. In the period of planned economy, especially during the third-line construction, the PRC established a multitude of large-scale enterprises in this region, such as Zhuying Group, Zhuye Group, and nuclear industry foundation of Hengyang, and affiliated scientific research institutions, which laid solid industrial and technical foundations for the present industrial development.

The attribute of ‘old industry’ severely bases the relation between enterprises and regional economic development. Most large-scale enterprises within the region are state-owned. In addition to restrictions in operation system, traditionally, the nation is responsible for the deployment of industrial affiliated facilities, and local governments pay little attention to the development of affiliated enterprises, which causes medium- and large-scale enterprises to have insufficient affiliated small- and medium-scale enterprises. Therefore, large-scale enterprises have little correlation with regions, and components and high-end technology always come from regions other than in Hunan Province. On-site research reveals that major components of large-scale manufacturing enterprises of Chang-Zhu-Tan City cluster come from Yangtze River Delta, Pearl River Delta and Northeast part of the PRC, and some core components and high-end technologies from Europe, North America and Japan. Local affiliated ability is relatively weak. Therefore, in local places, ‘there are many large-scale enterprises but local affiliated correlation ability is quite weak’, ‘modern industry sector are many, but generally ‘one enterprise constitutes one industry’”, ‘industries have barely no local chains, clusters, and bases’. This is also the major reason that, although in the nationwide sense, Hunan Province has a relatively high-volume mainstay industry system dominated by equipment manufacturing; however its total economic volume remains low.
II Orientation of Industry Spatial Pattern

(I) Five industrial regions of the province based on the variance in the combination of industrial development foundation, resource environment background and industrial development driving force

One is the agglomeration of Chang-Zhu-Tan in integration of advanced manufacturing industry, high-tech industry and modern service industry. It mainly includes Changsha, Zhuzhou and Xiangtan. This region has an advanced transportation network and urban system and abundant scientific and technical resources, and is the core region to drive the realization of new industrialization in Hunan. Its industrial development is featured by such dominant industries as equipment manufacturing, steel and non-ferrous metals, electronics and information and biological medicine. The goal is to build Changsha into the capital of the PRC’s engineering machinery, Zhuzhou and Xiangtan into national manufacturing bases of railway transportation equipment and of wind power generation equipment, and the whole region into the base of a automobile and aircraft equipment manufacturing industry.

The second region is Dongting Lake peripheral aggregation region of modern ecological industry. It includes Changde, Yueyang and Yiyang. This region has relatively advanced transportation networks and an urban system and solid agricultural foundations, but ecological and environmental requirements are high. Its future development focuses on the ecological industry, and meanwhile receives the radiating driving force of Chang-Zhu-Tan region and the industry shift of Yangtze River Delta. The major industries are ship building, electrical power, agriculture and agricultural product processing, foodstuff processing and petrochemical papermaking. Its goal is to build Yiyang into the manufacturing base of vessels and affiliated nuclear equipment in Dongting Lake region.

The third region is the region of Southern Hunan receiving industry transfer, including Hengyang, Chenzhou and Yongzhou, with advanced transportation networks and certain development foundations for equipment manufacturing and resource industries. In its future development, importance should be attached to the radiating driving force of Chang-Zhu-Tan City cluster and the industry transfer of Pearl River Delta. The major industries are machinery, light textile, and resource industries. Its goal is to build Hengyang into the manufacturing base of extra-high voltage power transmission and transformation equipment.

The fourth region is Loushou cold resource industrial region, including Shaoyang and Loudi. This region is featured by convenient transportation and abundant mineral resources. Efforts should be made to bring resource advantages into full play, and facilitate resource industries as metal smelting and other industries such as light textile and foodstuff through ecological utilization of resources, hi-tech
production and processing, enterprises in industrial parks and constant pollution control during production.

The fifth region is West Hunan, aggregation region of ecological industry, including Zhangjiajie, Xiangxizhou and Huaihua, featured by abundant tourism resources, with its development impetus being the development of various ecological products oriented at tourism. The major industries are agricultural product processing and ecological tourism product processing.

(II) “Radiating linkage of One Core, Three Zones, and Multiple Points” as the overall industry spatial pattern of “3+5” City Cluster

“One core” refers to the core region of Chang-Zhu-Tan City Cluster, with industries dominated by advanced equipment manufacturing, high-tech industry and modern service industry.

“Three zones” includes:

Yueyang-Chang-Zhu-Tan-Hengyang high-tech industry and advanced manufacturing zone, which relies on the comprehensive transport pivot of Hunan reach of Beijing-Zhuzhou railway to concentrate high-tech technology industry and advance manufacturing.

Chang-Zhu-Tan-Loudi industrial development zone of energy raw materials. The key is to facilitate the industry of energy raw materials along such cities and towns as Xiangtan, Xiangxiang, and Loudi, propel the development of Central Hunan with the westward radiating force of Chang-Zhu-Tan, and thus propel the development zone of urban industrial aggregation in West Hunan.

Chang-Zhu-Tan-Yiyang-Changde development zone of characteristic industrial aggregation, which mainly develops tobacco processing and energy industry, and is the development zone of urban industrial aggregation for Chang-Zhu-Tan to propel the development of Northwest Hunan.

“Multiple points” refers to new growth points represented by various kinds of industrial parks. Attention should be focused on the construction of eleven industrial parks, namely, Changsha Lugu Hi-Tech Industrial Park, Xingsha Advanced Manufacturing Industrial Park, Zhuzhou Hi-Tech Development Zone, Xiangtan Hi-Tech Development Zone and Jiuhua Industrial Park, Chang-Zhu-Tan CBD, Jinying Cultural Industrial Park, Jinxia Logistics Park, Shifeng Logistics Park, Jiuhua Logistics Park, Longping Hi-Tech Agricultural Park, Miluo Circulating Economy Park. Attention should also be paid to the transformation of three traditional industrial parks, namely Zhuzhou Qingshuitang, Xiangtan Principal Port and Xiashesi, and Changsha Pingtang.

III Strategic Emphasis of Regional Economic Development

(I) Further intensifying the development of Chang-Zhu-Tan, and forming a
core growth pole

“3+5” City Cluster with Chang-Zhu-Tan as the core has advantages like external communication, intensive capitals and technologies, and favorable natural and geographical conditions, and is the principal force to propel Hunan Province to realize new industrialization. To realize prosperity, Hunan has to further intensify the development of Chang-Zhu-Tan and facilitate Chang-Zhu-Tan City Cluster to take the lead in development in order to form the core growth pole. The formation of a core growth pole in Chang-Zhu-Tan could not only substantially enhance the economic role and comprehensive competitiveness of Hunan, but is also likely to have a greater radiating and driving role in the development of Central or Southwest part of the PRC.

(II) Actively cultivating a new economic growth pole

The realization of regional coordinated development means that attention should also be paid to the development of underdeveloped regions, while the development of excellent and advantageous enterprises is supported. On the one hand, the service input into underdeveloped regions should be increased through implementing the concept of impartial basic public service. On the other hand, full awareness should be given to the fact that from the perspective of the essence of industrialization being population, the industrialization of such regions as Chang-Zhu-Tan can hardly support the realization of new industrialization of the entire province, therefore, advantageous places should be selected in South Hunan and West Hunan to realize industrialization. Industries and population should be centralized in potential places with abundant reservation of resources and favorable conditions for transportation, especially downtown areas of cities at prefecture level and some county towns with centralized resources.

The county economy is based on traditional industries and agricultural economy. The development of county economy is to reform traditional agriculture and underdeveloped rural areas, and to realize agricultural industrialization via the concept of industrialization and specific measures; to vigorously develop rural industrialization and agricultural industrialization relying on industrial parks; and to reduce the number of farms and turn farmers into urban residents. The management system of household register of urban residents should be improved, and a unified system of urban residence registration facilitated. One or two cities (counties) should be selected as pilot places for a comprehensive affiliated reform of urban development.

(III) Supporting the Chang-Zhu-Tan region, around Dongting Lake region, and some regions in South Hunan to become key places receiving gradient transfer of national improvement trade

The Chang-Zhu-Tan region, around Dongting Lake region and some regions in South Hunan should be supported to become key places receiving gradient transfer of
national improvement trade to primarily engage in international and coastal improvement trade on a high technical level and large incremental contents oriented towards developed countries, Yangtze River Delta and Pearl River Delta. The policy effect of Yueyang, Chenzhou as the key basis of export processing industry determined by the Ministry of Commerce should be brought into full play, to construct industrial parks engaging in eastern industry shift and to solve the land bottleneck. Attention should be paid to the industry shift of eastern regions and the development of industries with regional characteristics should be actively guided to provide affiliated conditions for the development of industry shift of eastern regions. Linkage mechanism for Chang-Zhu-Tan to engage in industry shift of eastern regions should be explored and established. Policies and regulations for the development of service outsourcing of Chang-Zhu-Tan City Cluster should be completed, service outsourcing enterprises cultivated, and the formation of an industry cluster of service outsourcing facilitated.

(IV) Integrating and promoting different kinds of industrial parks and realizing intensified operation of land

Being in the process of rapid industrialization, Hunan’s task is far from being finished, and its urbanization level is tremendously low. At present, approximately 40 million people still live in rural areas. The expedition of industrialization and urbanization poses gigantic pressure to the occupation of land. It is a basic issue for Hunan, as one of the main production area of grains, in the medium- and long-term development to defend the contradiction of industrialization and urbanization and the needs for land against the current quantity of farmland. Only through a new industrialization approach and extensive operation, can the industries be developed. In order to implement new industrialization strategy, urban construction land should be put under unified planning, land reserve system completed, and land utilization enhanced. The development of industry clusters and the expedition of industrial park development should be combined and all kinds of industrial parks integrated and promoted based on the principles of centralized pattern, clustered industry, intensified land, and ecological and environmental protection. The development of industrial parks is an effective approach to adjust industrial structure and its space structure, and solidify industry foundation. Efforts should be devoted to formulating preferential policies, integration policies, and external investment attraction policies for industrial parks, and avoiding low-level overlapping and vicious competition and cannibalism. A thorough assortment and classification should be conducted for existing industrial parks at each level and of each kind, and industry cluster development and corresponding industrial park systems established according to the determined future focus, to propel the space distribution adjustment of industries via the development of industrial parks and the adjustment of inventory structure via increments brought about by large-scale investment attraction. Industry characteristics of industrial parks
should be cultivated, specialized markets constructed and cultivated, industry cluster environment optimized, regional economic competitiveness of the entire provinces continuously enhanced, regional space pattern optimized, and benefits of land utilization increased through the development of industrial parks.
Chapter IX Hunan Province’s Strategic Measures to Promote New Industrialization

I Strategy of Regional Economic Integration

(I) Integrating development of Hunan with the central region and Pearl River Delta region

Under the market economic conditions, the regional economy cannot balance itself and should take a position from which it is able to fully exert its comparative advantages in the labor division of the wider region, and should determine its leading industry and main structure commensurate to its function position.

The prominent problem of Hunan Province in industrial investment is the lack of a marketing concept and scientific reasoning, information inaccessibility and blindness. They are also the restricting factors for its industrial structure convergence with other five provinces in the central region. According to the analysis of industry census data, the problem of products overlapping with one another is particularly serious in ordinary level processing industrial products of textile, plastic, chemical fiber products, and construction materials among the six provinces in the central region. The products of central provinces possess a small market share, while the larger part of the market is taken up by the products from eastern regions. Furthermore, its output growth often combines with rising inventory, which cannot create profits; therefore, many enterprises get into trouble. The problem of unreasonable structure of industrial products in central provinces is still very prominent. The convergence between industrial product structures of different central provinces leads to the low concentration of products in this area, the difficulty of improving intensively the degree of production and weakening of economic benefits and competitiveness. The composition of resources of Hunan is the same as that of other provinces in Central part of the PRC. At present, the competition is greater than the complementarity and the present situation cannot be changed in a short time. Objectively, Hunan needs to seek for market and cooperation in a wider scope. Geographically, Hunan is adjacent to Guangdong, Guizhou and Guangxi, having the geographical advantages of receiving the industries transferred from the Pearl River Delta and of affecting South-Western part of the PRC. Hunan should improve itself by fully utilizing its resources, labor force and regional advantages. For development, Hunan must properly handle the connection of the industrial structure of the Pearl River Delta, enabling the industries and products of Hunan as an irreplaceable link in the economic belt. Based on this, Hunan should promote specialized labor division and further consolidate its economic
role in Central art of the PRC and evening entire country.

(II) Improving the regional integration development within Hunan Province

To revitalize Chang-Zhu-Tan collectively has the purpose of driving the development of other regions, further boosting the integration of Chang-Zhu-Tan city cluster and other regions.

The development core of the “3+5” City Cluster consists of Chang-Zhu-Tan, and 5 other cities and should intensify the cooperation and coordination with the dominant industries of Chang-Zhu-Tan, and specify regional division. To form the core growth pole of Chang-Zhu-Tan, Hunan must rapidly change the space structure of enterprises and population, form centripetal force towards Chang-Zhu-Tan, and concentrate manufacturing industry and population into Chang-Zhu-Tan through rapid assembly in this region under the support of policies and capitals of the province. A city is mainly supported by its industries; therefore, the entire province should first concentrate enterprises into Chang-Zhu-Tan to cultivate and expand dominant industries, intensify the relation of internal industries and take the lead to realize industrialization, which is the key issue for the prosperity of Hunan. First, integrated construction of Chang-Zhu-Tan should be accelerated, the internal administrative metes and bounds of Chang-Zhu-Tan City cluster broken through, and advantageous resources integrated to form composite force. Especially, the development of industrial parks is still encumbered by disadvantages as non-conspicuous dominant industries and low concentration degree of industry clusters, therefore, the industrial development capability of industrial parks should be further integrated and promoted, supporting forces concentrated, and the rationality of dominant industries and their space structure should be facilitated. Second, the promotion of the industry technology level should be adhered to as the objective, and the possibilities for independence and innovation diversified. Third, the strategic opportunity of ‘implementation first and pilot first’ of dual-type a ‘Bi-Pattern’ society should be grasped, the policy support of the state for a ‘Bi-Pattern’ society construction of Chang-Zhu-Tan utilized to the utmost, the strategic emerging industrialized bases with circulating economy and high technology leading in the PRC established, and more economic growth points with autonomous intellectual property rights as the core cultivated.

II Strategy of Technical Innovation and Talents

In this new economic era, technical innovation and human capital become the most important endogenous variable and driving force, so we must rely on technologies and professionals in order to keep fast economic development. Today’s development of productivity is lead by science and technology; today’s world competition is barely technical and talents competition, and the core position of
human capital is fully consolidating. The central government has proposed the strategy of experts making a stronger nation, and Hunan government has also proposed the strategy of experts making a stronger province. At present, Hunan is rich in human resources, but poor in human capital. In order to minimize the gap to developed regions, accelerate the process of new industrialization and realize leapfrog development, we must make great efforts in development, training, absorption and engagement of experts, and speed up technical progress and technical innovation.

Therefore, to strengthen the science and technology education base of Hunan Province, perfectly combine the talents project of Hunan Province and the promotion of industrialization and transfer the labor resources into capital advantage of human resources is the key of solving innovation and structural assimilation issues in the process of new industrialization in Hunan Province. Meanwhile, it is necessary to establish a technical innovation mechanism, and enhance technical innovation capability.

(I) Give the experts full play, launch significant projects with 46 academicians, establish a research and promotion platform; the government must give policy support to form large-scale projects with various characteristics, solve the problem of weak independent innovation and industrial structure convergence.

(II) Take the 4.6 million experts with intermediate professional titles or above as the mainstay of the various sections of a ‘Bi-Pattern’ society and exert their ingenuity to play a role in competitive industries in Hunan Province, and constantly create new competitive industries, gaining comparative advantages and even absolute superiority in the domestic market and global market competition.

(III) Strengthen training of local labor. It is necessary to strengthen personnel training and employee training, focus on vocational education, basic education and investment in education in rural areas, in order to improve the quality of human resources and expertise. Fully take the resources advantage of a labor force of 13 million through further solve policy problems of rural migrant workers, effectively protect the lawful rights and interests of rural migrant workers, increase the rural workforce training subsidy and capital scale, take Hunan Province as the trial base for reform and development of rural vocational education, the vocational skills training base and the base of export of high-quality labor services. Transfer the labor resources into capital advantage of human resources to ensure the transfer ability of central region to undertake eastern and foreign industries.

(IV) Exercise preferential treatments and policies to attract experts. We shall attract domestic and foreign experts with open minds, by multiple channels and forms, based on projects, and give priority to introducing high level technical innovation experts, management experts, marketing experts and various foreign affairs professionals who are familiar with international practices. We shall speed up to build a team of entrepreneurs of market expansion capability, innovation spirits, and
innovation capability, who are familiar with domestic and international competition. We shall try our best to create a good environment to attract and engage experts, establish a competition mechanism good for all classes of excellent professionals to offer themselves and make the best use of their knowledge and skills, and encourage enterprises to practice an annual salary system, shareholding system, options system and ‘technical results contributing to shareholding’ system (with appropriately increasing the upper limit of salary).

(V) Establish a technical innovation mechanism, and enhance technical innovation capability. We shall further deepen the technical system reform, step up the transformation of technical results into benefits, increase technical innovation capability, and establish an innovating system and operating mechanism that meets the requirements for socialist market economy and the rules of technical development. We shall increase governmental and social investment in science and technology, and make sure the governmental investment in science and technology from all levels of treasury authorities is higher than the increased current financial revenue, so that governments can fully play their role in technical progress and industry restructuring. We shall build the main body of technical innovation at multiple levels, and in particular, enable enterprises to become the main body of technical progress and innovation, intensively support and establish a group of national level and provincial level corporate technical centers. For example, establish technical R&D centers for all key enterprises, and establish different types of technical development institutions for other large or middle-size enterprises. Further expand international communication and cooperation, support and establish diversified cooperative R&D institutions, make great efforts to attract inbound enterprises to set up R&D institutions in Hunan Province, encourage and support local enterprises and scientific research institutes to seek cooperative research and development with developed regions and foreign countries. Establish a reasonable intellectual property right system, and practice preferential policies to introduce technologies. Establish a venture capital investment mechanism, and support the industrialization of high and new technologies. Positively advance the combination of industry, education and research, lead enterprises and various professional scientific research institutes and higher education institutions to carry out a joint breakthrough around the key technical bottleneck, and promote the production and industrialization of high new technical results. Support and lead scientists and technicians to create business with new technical results, and make them become the core force of speeding up high new technical industrialization.

III Ecological Protection Strategy

Energy and environment turn into the fundamental strategy of economic and social development, for most countries. During the process of new industrialization in
Hunan Province, developing scientific, sustainable energy conservation and environmental protection strategy is extremely urgent. Hunan is relatively short of energy resources, meanwhile at a middle stage of the industrialization. Within the coming 5 to 10 years, rapid development of either category or industry size of heavy industry is unavoidable, great energy demand and high energy consumption will be brought out by heavy industry-centered industrial structure and the contradiction between the energy supply and demand will become tough. Energy production and consumption in Hunan mainly relies heavy consumption of fossil energy such as coal and the extensive economic growth pattern has caused serious environmental pollution of air, water and so on. Hunan is a less developed province, funds invested in the fields of energy conservation and environmental protection is seriously inadequate due to limited local resources.

(I) Strengthening the adjustment of industrial structure, speeding up the development of industrial clusters with sound growth and low-carbon economic industry clusters with low energy consumption and accelerating the elimination of backward productivity

Nonferrous, petrochemical, steel, paper making and cement, which are high emission industries, took fair proportions in the industrial structure of Hunan. Also, people were hardly conscious of environmental protection in past years and environmental protection policies were not effectively implemented; many problems resulting from this period still exist, and structural pollution becomes more and more noticeable. As a province of nonferrous metal, many small scaled smelting plants and mines are conducted in Hunan, whose low technology could result in a waste of resources and serious environmental problems.

(II) Quickly improving of the high technology part in the heavy industry

Aiming at sustainable development, Hunan shall accelerate promoting the utilization of high technology to transform the traditional heavy industry and the upgrading of the technical industry structure. Hunan should take technical innovation as the power, take human capital as the main body, constantly strengthen independent innovation capability of the industry, constantly apply sophisticated techniques and use sophisticated equipment, and strive to increase technical contributions to the heavy chemical industry. It is important to give full play to the characteristics of the heavy chemical industry, for example, long industrial chains, large forward-backward input/output linkage effects, and strong drive for related industries, and positively drive heavy chemical industry to develop from a mining and raw material industry to a deep processing and high value added up/downstream high new technical industry.

(III) Encouraging the development of green economy

The circum-Dongting lake area is the traditional ‘land flowing with milk and honey’ in the PRC with rich ecological resources, a subtropical landscape and rich biological resources in western Hunan Province. It provides a favorable environment.
for the development of green economy. Using the natural conditions of lakes and mountains, vigorously develop the anti-season agriculture and the main agriculture; use the pollution-free ecological environment to develop the non-polluted food. Develop scale and industrialization patterns for the subtropical fruits industry; formulate preferential policies in technical development, marketing, production and raw material production to create a policy environment for green economic development.

(IV) The comprehensive utilization of ecological environment

Strengthen the overall protection and utilization of such ecological environment and resources as water, land, minerals, forest and wetland, strictly enforce the soil and water protection scheme system during construction projects, and reduce the destruction of landform vegetation and possible soil erosion. Strengthen strategic protection, control and preservation of spatial resources.

(V) Vigorously developing the recycling economy and conduct clean production

According to the principle of ‘reduction, reuse and resources’, conduct clean production and carry out ecological design and modification of industry and industrial parks, endeavor to realize recycling of waste. Implement environmental identification, environmental authentication and a governmental green procurement system, improve the recycle and utilization system of the renewable resources, formulate laws and regulations, policies, standards and guidelines favorable for the development of recycling economy and work out technical guidelines for recycling economy planning. Organize and carry out the scientific research and technological development of recycling economy, establish and improve the technical supporting system of recycling economy and deepen the recycling economy pilot and demonstration.

Adopting improved design, utilization of clean energy and raw materials, adopting advanced technology and equipments, improvement of management and comprehensive utilization, reduce pollution at source, enhance the efficiency of resource utilization. Fully implement clean production in such industries as chemical industry, metallurgy, brewing, papermaking, electroplating, etc, implement compulsory clean production examination and verification and release to the public for those enterprises that exceed sewage discharge standards and those that meet discharge standards but still have a relatively high total amount of pollution discharge. For those who have passed the clean production examination and verification, provide preferential policies of priority application, a special fund for clean production and the special fund for environmental protection. Support a batch of enterprises with better conditions for conducting clean production, and foster a batch of “zero discharge of pollutant” enterprises.

(VI) Establishing a regional ecological compensation mechanism

Establish and implement the paid allocation of the initial rights of total amount
of pollutants, pollution discharge license, and pollution discharge right trade system, establish a pollution-discharge right trade market among Chang-Zhu-Tan city cluster to develop a pollution-discharge right trade pilot, promote market operations of environmental protection and pollution control. Reform levy and management method of urban sewage and solid waste handling fee and innovate levy and management mode of pollution discharge fee.

IV Strategy of System Innovation and Reform

Facing the new international economic framework, the PRC needs to create new space for industrial development; the eastern regions need to upgrade the industrial structure, develop technology-intensive and high-tech industries, and must transfer some labor-intensive industries to the central region. The spatial transfer of industry requires certain conditions, which mainly refer to the good business environment of the industry introduction place needed by industrial growing. The environment depends not only on the costs of factors like labor, land, etc, but also on the perfect infrastructure system and the institutional environment. Hunan Province, a large agricultural province, whose industrialization level is not high, has small economic aggregate and a low degree of opening up to the outside world. In Hunan Province even the central regions are relatively backward in opening up to the outside world, and fall far behind the national average level in the development of export-oriented economy and attracting outside production elements, which means that its institutional environment needs improvement urgently.

(I) Updating ideas and concepts positively and forming the all-round opening up institutional mechanisms

Deep opening up is the most effective way and important impetus to speed up the new industrialization. Tight environment and outdated concepts are the important factors constraining the economic development of Hunan. These issues are deeply rooted in its economic foundations and cannot be changed only by subjective reform and education without the impact of external material force. Therefore, we should adopt a development strategy of full opening up domestically and internationally. The opening-up can bring new ideas and institutional mechanism reforms. At present, for Hunan, to realize all-round opening up externally and internally is to take the advantage of natural resources, human resources, and systems, to transform governmental functions and strengthen the serving awareness of the government, to improve the investment environment, to enhance the effort in investment attraction. All these will help to attract more industries, specialists, funds and technology to gather in Hunan, and make Hunan become the paradise for entrepreneurship.

In the adjustment of industrial structure, there are serious problems of administrative barriers, trade monopoly, barriers between different departments and
overlapping functions. Combine the basic role of resource allocation played by the market mechanism and effective governmental regulation, through accelerating reform, eliminate system and mechanism obstacles that restrict economic development, speed up the system and mechanism innovation to foster the vitality for economic development and independent growth mechanism, therefore, enhance the vitality and efficiency for economic development.

In spreading industrialization of high and new technology, the distribution of social resources shall be reformed, from the previous dispersed distribution to centralized distribution, high-tech industry and regional growth pole for in-depth and accelerated development; the income distribution system shall be reformed, from distribution according to work done to integrated distribution according to labor, technology, management and other factors.

(II) Actively cultivating the market

Only by adopting supernormal strategic measures to organically combine the planning and management of government and market mechanism Hunan can catch up with the pace of the entire nation in the coming 10 years. Supernormal development means to deadly conform to the rules. Compared to coastal regions in South-Eastern part of the PRC, the present development of Hunan is far behind. Hunan is a province with relatively underdeveloped industrialization. The long-term planning economy system and its concepts is beyond imagination for most citizens of Hunan, whose market awareness is not sufficient for the demand of market economy. People are highly dependent on the government. The non-governmental economy is still weak and the ability of the government to mobilize economic resource remains strong. Therefore, Hunan should actively cultivate the market, gradually develop an enterprise directed economy, develop industry according to the market demand and enable the market to exert the basic function of configuring resources in a wider range and to a greater extent.

(III) Speeding up the development of the non-public sector of the economy

Further smooth management mechanisms, change the corporate management by means of ownership nature, eliminate system barriers; speed up the establishment of a policy environment of fair competition; modify and abolish those policies and requirements that are adverse to the development of nonpublic economy, and practice equal policy treatments in connection with registration management, charge standard, financial discount interest, bank loan, land use, import/export operations right, participation in social insurance etc.; relax the restrictions on market access, entitle business with national treatment, create market conditions of fair competition, lead eligible enterprises to participate in the infrastructure construction and in the fields of tourism, environmental protection, ecology, science and technology, culture, intermediary agency service and others; enable civil technical enterprises to develop and enhance themselves, support advantageous enterprises for IPO financing;
strengthen policy supports, improve the service system, and encourage the public to create business.

(IV) Breaking the institutional barriers to enable free movement of production factors and achieve the urban-rural integrated development

The process of urban-rural integration is the process of translating the conflicts between two production modes of industry and agriculture, and the urban and rural living mode. To realize the strategic objective of bringing people wealth and strengthen the province, we should accelerate the urbanization of population, reduce rural population, liberate farmers from land and enable most farmers to enter into non-agricultural sectors while accelerating new industrialization and upgrading industrialization. Only in this way can the reconstruction of the agricultural production mode and living mode of farmers be realized and the processes of marketization, translation into enterprises and modernization of agriculture accelerated. In Hunan Province, 58% of the population is peasants, so to change the social identity, mode of production and living style of peasants is the major task in social and economic development in Hunan Province. To coordinate and regulate urban and rural economy puts emphasis on driving the overall advancement of industrialized agriculture and urbanization to facilitate surplus rural labors to transfer into the cities and towns and improve urbanization standards and employment levels of the whole society, led by industrial development.

Urban area and rural area should be coordinated and developed economically, socially, culturally and ecologically. This is mainly represented in the following aspects. For economy, Hunan should circulate in order, optimize and combine the production elements among urban and rural areas and different industries by system innovations such as unified residence systems, land systems, social security systems and management systems to ensure sustainable development of urban and rural economy. For a ‘Bi- Pattern’ society, Hunan should adjust the distribution of economic benefit between urban and rural areas by some measures to create a fair development environment and fair conditions. For the ecosystem, Hunan should include the urban and rural production and living into the urban and rural ecosystem. For culture, Hunan should ensure the unified advanced cultural value concept and education of urban and rural areas and farmers should enjoy the same modern civilization as urban citizens in socialized community life such as education, transport, shopping and healthcare.

V Strategy for Optimization of Organization Structure

One important factor for the relatively backward economy of Hunan Province is that the industry is full of small scale enterprises at low industrial cluster degree, but lacks dominant and super-sized enterprises. In this way, to accomplish the strategic objective of new industrialization, a series of strategic measures must be taken to
advance optimization of organization structure along with the implementation of the ‘4000 project’.

One-hundred billion industries: expand a group of industries with output value over one hundred billion, i.e. in line with the national industrial adjustment and revitalizing plan, boom a group enterprises with a turnover of more than one-hundred billion. In 2012, electrical appliance, automobile, metallic mature manufacturing and photovoltaic industry will be added to be more than one-hundred billion turnover and track traffic, wind-powered equipment manufacturing, feed processing, deep processing of copper and aluminum, petrochemical, building material, textile and medical industry will be added in 2015.

One-hundred billion cluster: develop a group of clusters with output over one-hundred billion, i.e. promote the development of existing 50 industrial clusters in the province, further improve the intensification and scale of Hunan Province.

One-hundred billion enterprise: nurture a group of enterprises with sales values of more than one-hundred billion, i.e. support leading enterprises with good development bases, vast market potential, strong driving function for turnover over one-hundred billion in 2012 like VALIN, Zoomlion, Sany Group and Hunan Non-ferrous, etc.

One-hundred billion park or area: create a group of parks or areas with total output values of more than one-hundred billion, i.e. focus on national and provincial industrial areas, based on the gross income of technology-industry trade over one-hundred billion in Changsha high-Tech Development Park in 2008, strive for a turnover of more than one-hundred billion in Chansha Economic Development Area and Zhuzhou High-tech Area in 2012 and Xiangtan High-tech Area, Xiang-tan Jiuhua Economic Area, Yueyang Yunxi Industrial Area, Hengyang High-tech Area, Yiyang High-tech Area, Loudi Economic Development Area and Chenzhou Non-ferrous Metal Industrial Park of Hunan Province in 2015.
Chapter X  Supporting Policies and Measures for Hunan New Industrialization

Strategy

I  Investment and Financing Strategies

(I) The bottleneck constraints in investment and financing being obvious

As the industrialization process in Hunan Province speeds up, constantly increasing projects involving infrastructure construction and industry development, more funds are demanded. However, the ‘bottleneck’ constraints in investment and financing are still serious. The following points are the concentrated expression of these ‘bottleneck’ constraints:

1. The overall level of investment and financing being relatively low

In terms of investment level in the year 2008, the total investment in Hunan Province accounted for only 3.28% of the total investment nationwide while the economic aggregation of Hunan Province accounted for 3.8% of the national total economic aggregate, with the former being 0.52 percentage points lower than the later one. In terms of credit availability, the total investment in Hunan Province is not compatible with the economic development of Hunan Province. At the end of 2008, the loan-to-deposit ratio of the financial institutions in Hunan Province was 64.8%, 4.85 percentage points lower than that of 2005 at the end of 10FYP. In 2008, both the GDP and deposits of Hunan Province exceeded CNY1,000 billion, with the GDP reaching CNY1,115.7 billion. However, the loan balance of various financial institutions in Hunan Province only accounted for 2.2% of the national loan balance, 1.6 percentage points lower than the percentage of GDP of Hunan Province in the national GDP.

2. Limited financing channels

Now, the financing channels of the enterprises in Hunan Province are becoming more and more diversified, but the process is slow. The main financing channel for the enterprises in Hunan Province is bank credit. Other financing channels, especially financing from the security markets, are of small scales. At the end of 2008, though the number of listed companies of Hunan Province reached 54 (49 of which are domestic listed companies and the 5 of which are abroad listed companies), only CNY6.759 billion were raised from the securities market, accounting less than 2% of the total amount of money raised from securities market nationwide. The listed companies of Hunan Province have problems as small equity scale, low profit level and weak re-financing capacity. What’s more, insufficient back-up resources also
seriously constrain the growth of scale and level of direct financing in Hunan Province. Enterprise financing’s over-reliance on bank credit, on the one hand is disadvantageous for the enterprises to win more flexible financing, and on the other hand, increases the risk of bank credit and counteracts the sustainable development of the economy and finance in Hunan Province. In addition, in case of credit crunch or adjustment of the credit management system, enterprises’ over-reliance on bank credit may bring great challenges for the production and operation of the enterprises themselves.

3. Relative insufficiency of investment in manufacturing industry

Industry investment is an important index reflecting the industrialization process. As Hunan Province is in the middle-stage of industrialization, speeding up the development of manufacturing industry is the key for propelling new industrialization. However, the investment in the manufacturing industry in Hunan has been weak for a long time. In recent years, though the proportions of investments in equipment manufacturing industry, logistics industry and in energy-conserving and environment protection have been constantly increasing, the proportion of investment in manufacturing industry in Hunan in the total provincial investment is still lower than that of the national average value. In the year 2007, the proportion of manufacturing industry investment in Hunan Province in the total provincial investment was 3.97% lower than the proportion of the national investment in manufacturing industry in total national investment. (See Table 10-1).

In terms of investment in the manufacturing industry, the investment in equipment manufacturing industry in Hunan Province is much lower than the investment nationwide. From 2004 to 2008, the proportions of the national investments in equipment manufacturing industry compared to the national total investment in manufacturing industry were 23.28%, 26.83%, 29.38%, 31.19% and 32.37% respectively, much higher than the proportions of Hunan Province’s investments in equipment manufacturing industry compared to the total investment in manufacturing industry. In recent years, this proportion has been wandering around 20% and about 10% lower than national average value.

Table 10-1  Comparison between Industrial Structure of Fixed Assets Investment in Hunan Province and that Nationwide (2005-2007) (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hunan Province</td>
<td>Nationwide</td>
</tr>
<tr>
<td>Agriculture, forestry, animal husbandry and fishery</td>
<td>2.67</td>
<td>1.1</td>
</tr>
<tr>
<td>Mining industry</td>
<td>2.70</td>
<td>4.3</td>
</tr>
<tr>
<td>Manufacturing industry</td>
<td>22.65</td>
<td>27.10</td>
</tr>
<tr>
<td>Industries which produce and supply power, fuel gas and water.</td>
<td>9.53</td>
<td>9.6</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>------</td>
<td>-----</td>
</tr>
<tr>
<td>Building industry</td>
<td>1.38</td>
<td>1.1</td>
</tr>
<tr>
<td>Transportation, storage and postal industries</td>
<td>7.58</td>
<td>11.50</td>
</tr>
<tr>
<td>Information transmission, computer service and software industries</td>
<td>2.07</td>
<td>2.1</td>
</tr>
<tr>
<td>Wholesale and retail industry</td>
<td>4.46</td>
<td>2.0</td>
</tr>
<tr>
<td>Lodging and catering industry</td>
<td>1.56</td>
<td>0.9</td>
</tr>
<tr>
<td>Financial industry</td>
<td>0.17</td>
<td>0.1</td>
</tr>
<tr>
<td>Real estate industry</td>
<td>25.53</td>
<td>23.3</td>
</tr>
<tr>
<td>Leasing and business service industries</td>
<td>0.75</td>
<td>0.7</td>
</tr>
<tr>
<td>Scientific research, technical services and geological survey</td>
<td>0.61</td>
<td>0.5</td>
</tr>
<tr>
<td>Water conservancy, environment and public facilities management industry</td>
<td>7.33</td>
<td>8.0</td>
</tr>
<tr>
<td>Resident service and other service industries</td>
<td>0.25</td>
<td>0.2</td>
</tr>
<tr>
<td>Education</td>
<td>2.67</td>
<td>2.6</td>
</tr>
<tr>
<td>Health, social security and welfare</td>
<td>1.15</td>
<td>0.8</td>
</tr>
<tr>
<td>Culture, sports and entertainment industries</td>
<td>0.80</td>
<td>0.9</td>
</tr>
<tr>
<td>Public management and social organization</td>
<td>6.15</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Source: *China Statistical Yearbook* and *Hunan Statistical Yearbook*.

In 2007, Hunan Province’s total investment in manufacturing industry was CNY111.81 billion, accounting for only 2.51% of the national total investment in manufacturing industry and much lower than the proportion of 3.8% of Hunan Province’s GDP compared to the national GDP. Compared with coastal provinces, investment in manufacturing industry in Hunan equals 18.01% of that in Jiangsu Province, 18.4% in Shandong Province, and 33.35% in Zhejiang Province; compared with other 5 provinces in central region of the PRC, the total investment in manufacturing industry in Hunan only equals to 34.97% of that in Henan Province, 73.03% in Anhui Province, 88.21% in Jiangxi Province and 88.83% in Hubei Province.

(II) **Comment on the effect of the existing financing and investment policy**

The development of new industrialization is a process demanding a great amount of capital. As a large agricultural province, weak industrial province and depressed financial province of the PRC, the development of Hunan Province has been restricted by the bottleneck of financial scarcity. Since the 21st century, especially in the 11th five year period, a series of financing and investment policies have been issued for new industrialization in Hunan Province and the implementation of those policies has an important promoter function in accelerating the new industrialization process in Hunan Province. However, most of these policies were instructive and not carried out practically, so the effect of implementation still remains unclear. From different areas,
the equipment manufacturing industry lacks support through risk investment and few enterprises invest in the capital market. Therefore, the financing and investment channel shall be diversified. There’s no complete financing and investment system, but a simple channel for energy saving and environmental protection while the new investment and financing mode is still under research. Now, in modern logistics, financing in the capital market has still not been started and the introduction of strategic investors shows little effect and returns. Thus, it is urgent to consolidate financial innovation for logistics.

1. Comment on existing financing and investment policy for equipment manufacturing industry

Since 11FYP, the government of Hunan Province has issued many policies in relation to the equipment manufacturing industry: Advice on Encouraging and Supporting Development of Engineering Machinery Industry (XGI[2007]no.19) and Plan for Implementation of Reinvigoration of Equipment Manufacturing Industry in Hunan Province (2009—2011 [2009] no.16), among them, are main two financial support polices: one aims to improve the credit service and financing environment for engineering machinery industry by expanding financial support to major projects and developing venture capital investment and trust financing to support engineer machinery. In Hunan Province, high-tech venture investment limited companies and middle and small sized enterprise credit guarantee limited companies give focal support to venture and develop projects of the engineering machinery industry, especially financing in internal and external capital market by middle and small sized secondary enterprises. However, in the Plan for Implementation of Reinvigoration of Equipment Manufacturing Industry in Hunan Province (2009—2011) issued in June, 2009, there’s no systematic regulation on investment and financing, only stipulating it is essential to introduce a large quantity of strategic investors, give financing support in the issue of stock, enterprise bonds and bank loans to restructured enterprise and offer loan discount to key enterprises in acquiring manufacturing enterprise and R & D institutions out of Hunan Province and the PRC and other relating projects.

From the effect of policy implementation, not enough policies supporting the development of equipment manufacturing industry have been carried out in Hunan Province currently and financial investment by the government mainly plays an introductory role whereas the strength and emphasis of introductive investment of the government shall be consolidated. In the equipment manufacturing industry, there’s not enough risk investment support in Hunan Province and people are scarce of private investment. Though financing in the capital market to promote the development of equipment manufacturing industry has been started, there’s only few listed enterprises and they are in small scale. Among the listed companies in the equipment manufacturing industry, those in Hunan Province only account for 5%; while of the nearly 50 listed companies in Hunan Province, only four are from the
equipment manufacturing industry. In short, the financing and investment channels and modes for the equipment manufacturing industry in Hunan Province shall be further diversified.

2. Comment on existing investment and financing policy in energy-saving and environmental protection

In recent years, a series of policies and documents has been issued to promote energy conservation and environmental protection in Hunan Province, mainly including: Advice on Vigorous Development of Circular Economy and Construction Of An Energy Saving and Environmental Friendly Society (XI [2006] No. 14), Decision on Implementing a Scientific Outlook on Development and Reinforcing Environmental Protection (XGI [2006] No. 23), Advice on Vigorous Development of Circular Economy and Construction Of An Energy Saving and Environmental Friendly Society, Plan for Integrated Implementation of Energy Saving and Emission Reduction in Hunan Province (XGF [2007] No. 29), Working Plan for Development and Improvement of Regulating Mechanism for Recourse Saving and Environmental Protection Hunan Province(XGOF [2009] No. 36), Planning of Resource-saving Society Construction in the 11th Five-year in Hunan Province, Energy Saving Plan for the 11th Five-year in Hunan Province, Plan for Development of Circular Economy in the 11th Five-year in Hunan Province and others, which mainly present the following financing and investment policies. (a) Encouraging and guiding financial institutions to reinforce financial support to circular economy, environment protection, energy saving and emission reduction and technological reform; (b) policy-oriented banks and commercial banks shall give credit support to energy saving and emission reduction projects and may check and ratify a certain line of credit to enterprises with good credit and offer multiple financial services in time; (c) encouraging foreign investors to invest in energy saving areas and introduce foreign government loans, international financial institution and social capitals to invest in environment protection undertakings; (d) various institutions shall provide prior loan guarantee for major energy saving projects.

There’s no obvious progress concerning the implementation effects of those policies. Generally speaking, there are still many problems, like incomplete energy saving, environmental protection, investment and financing mechanisms, unimplemented investment, simple investment and financing channels. What’s noted is mostly a lack of stably increasing systems of investment and secondarily very simple financing and investment channels with huge financial gaps. E.g. as required by the 11th Five-year national plan for environmental protection, in order to achieve the environmental protection goals for the 11th Five-year, the investment in environmental protection shall take up about 1.35% of GDP in the PRC. Analogue, the annual investment in environmental protection shall be about 12.5 billion in the 11th five years in Hunan Province. However, in recent years, the pollutant charge is
only about 500 million in Hunan Province, simply depending on governmental finance and investment in pollution discharge enterprises which inevitably will cause a huge capital gap. From other financing and investment channels, at present, diverse approaches for financing and investment in energy conservation and financing are still under exploration and there’s no new financing and investment mode in Hunan Province.

3. Comment on existing financing and investment policy for logistics

As for financing and investment polices in logistics, there are two terms in Proposals for Further Acceleration of Modern Logistic Development (XGI 〔2007〕 No. 41) issued on August 1, 2007: one is to take full advantage of introductive financial capitals. The provincial public finance arranges a certain amount of capitals from introductive funds for service to facilitate the development of modern logistics every year. These are mainly used for loan interest discount of major logistic enterprises and projects, commonweal (public) infrastructure construction and foundation work and demonstrative business reforms in logistics. Governments of all municipalities, counties and districts will also arrange a certain number of funds to support the development of local logistics, by reference to measures of the provincial government; the other term is to increase investment by multiple channels. More and more significant logistic projects with development potential shall be recommended to be listed in the project plan of the national bonds discount funds allotted by the central government. Departments directly subordinated to the province shall prepare certain proportions of introductive funds to help the development of logistics sector every year. The provincial middle and small sized enterprise credit guarantee institutions shall prepare some funds to support the development of small and middle sized logistic enterprises every year. On the basis of consolidation in cooperation between banks and enterprises and encouragement of independent approval of loan by financial institutions, loans for logistic enterprises and projects shall be added. Logistic enterprises meeting requirements are encouraged to collect money from the capital market. On June 11, 2009, the government of Hunan Province issued the Plan for Implementation of Reinvigoration of Logistics in Hunan Province (2009—2011), (XZF [2009] No. 26) document, which doesn’t present more support policies than previous ones did but presents rigorous principles.

From the effect of policy implementation, they are largely introductive, e.g. to direct the development of logistics and we have to wait to see the implementation effect. At present, the financing and investment channels and approaches for logistics do not develop and diversify quickly in Hunan Province. E.g. there’s no listing of logistic companies in the listing of companies of Hunan Province; the introduction of strategic investors doesn’t receive good return and the new logistic financing and investment system hasn’t been established, yet. Furthermore, modern logistics lacks financial innovation. As to materialize measures for policy implementation, it is
mainly indicated in investment of the provincial government in modern logistics as the government decides to set a dedicated fund for the development of modern logistics from 2008 in Hunan Province by taking out of 5 million from the provincial public finance. However, compared with advanced provinces or municipalities, the governmental investment is still very small. e.g. Shenzhen, Guangdong province, arranges 200 million special fund for logistics development in 2009 to support major logistic enterprises and new shipping routes and scheduled transportation; Jiangsu province arranges 30 million special fund to support third party logistic enterprises every year, up to 2 million for each project. In the middle part, Hubei province offers subsidy 0.8 million for the third party logistics and chain delivery projects, CNY50,000 fiscal subsidy for every regular cargo ship for container service in Yangluo port and the government will act in coordinating credit support by financial institutions for qualified significant logistic projects.

(III) Investment and financing strategies

From now on until 2020, Hunan Province will be in the key period of promoting the new industrialization, in which infrastructure construction, urbanization, industrial upgrading, social development fiercely demand financing and investment and require a large number of and highly intensified financial and investment activities, at an annual increase over 20%. Since Hunan Province is located in the middle part of the PRC and in an unfavorable position in the marketized and intensified capital distribution pattern, indicating rigorous supply and demand conflicts of structural capital, basic financing and investment ideas shall be: ensuring a reasonable investment rate in terms of strategic height and constant expansion of investment and financing channels, insisting on the principle of energy conservation and environmental protection, constantly bringing forth new ideas on financing and investment modes, constructing a diverse investment and financing system required by the new industrialization in Hunan Province, optimizing the environment and innovating the systems and mechanisms for investment and financing to scientific and sound industrial guidelines. Specific strategic countermeasures include: continuous increase of government investment and credit support, full play of capital market for direct financing, further improvement of investment inviting standards, utilization of private capitals through multiple channels, further development of an investment and financing system reform and optimization of the investment and financing environment.

1. Continuously increasing government investment. It is essential to use opportunities afforded by the state promoting an economic incentive scheme, releasing an adjustment and revitalization plan for ten industries, implementing a strategy for central part of the PRC to raise and advance the two-oriented society and developing general supportive reform tests for the Chang-Zhu-Tan city cluster, etc. Thus, put forward and reserve a school of major infrastructure projects and major
industrial projects specifically for more intensified financial support of the state, taking full advantage of funds within the central budget, special funds of related state ministry and commission, national loans and financing through enterprise bonds; the provincial and local government shall continue to increase investment based on their growth of finance to give better support to the new type of industrialization through multiple methods, including free financing, loan subsidies, allowance (guiding) funds and venture capital funds.

2. Continuous intensifying financial support. It is essential to strengthen guidance on credit funds of banks and build up and improve a regular communication and negotiation system between the government, departments and banks, expanding cooperation between banks and enterprises further, releasing superior industries and advantageous projects of Hunan province in time so as to provide a fast and convenient information exchange platform for banks and enterprises to strive for syndicated loan and accelerated integration of financial capitals and industrial capitals. All commercial banks shall innovate their financial service mode, increase financial varieties, expand credit marketing and leverage credit scale to the maximum extent so as to provide better credit support to the new type of industrialization in combination with their own features and business requirements and in terms of their own industrial and credit policies. Furthermore, it is essential to consolidate the construction of a financial support platform like a guarantee institution to provide financial facilities for the new type of industrialization projects.

3. Fully playing of capital market for direct financing. In terms of the shareholding reform and floatation of shares, it is required to give prior support to projects compliant with requirements of new type of industrialization and make full play of directing financing to expand the amount of capital stock of listed companies with all efforts and improve their profitability. This should lead listed companies to invest capitals raised by floating stocks into equipment manufacturing, modern logistics and energy saving, environmental field, etc.. Meanwhile, it is essential to encourage advantageous enterprises to acquire and merge listed capitals for better capital operations and fast expansion through capital market. In addition, it is essential to construct a new investment and financing platform in accordance with requirements on the development of the new type of industrialization, e.g. to speed up the increase of investment in establishing Xiang River industrial investment funds to help it exercise investment function as soon as possible and develop into the main platform for provincial industrial investment and thus add another source of strategic funds for the province based enterprises. As a result, it will lead Hunan Investment Holdings, Xing Xiang and other state-owned asset management companies to transfer more capitals into key projects with higher strategic value and major breakthroughs in technology and in compliance with requirements for the development of new industrialization in Hunan province.
4. **Further improving investment inviting standards.** In advancing the new type of industrialization in Hunan province, it is essential to expand the attraction of foreign investment and improve its quality and benefits, strengthen the introduction of strategic investors, improve strategic alliance with domestic and foreign big businesses and companies by introducing large companies, large syndicates and large projects. It is essential to introduce and accommodate a group of multinational companies to aggressively establish a large equipment manufacturing base and research and development center, procurement center, logistic center and regional headquarters in Hunan province. Furthermore, more efforts shall be made to acquire funds of international organizations and institutions in the form of aid, trade, investment, etc. for the energy conservation and environmental protection area in Hunan province. Measures shall be taken to encourage enterprises inside and outside Hunan province to look for domestic and international partners to support cooperation or joint venture between enterprises of the province with foreign businesses, especially strategic investors in the form of consolidation, acquisition, increase in capital and share, etc. Encourage domestic and foreign famous enterprises to acquire and merge local enterprises of Hunan province. It is essential to catch opportunities of all-around regional cooperation in Pan-Pear River Delta, Yangtze River Delta and Central part of the PRC, etc. to leverage the location advantages and good industrial base as well as low operation costs in Hunan province to vigorously accommodate domestic and foreign industrial transition.

5. **Utilizing private capital through multiple channels.** Private capital is an important force for investment and financing in Hunan province and has made significant contributions to the economic growth of the whole province. In the future, it is essential to expand access for private funds by launching private investment, boosting conversion of deposits and encouraging private investment in the process of new type of industrialization of Hunan province through sole proprietorship, joint venture, cooperation, associate, project financing, PPP, BOT, TOB, ABS, etc. It is essential to have the courage to open municipal and civil utilities and infrastructure areas for private businesses to invest so as to expand the investment room of non-state-owned sectors. It is essential to boost the development of risk investment for starting businesses and encourage the establishment of risk investment funds for starting businesses in line with market mechanism to lead private capitals into the area of risk investment for starting business and to create a good environment and route for private capitals to invest in the new type of industrialization of Hunan province. Besides, encouraging and directing private capitals, especially domestic and oversea venture (risk) investment funds to involve in equipment manufacturing, modern logistics, energy conservation and environmental protection of Hunan province is inevitable.

6. **Further developing the investment and financing system reform.** It is
essential to boost the reform of the investment and financing system centering on the advancement in the innovation of the investment and financing system for the new type of industrialization to reduce institutional ineffective investment but to develop the standard relationship between the government and investment and financing bodies so as to activate government and investment and financing bodies for a better and solid system and mechanism base for the growth of investment and financing and optimization of the structures. On the one hand, the investment and financing management system shall be improved. With the principle of the one who puts investment, who makes decision and who benefits will bear the risk, the position of the enterprise as the investment and financing body shall be implemented and an approval system, shall be standardized, the registration and documentation system shall be improved, at the same time, the motivation for social capitals to invest and finance shall be broadened so as to boost fair competition among all investment and financing bodies. On the other hand, a scientific and standard decision making system of the government for investment and financing projects shall be developed and established so as to improve administration of the government on investment and financing projects and capitals and simplify and standardize procedures for project approval and make full play of investment and financing effect of the government. Furthermore, the legislation system with respect to investment and financing shall be improved to regulate investment and financing behaviors of investment and financing bodies. The investment and financing regulation and control approach of the government shall be coordinated and improved by comprehensive application of economic, legal and indispensable administrative approaches to enable effective regulation and control of the investment and financing of the whole society, mainly through indirect regulation and control. Finally, it is essential to expand the reform of the financial system further to intensify financial support for the private economy and middle and small sized enterprises.

7. Optimizing the investment and financing environment. A good investment and financing environment is the essential guarantee for fast development of investment and fiancé and virtuous cycles. For Hunan province, the key to improve and optimize investment and financing environment is to do three things properly: first, to improve the credit system further by rigorously improving credit consciousness of the whole society and seriously penalize the behavior of shifting off debts, by competing with speeding up improvement of enterprise credit registration and by consulting systems of banks and establish an individual credit system step by step with emphasis on the application of the credit system so as to provide institutional and technological guarantee for the optimization of the credit environment and credit extension; second, to develop an investment and financing intermediary service system, e.g. investment and financing consultation, project assessment, design, tender agent, accounting, auditing, legislation, supervision,
enterprise credit rating and assets appraisal, and improve the guarantee system for investment and financing by advancing innovation and diversification of investment and financing bodies; third, to enhance guidance on investment and financing orientation by consolidating planning, warming, regulation and control functions of the government in investment and financing to improve guiding on planning and the scientific nature in investment and financing guiding, reduce waste in investment and financing due to improper planning, guiding and poor implementation, etc.; building up early warning and protection systems for risks in investment and financing to improve monitoring and analysis of the operations of investment and financing and release a corresponding regulation and control policy and state and development trend of investment and financing in major industries to the society in time in case of wastes in investment and financing due to insufficient information.

(IV) Proposals for investment and financing policy

1. Making investment and financing policies beneficial for the development of the equipment manufacturing industry in Hunan Province

First is to aggressively organize the implementation of the state adjustment and revitalization plan for the equipment manufacturing industry and increase supporting capital investment in Hunan Province. Second is to establish special funds for the development of the equipment manufacturing industry in Hunan Province. Third is to fund “incubators” and provide financial discount by the government for technological enterprises in the equipment manufacturing industry to help curtail the starting period of the venture. Fourth is to take advantage of procurement of the boost of the development of equipment manufacturing industry. Fifth is to encourage private capitals and multinational or giant cooperation to invest in the equipment manufacturing industry in the way of sole proprietorship, shareholding and subscription. Sixth is to support fiercely the equipment manufacturing enterprise meeting requirements to collect money from domestic and oversea capital markets and apply for issuing of corporate bonds. Finally, speed up financial innovation and promote domestic seller’s credit, letter of credit and joint guarantee loan for the high-tech equipment manufacturing industry.

2. Developing investment and financing policies to speed up the development of modern industrialization

First, it is essential to prepare and set up funds for logistic development in Hunan Province, in particular, prior subsidized interest loan for major logistic parks; the government may invest in construction of logistic infrastructures and lease them to logistic enterprises to reduce the one-off investment pressure; or allow pre-tax loan repayment for enterprises engaging in logistic platforms to improve their financing capability. Second, encourage logistic enterprises to get involved in assets restructuring through equity investment, shareholding, merger, combination, joint venture, cooperation and other forms. Third, permit logistic enterprises with
development potential to issue long-term bonds, test issuing of stocks and liberate restrictions to a certain extent. Fourth, improve the logistic guarantee system, expand the guarantee scope of movable mortgage in logistics and explore to establish dedicated policy guarantee institutions in Hunan Province. Fifth, develop logistics and supply chain finance, vigorously considering the joint construction of ‘logistic banks’ by enterprises and financial institutions.

3. Formulating investment and financing policies in support of development of energy saving and environmental protection

First, increase investment of public finance in energy saving and environmental protection, competing for state bonds and issue of local bonds to boost energy saving and environmental protection, enhance a collection of a pollutant charge, sewage disposal charge and waste treatment charge by improving the collection standard. Second, ask for state support and issue energy saving and an environment protection lottery. Third, develop BOT and TOT type of energy saving and environmental friendly financing methods. Fourth, encourage the integration of venture investment, energy saving and environmental protection, take advantage of the stock market for financing, increase the issue of energy saving and environmental friendly bonds, attempt to finance in ABS methods and explore to develop energy saving and environmental protection trust investment and lease. Fifth, widely absorb international trust credit funds, take advantage of preferential loans of WB, ADB to develop the energy saving and environmental protection industry rapidly.

II Fiscal and Taxation Policies and Measures

Recently, the central government and the local governments attached much importance to the implementation of fiscal policy and significant positive effects come into the stage. Meanwhile, problems in the field of both fiscal system and fiscal policy implementation exist. In order to facilitate the development of Hunan new industrialization, improvement and innovation, innovation must be implemented.

(I) Hunan’s fiscal system and fiscal conditions

1. Current fiscal system framework

At present, most county areas and municipalities implement the tax-sharing system covering “dividing taxes, confirming revenue and expenditure, sharing in excess revenue, burdening for the shortage”. Meanwhile, Hunan sees the traditional fiscal system with the character of “handing in all the collected revenue and confirming all the expenditure”. Strictly speaking, Hunan’s fiscal system is a mixture between the typical tax-sharing system and traditional system.
Box 10-1  Hunan’s Fiscal System Framework

Fiscal revenue and expenditure is divided according to the governmental levels. Provincial fiscal revenue includes profits and sales-tax from the enterprises affiliated to the provincial administration. So is the municipality fiscal revenue. The tax-sharing revenue including resources tax, land value-added tax, urban land use tax, and the sharing rate is 50 per cent. The provincial expenditure includes infrastructure investment, technology upgrading and new product experiment affiliated to the provincial enterprise, facility construction, price subsidy and other specified expenditure items. The municipality level expenditure covers the relevant infrastructure investment, technology upgrading and new product experiment expenditure, facility construction, price subsidy, agriculture expenditure, city maintenance and construction expenditure, and administrative expenditures, etc.

Tax debate base from the provincial government to local governments follows the base confirmed in 1993. Since 1994, tax debate has gradually increased based on the calculation of 1993. The average increase of tax revenue returned Hunan is equal to an additional 30 per cent of the average increase in the VAT and consumption tax, and 20 per cent of the average increase of tax debate is assigned to the municipality and county level governments; the remaining 10 per cent are controlled by the provincial government. If the revenue turned over to the central and provincial government fails to meet the expected targets in a specific year following 1994, the provincial government is supposed to deduct the tax debate base.

The current fiscal system maintains some contents of the earlier system. The subsidy from the provincial government will continue to increase based on the previously calculated model. In the case of Xiangtan City implementing a different distribution method, the current system also allows Xiangtan to continue its previous method. The other special purpose subsidies from the provincial government to should go into the local governments as far as possible. This principle also applies to the low level inter-government transfer system.

Source: Hunan Public Finance Bureau

2. Hunan’s overall fiscal condition

(1) Fiscal revenue

Since 1998, the fiscal revenue in Hunan province has grown steadily. In 2008, general budgetary revenue reached CNY72.3 billion, up 19.2 per cent compared to 2007. Provincial budget revenue reached CNY14.6 billion, up 17.96 per cent. The growth rate at the municipality level was 26.9 per cent. On a yearly basis, the growth rate of totaled fiscal revenue reached 19.7 per cent from 2001 to 2009.

The average fiscal revenue in municipality was relatively low. In 2007, the average fiscal revenue was only CNY954 per person, ranked 24th among 31
provincial units, and ranked No. 3 in the middle areas (Table 10-2).

Table 10-2   The National Average General Budget Revenue per capita (2007)

<table>
<thead>
<tr>
<th></th>
<th>Population (10,000 persons)</th>
<th>General budget revenue (CNY 10,000)</th>
<th>Average fiscal revenue per capita (CNY)</th>
<th>Ranking list</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Total</td>
<td>132,129</td>
<td>235,726,181</td>
<td>1,784</td>
<td></td>
</tr>
<tr>
<td>Beijing</td>
<td>1,633</td>
<td>14,926,380</td>
<td>9,140</td>
<td>2</td>
</tr>
<tr>
<td>Tianjin</td>
<td>1,115</td>
<td>5,404,390</td>
<td>4,847</td>
<td>3</td>
</tr>
<tr>
<td>Hebei</td>
<td>6,943</td>
<td>7,891,198</td>
<td>1,137</td>
<td>19</td>
</tr>
<tr>
<td>Shanxi</td>
<td>3,393</td>
<td>5,978,870</td>
<td>1,762</td>
<td>11</td>
</tr>
<tr>
<td>InnerMongolia</td>
<td>2,405</td>
<td>4,923,615</td>
<td>2,047</td>
<td>8</td>
</tr>
<tr>
<td>Liaoning</td>
<td>4,298</td>
<td>10,826,948</td>
<td>2,519</td>
<td>7</td>
</tr>
<tr>
<td>Jilin</td>
<td>2,730</td>
<td>3,206,892</td>
<td>1,175</td>
<td>17</td>
</tr>
<tr>
<td>Heilongjiang</td>
<td>3,824</td>
<td>4,404,689</td>
<td>1,152</td>
<td>18</td>
</tr>
<tr>
<td>Shanghai</td>
<td>1,858</td>
<td>20,744,792</td>
<td>11,165</td>
<td>1</td>
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<tr>
<td>Jiangsu</td>
<td>7,625</td>
<td>22,377,276</td>
<td>2,935</td>
<td>6</td>
</tr>
<tr>
<td>Zhejiang</td>
<td>5,060</td>
<td>16,494,981</td>
<td>3,260</td>
<td>4</td>
</tr>
<tr>
<td>Anhui</td>
<td>6,118</td>
<td>5,436,973</td>
<td>889</td>
<td>27</td>
</tr>
<tr>
<td>Fujian</td>
<td>3,581</td>
<td>6,994,577</td>
<td>1,953</td>
<td>9</td>
</tr>
<tr>
<td>Jiangxi</td>
<td>4,368</td>
<td>3,898,510</td>
<td>893</td>
<td>26</td>
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<td>Shandong</td>
<td>9,367</td>
<td>16,753,980</td>
<td>1,789</td>
<td>10</td>
</tr>
<tr>
<td>Henan</td>
<td>9,360</td>
<td>8,620,804</td>
<td>921</td>
<td>25</td>
</tr>
<tr>
<td>Hubei</td>
<td>5,699</td>
<td>5,903,552</td>
<td>1,036</td>
<td>23</td>
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<tr>
<td>Hunan</td>
<td>6,355</td>
<td>6,065,508</td>
<td>954</td>
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<tr>
<td>Guangxi</td>
<td>9,449</td>
<td>27,858,007</td>
<td>2,948</td>
<td>5</td>
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<tr>
<td>Guangxi</td>
<td>4,768</td>
<td>4,188,265</td>
<td>878</td>
<td>28</td>
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<tr>
<td>Hainan</td>
<td>845</td>
<td>1,082,935</td>
<td>1,282</td>
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<tr>
<td>Chongqing</td>
<td>2,816</td>
<td>4,427,000</td>
<td>1,572</td>
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<tr>
<td>Sichuan</td>
<td>8,127</td>
<td>8,508,606</td>
<td>1,047</td>
<td>21</td>
</tr>
<tr>
<td>Guizhou</td>
<td>3,762</td>
<td>2,851,375</td>
<td>758</td>
<td>29</td>
</tr>
<tr>
<td>Yunan</td>
<td>4,514</td>
<td>4,867,146</td>
<td>1,078</td>
<td>20</td>
</tr>
<tr>
<td>Tibet</td>
<td>284</td>
<td>201,412</td>
<td>709</td>
<td>31</td>
</tr>
<tr>
<td>Shanxi</td>
<td>3,748</td>
<td>4,752,398</td>
<td>1,268</td>
<td>16</td>
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<tr>
<td>Gansu</td>
<td>2,617</td>
<td>1,909,107</td>
<td>730</td>
<td>30</td>
</tr>
<tr>
<td>Qinghai</td>
<td>552</td>
<td>567,083</td>
<td>1,027</td>
<td>22</td>
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<tr>
<td>Ningxia</td>
<td>610</td>
<td>800,312</td>
<td>1,312</td>
<td>14</td>
</tr>
<tr>
<td>Xinjiang</td>
<td>2,095</td>
<td>2,858,600</td>
<td>1,364</td>
<td>13</td>
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</tbody>
</table>

Tax revenue dominated fiscal income in Hunan province. In 2008, the ratio of tax revenue to fiscal revenue was 82 per cent. In addition, the turn-over tax composed the main source of tax revenue, and the next biggest revenue source was income tax.
Moreover, value-added tax (VAT) was the major part of turn-over tax. Since 2001, the ratio of VAT to tax collection has stayed at 35 per cent, and income tax revenue accounted for 17 per cent of tax revenue (Table 10-3).

Table 10-3  Hunan’s Tax Revenue Distribution (%)

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
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</thead>
<tbody>
<tr>
<td>Turn-over tax</td>
<td>74.7</td>
<td>75.8</td>
<td>76.1</td>
<td>76.9</td>
<td>76.9</td>
<td>75.2</td>
<td>72</td>
<td>68.7</td>
</tr>
<tr>
<td>VAT</td>
<td>40.3</td>
<td>40.4</td>
<td>40.7</td>
<td>41.5</td>
<td>41.7</td>
<td>40.7</td>
<td>38.4</td>
<td>35.4</td>
</tr>
<tr>
<td>Consumption tax</td>
<td>21.8</td>
<td>20.6</td>
<td>19.6</td>
<td>19.8</td>
<td>19.6</td>
<td>18.5</td>
<td>17.2</td>
<td>17.1</td>
</tr>
<tr>
<td>Business tax</td>
<td>12.6</td>
<td>14.8</td>
<td>15.8</td>
<td>15.6</td>
<td>15.6</td>
<td>16</td>
<td>16.4</td>
<td>16.2</td>
</tr>
<tr>
<td>Income tax</td>
<td>17.8</td>
<td>16.7</td>
<td>16.3</td>
<td>15.9</td>
<td>15.8</td>
<td>17.3</td>
<td>18.9</td>
<td>18.5</td>
</tr>
<tr>
<td>Other taxes</td>
<td>7.4</td>
<td>7.6</td>
<td>7.6</td>
<td>7.1</td>
<td>7.1</td>
<td>7.4</td>
<td>9.2</td>
<td>12.8</td>
</tr>
</tbody>
</table>

Viewed from the point of growth rate, the fiscal revenue in Hunan is in line with that of the PRC, yet 3.8 point lower than the national average level (Figure10-1) (on yearly basis, hereafter).

Figure 10-1  Fiscal Revenue Growth Rate in the PRC and in Hunan (%)

(2) Government expenditure

Since 2003, the government expenditure increased rapidly, from CNY57.4 billion in 2003 to CNY176.5 billion in 2008, annually rising by 25.19 per cent.
Education weighted largest among governmental expenditure. In 2008, the proportion was 17.63 per cent. The next largest areas of expenditure were social security, employment, which indicated that the governments in Hunan began to concentrate on the issue of so-called people's livelihood.

There were not many changes for those expenditures. That is to say, they were relatively stable from 2003 to 2008; the ratio of agriculture expenditure was 9.9 per cent, science expenditure 1.55 per cent, education 16.9 per cent, and social well-being and employment 15.2 per cent (Table10-4). Of course, because of low average fiscal capacity, the problem of irrational fiscal structure still remained seriously, particularly the big gap in science and technology and Medicare between the east provinces and the Hunan province.

<table>
<thead>
<tr>
<th>Item expenditure</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>53.58</td>
<td>85.97</td>
<td>89.66</td>
<td>93.73</td>
<td>125.92</td>
<td>176</td>
</tr>
<tr>
<td>Ratio (%)</td>
<td>9.3</td>
<td>11.9</td>
<td>10.3</td>
<td>8.8</td>
<td>9.3</td>
<td>10.0</td>
</tr>
<tr>
<td>Science</td>
<td>11.05</td>
<td>10.71</td>
<td>12.98</td>
<td>15.02</td>
<td>20.49</td>
<td>27</td>
</tr>
<tr>
<td>Ratio (%)</td>
<td>1.9</td>
<td>1.5</td>
<td>1.5</td>
<td>1.4</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Education</td>
<td>113.03</td>
<td>104.33</td>
<td>153.75</td>
<td>162.64</td>
<td>228.52</td>
<td>311</td>
</tr>
<tr>
<td>Ratio (%)</td>
<td>19.7</td>
<td>14.5</td>
<td>17.6</td>
<td>15.3</td>
<td>16.8</td>
<td>17.6</td>
</tr>
<tr>
<td>Social security and well being and Employment</td>
<td>69.72</td>
<td>100.15</td>
<td>115.71</td>
<td>189.38</td>
<td>220.98</td>
<td>310</td>
</tr>
<tr>
<td>Ratio (%)</td>
<td>12.2</td>
<td>13.9</td>
<td>13.2</td>
<td>17.8</td>
<td>16.3</td>
<td>17.6</td>
</tr>
<tr>
<td>Total fiscal expenditure</td>
<td>573.75</td>
<td>719.54</td>
<td>873.42</td>
<td>1064.52</td>
<td>1357.03</td>
<td>1765</td>
</tr>
</tbody>
</table>

(3) Fiscal transfer

Generally speaking, the expenditure is above the fiscal revenue in Hunan, and the distance is met with the central government transfer, which is composed of tax rebate and transfer. In 2008, the proportion of fiscal transfer composed 89 per cent of the total subsidy of the central government, indicating high dependence of Hunan province on the central government.

Fiscal transfer is divided into two parts, generous transfer and specified transfer. In 2007, the rate weighted 56 per cent of fiscal transfer, and it decreased to 51 per cent (Table 10-5).
Table 10-5  Transfer to Hunan Province from the Central Government  
(CNY100 million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total subsidy from the central government</th>
<th>Tax debate</th>
<th>Tax transfer</th>
<th>Generous transfer (1)</th>
<th>Specified transfer (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>328.72</td>
<td>103.36</td>
<td>225.36</td>
<td>121.98</td>
<td>103.38</td>
</tr>
<tr>
<td>2004</td>
<td>454.87</td>
<td>111.92</td>
<td>342.95</td>
<td>161.24</td>
<td>181.71</td>
</tr>
<tr>
<td>2005</td>
<td>503.76</td>
<td>117.68</td>
<td>386.08</td>
<td>204.22</td>
<td>181.86</td>
</tr>
<tr>
<td>2006</td>
<td>653.05</td>
<td>122.42</td>
<td>530.63</td>
<td>285.57</td>
<td>245.06</td>
</tr>
<tr>
<td>2007</td>
<td>851.35</td>
<td>129.29</td>
<td>722.06</td>
<td>406.45</td>
<td>315.61</td>
</tr>
<tr>
<td>2008</td>
<td>1,067.99</td>
<td>116.81</td>
<td>951.18</td>
<td>483.03</td>
<td>468.15</td>
</tr>
</tbody>
</table>

Based on Figure 10-2, the growth rate of the fiscal transfer to Hunan province has declined sharply since 1998, and remained relatively stable after 2000. In the past two years, the growth rate kept at more than 30%.

Despite the large amount of generous transfer to Hunan, the average level is still much lower than that for the Western region. What is worse, the gap seems to have increased in the past years. In 1997, the average transfer in Hunan, Shanxi and Inner Mongolia was CNY6.95, CNY6.99 and CNY21.47, respectively. By 2003, the average fiscal transfer in Hunan was CNY32.93, yet the amount in Shanxi and Inner Mongolia was CNY37.57 and CNY69.71, indicating the gradually larger gap.

3. Local Fiscal conditions at different levels
The provincial fiscal revenue and public expenditure grows steadily. The provincial fiscal revenue rose from CNY4.9 billion in 2003 to CNY14.6 billion in 2008, annually increasing by 24.4 per cent. The provincial public expenditure rose

![Figure 10-2  Growth Rate of Fiscal Transfer to Hunan (%)](.)
from CNY14.8 billion to CNY36.1 billion, up 19.7 per cent on a year-to-year base (Figure 10-3).

![Figure 10-3 Hunan’s Provincial Fiscal Conditions (CNY100 million)](chart)

The annual growth rate for the municipality fiscal revenue was 24.05 per cent from 2003 to 2008, a little bit slower than that of the provincial fiscal revenue. Yet on the expenditure side, the growth of the municipality level is much higher than the provincial level. Correspondingly, transfer to the municipality government grew, from CNY5.1 billion in 2003 to CNY15.6 billion in 2008, which means that the municipality government controlled more fiscal resources to promote the regionalism and industrial construction in the process of new industrialization (Figure 10-4).
The county-level fiscal revenue and expenditure is largest among the four levels of public finance. In 2003, the county-level fiscal revenue was CNY1.2 billion higher than that of municipal fiscal revenue, and the county-level fiscal expenditure was CNY12.15 billion higher than that of municipal fiscal expenditure. In 2008, the fiscal difference was CNY10.6 billion, and the expenditure gap climbed to CNY62.1 billion (Figure 10-5). The increasing growth rate of fiscal expenditure indicates that the county-level governments bear most of the expenditure responsibility of the Hunan province and thus face serious fiscal difficulties.
The volume of the township fiscal revenue and expenditure is the smallest among the four levels of local governments. In 2008, the ratio of township fiscal revenue to total fiscal revenue in Hunan was 10.8 per cent. Despite this, the township governments face increasing fiscal burden. In 2003, fiscal surplus was CNY500 million. Yet in 2007, the deficit prior to fiscal transfer appeared CNY3.1 billion. The reasons for township fiscal difficulties are comprehensive, including policy changes like canceling agriculture tax, and insufficient fiscal capacity under current fiscal framework (Figure 10-6).

![Figure 10-6  Hunan’s Township Fiscal Conditions (CNY100 million)](image)

4. Hunan Provincial Transfer to the Municipal and County Governments

Figure 10-7 shows that the size of fiscal transfer to the municipality and county government from the provincial government explodes very quickly, rising from CNY500 million in 2001 to CNY15.9 billion in 2008. Among them, fiscal transfer to the county government is the major part, accounting for 74 per cent in 2001 and 71 per cent in 2008.

However, it should be kept in mind that the fiscal transfer to the municipality governments recently rose sharply, from CNY1.4 billion in 2006 to CNY4.6 billion in 2008, indicating again that the provincial government strengthened efforts to allocate resources within the municipal territory, which was good for adjustment and optimization of the regional industrial distribution and for the creation of a favorable environment for new industrialization (Figure 10-7).
(II) Challenges for reforming Hunan’s sub-provincial fiscal system

Sub-national intergovernmental fiscal relations, which bear close relation to the local governments’ enthusiasm and initiative to implement industrialization strategy, can be regarded as an important institutional factor for realizing industrialization. Reforming the current fiscal relations and the transfer payment system in Hunan province will have direct and indirect impact on its new industrialization effort. Challenges of these reforms will also have significant implications.

(III) New requirements and challenges for the local public finance

1. New requirements for the local public finance

New industrialization has brought new demands for local financial support, which include: how public finance supports New industrialization, how to use tax incentives to stimulate New industrialization, how to change the financial notions and improve financial capacity to adapt to the needs of New industrialization.

(1) Financial support

New industrialization has brought new demands for the local financial support. The first is how to determine the support targets and scope of local finance. Local finance should support the enterprises on their way to new industrialization, or through industrial restructuring and upgrade to speed up the process of new industrialization. The second demand is how to determine the mode of financial support. Local finance may adopt direct investment or through direct subsidies, interest subsidies or government guarantees to support the development of new industrialization, which produce different results. Thirdly, there is the determination of local financial support’s efforts. To what extent should local finance support different regions at different stages of development.

(2) Tax incentives
What kind of tax incentives are the most conducive to the new industrialization process is also an important local fiscal problem, which includes: whether using direct taxes or using indirect taxes to stimulate the industrial development; what kind of production link should be applied: exploitation link, production link or distribution link? Is refund after collection or the direct tax incentives to business management? Are taxes incentives on capital or on earnings; how do tax incentives combine with tax constraint, and so on.

(3) Fiscal capacity

Local finances should be confined to the driving GDP growth and engage in building financial resources, but also support saving resources and protecting the environment. In the long run, economic growth, social development, environmental protection and resource conservation will essentially be unified, which will put new demands on local fiscal capacity. New industrialization represents the development trend of industrialization and requires local finance to possess new capacities, including a stable revenue growth mechanism, a reasonable level of fiscal expenditure structure and effective budget management capabilities (such as transparency, the reasonable procedures), capabilities to guard against risks, as well as emergency response capabilities to crises.

(4) Financial notions

There is no perfect example for new industrialization, thus continuous exploration of lessons learned is inevitable. This requires breaking the traditional concept built on the basis of traditional industrialization and learning new things from new situations, new problems and new contradictions. Local finance needs to adapt to this new change and update its concepts. Traditionally, finance mainly focused on making big profit, cultivating financial resources and paying attention to the increase of profit; now public finance should rather support the shared growth to ensure that more people share the fruits of this growth. Economic growth does not automatically reduce poverty and will not automatically be beneficial for everyone. It would be a failure if the new industrialization brought only the expansion of the economic scale. This requires new knowledge and new ideas.

2. Uncertainty and public risks in the reform and development

Nowadays, economic and social operations are fraught with risks, such as natural risks, social risks and economic risks. In its process of reform and development, Hunan Province is also faced with uncertainty and risk in the reform and development.

(1) Uncertainty and risk of reforming and development

There are needs of related complementary reforms to new industrialization in Hunan; otherwise it would be very adverse to the process of new industrialization. If the social security reform is lagging behind, or staff’s social security in the bankrupt or restructuring state-owned enterprises is not in place, it not only increases the burden
on local finances, but also drags down the process of new industrialization. In addition, the reforms in other areas, such as the reform of the educational system, the reform of the institutional unit, the reform of the state-owned enterprises, the reform of the financial system, fiscal reform and land reform, have a domino effect; the failure of any of the reforms potentially has a profound impact on the development direction and the course of new industrialization in Hunan Province. Besides, the demands of the external market, other development of economic and social areas, such as social stratification, change in exchange rate, political events, etc., may have a direct or indirect impact upon the process of new industrialization in Hunan.

(2) Coordination of reform and support in public finance

Reform is the engine of development, development is the purpose of reform, and the reform and development are unified in nature. In accordance with the requirements of the framework of public finance, Hunan province should further adjust and optimize the structure of financial expenditure. Finance should gradually withdraw from the field of general competition, and gradually reduce the investment in corporate management development projects, applied research projects, as well as undertakings that can utilize social capital to develop. Finance should make more expenditure efforts in “Farm, Farming & Farmer”, education, science and technology, health, employment, social security, environmental protection, public safety. However, finance should give support to specific industries. For Hunan province, it should make great efforts to invest in equipment manufacturing industry, logistics, energy-efficient and emission-reduction industries, as well as necessary infrastructure constructions. In general, industrial infrastructure needs great investment, in which private capital is usually unwilling to invest. The problem of how to support industrial development and not bring about the “crowding-out” effect on the expenditure of general public services at the meantime is also a difficult issue to be faced by fiscal work.

(3) The Relationship between the efficiency and equity in public finance

Efficiency and equity has been one of the fundamental issues that should be handled by fiscal work. The development process of new industrialization in Hunan is also the process of free movement and gathering of elements. The market freely allocates resources through elements, resulting in some enterprises, developing and expanding competition. Some areas will develop rapidly, with part of staff receiving a relatively high income in the initial distribution, while some industries, some areas and some units will be in an inferior position in development. The difference in the possession of resources between industries, regions and different groups of people results in a great gap of income and welfare, and the gap has an expanding trend with the acceleration of industrialization process. How to handle the economic efficiency and social equity in the process of the information industrialization is also an issue to be attended to by fiscal work.

(4) Contradiction between high starting points required by new
Industrialization and the current low level

New industrialization requires making use of high technology and advanced applicable technologies to transform traditional industries, and the use of information technology to drive industrialization. Because of the low starting point of new industrialization in Hunan province, it is difficult to achieve all the goals of new industrialization in short term. The contradictions between the high starting points required by new industrialization and the current low level highlight in: first, the contradiction between industrial clusters and redundant construction. The majority of enterprises in Hunan Province have not yet formed the chain of division and collaboration, which result in low-level duplicate construction and high operating costs, and industrial clusters are hard to achieve in short term. Secondly, there is a conflict between high-tech and lack of human resources. Hunan lacks human resources and technology and has a relatively small number of enterprises with high, sophisticated and new technique and industries with high added value. The third contradiction is the contradiction between high investment and poor financial capacity. Informationalization requires substantial financial investment, especially the primary investment in industrial infrastructure facilities. In addition, environmental management also causes a large number of costs. Moreover, it can not produce much financial revenue for a period of time before new industrialization has set up. For such a big, central agricultural province as Hunan Province, it has limited capacity of local financial revenue and large pressure of expenditures. Consequently, the way to handle the contradiction between financial input and output will be a long-term issue faced by fiscal work in Hunan.

<table>
<thead>
<tr>
<th>Box 10-2 High Environment Protection Cost for Locality</th>
</tr>
</thead>
<tbody>
<tr>
<td>In accordance with the &quot;Eleventh Five-Year&quot; program on energy-conservation and emission-reduction in Xiangtan City, it will implement 14 COD projects of reducing SO2 at different stages. 94 small enterprises in small papermaking plants, small cement plans, small glass plants, small smelting plants will be closed or suspended in the process of industrial restructuring. At the aspect of emission-reduction, it will install on-line automatic detection devices to the key sources of pollution in the city's state-holding enterprises, and build a network with the Environmental Protection Agency of the province and the city. This will require a total investment capital of more than CNY3 billion, while the total fiscal revenue in the Xiangtan City was only CNY3.939 billion. Obviously, it will be hard for the local public finance to carry out energy-saving and environmental protection.</td>
</tr>
<tr>
<td>Source: Field Study</td>
</tr>
</tbody>
</table>

In the current arrangement of the fiscal system framework, it is hard for Hunan to reunite three important fiscal elements, i.e., fiscal property right, fiscal capacity and
expenditure responsibility. There is still a lack of efficient fiscal policy instruments to facilitate resource-saving and environment protection, and restrict high-energy consumption and high-pollution industries. And the goal of fiscal policy is obscure.

3. Challenges to local fiscal system

To some extent, the assignment of the current fiscal system in Hunan conflicts with the interests of the new industrialization strategy in some areas. The arrangement of revenue collection affiliated to the administrative level goes against optimizing resources allocation and fair competition. Transfer featured with "base plus increment" increased the difficulty for the local government to develop. The expenditure for local governments is expanded.

Fiscal revenue is affiliated to the administrative level. Such an arrangement will help repeated construction and regionalism, restrict free movement for production factors, and go against industrial gathering. In addition, frequent changes in capital, cooperate governance and enterprise ownership make it difficult to define the level of revenue resources. It is harder to make correct judgment for the stock enterprise, joint-stock enterprise, and affiliated enterprise.

The "base plus increment" transfer model. Under such a framework, the lower level government fails to benefit from the fruits of industrialization when the economic growth rate the excels fiscal growth rate, and thus there is still a lack of efficient local fiscal capability. Take Zhuzhou municipality as an example. In 2007, its total fiscal revenue was CNY7.79 billion, including CNY4.03 billion revenue shared between the central government and provincial government. And only 48.3 per cent of revenue was left within its own level.

Expanded local public expenditure responsibility. The expanded expenditure responsibility is caused by three factors. One is the expenditure assignment required by higher level governments and the relevant complemented assignment. The second factor is transition costs burned by the local government including accepting some employees originally from the central and provincial state-owned enterprise; these employees cover teachers, securities custody clerk and doctors. The final factor is the cost of environmental protection and pollution management.

<table>
<thead>
<tr>
<th>Box 10-3</th>
<th>Restructuring in the Old Industrial Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>At present, the Zhuzhou municipality government has already accepted 54 schools, including 2,765 employees, 2,328 retirees. The government has also separated 9 securities apartment, cancelled 24 similar organs without transforming into enterprises or institutions. In addition, the government accepted 16 hospitals including 1,700 employees and 26,000 retirees. More then 20,000 employees from the central and provincial level enterprises are now allocated in Zhuzhou. Finally, the local government has to settle the arrangement of 56,000 temporal workers. Suppose the average settlement cost is CNY35,000, and then Zhuzhou has to spend more than CNY1.9 billion on the enterprise transition.</td>
<td></td>
</tr>
<tr>
<td>Source: Field Study</td>
<td></td>
</tr>
</tbody>
</table>


1. Contents

There are three fundamental factors encouraging the role of fiscal and tax policy. The first is the requirement of new industrialization. The second is the requirement of expanding domestic demand and promoting economic growth. The third is the requirement of improving the competition capacity.

Fiscal and tax policy on the national side

In the PRC, the role of fiscal and tax policy is mainly embodied on the national side, including kinds of tax preferential policies and institutions. In addition, the PRC is studying and implementing fiscal policy.

(1) Policy on supporting the manufacturing industry

Tax preferential for import specified goods. In 2006, the state council pointed out that a specified preferential tax on import will be implemented, if possible, to support qualified high-tech equipment and products. In 2008, for the importing key parts and materials of super distribution and transformer electricity equipment, large-scale petrifaction equipment and large-scale coal petrifaction equipment, the tariff and value-added tax was be drawn back after levying, so there was no tarif on some importing equipment.

VAT transformation. Since January 1st 2009, the PRC implemented the transformation from production-based VAT to consumption-based VAT, and the VAT on new equipment will be deducted, which will greatly encourage the development of technology and equipment innovation.

Sales tax. Sales tax is free of revenue for the enterprises and individuals who are involved in the technology transfer, technology exploration and relevant consultation and service in manufacturing industries.

Government expenditure tax. In 2006, the State Council announced that fiscal preferential policy would be arranged for ordering and using the first made-in-the PRC manufacturing technology equipment and more government expenditure would be set up to support the technology upgrading, etc.

(2) Policy on supporting energy conservation and emission reduction

Corporate income tax. Income from qualified environment protecting and energy conservation and water saving enterprises would be free of or be subtracted from cooperate income tax. The investment on environment protection, energy saving and water conservation will be counteracted by 10 per cent. When the investment is not big enough, it can be transferred to the next five years. The taxable income of the enterprises involved in the resources utilization will be deducted by 10 per cent. Enterprises with qualified environment-protecting and high-new technology are expected to enjoy 15 per cent preferential tax rate.

Consumption tax. Consumption tax on products with high energy consumption and high consumption of non-renewable resources and high environmental pollution like oil, wood floor, and wood one-off chopsticks will encourage people to save
energy and resources.

Sales tax. Sales tax is free of revenue for the enterprises and individuals who are involved in the technology transfer, technology exploration and relevant consultation and service in energy-conservation and environment-protection industry.

VAT. Preferential VAT tax can be divided into two parts. One is the renewable resources VAT, another is resources utilization VAT.

Public expenditure and fee policy. In 2008, the State Council stimulated a working schedule on energy-conservation and emission-reduction. Under such a schedule, the central government will increase input in areas like monitoring, executing the law, urban wasteful water disposal, rural pollution protection, etc.

(3) Policy on Supporting Logistics

Corporate income tax. Qualified enterprises will submit unified cooperate income tax.

Sales tax. Sales tax is free of revenue for the enterprises and individuals who are involved in the technology transfer, technology exploration and relevant consultation and service in logistics industry. For the experimenting enterprises which transfer part of their business to other enterprises, the taxable revenue is equal to the difference between total revenue and total cost which includes the transportation of other enterprises.

Government expenditure. In 2007, the State Council required relevant ministries to support services industry, including logistics industry. Among them, fiscal expenditure was required. In 2009, the PRC stimulated a schedule on logistics adjustment and development, and more central government funds and subsidy will channel into this industry.

Fiscal and Tax Policy on the Local Side

Based on budget law and the current fiscal system framework, Hunan province has no authority to approve or cancel certain specific taxes, yet the local government can carry out the preferential fiscal and tax policy, and make measures by public budgets and financing to support the above three core industries.

(1) Policy on Supporting Manufacturing Industry

Since 2006, Hunan initiated a series of matched policies and measures. In 2007, Hunan set up new industry guide funds, and planned to arrange CNY300 million to support new industry. Among them, funds on supporting machine equipment amounted to CNY210 million. In 2007, Hunan formed specific fiscal measures to support the car industry and other manufacturing industries. In 2009 further government purchase, direct public investment, fiscal subsidy and other measures were introduced to support the investment and consumption of car industry.

(2) Policy on Supporting Energy Conservation and Emission Reduction

Based on the current national policy, Hunan supports the energy conservation and emission reduction industry mainly by confirming more than 200 enterprises and
(3) Policy on supporting logistics

Hunan supports the logistics industry mainly by the following measures. First, Hunan selected 7 experimented logistics enterprises with the National Bureau. Second, Hunan arranged specific funds to support this industry, for example by launching CNY5 million on this area. Third, other departments also arranged some funds on logistics infrastructure.

2. Positive effects

(1) Lightened burden of the industry

National and local fiscal and tax preferential policy greatly lightened the burden of the above industry, and were welcome by the relevant enterprises and individuals. For example, for each experimented logistics enterprise the repeated tax burden was lightened by the amount of CNY875 thousand.

(2) Improved innovation capacity

Preferential fiscal and tax policy greatly encouraged the technology research and development, the independent innovation capacity was improved significantly. In 2008, the added value of Hunan manufacturing enterprises amounted to CNY56 billion, 44.3 per cent on an annual growth. Some emphasized industries, like Zhong-lian Zhong-ke, San-yi Zhong-gong, and Xiang-dian group, San-he Ke-ji have made great progress in technology innovation.

(3) Expanded size of the business

With the help of fiscal policy, some core enterprises accelerated the process of emerging among regions and industries. For example, the value-added in 2007 of Zhong-lian Zhong-ke and San-yi Group was above CNY10 billion, and the value-added in 2008 exceeded CNY20 billion.

(4) Development of a predominant industry

In 2007, the value-added in Hunan manufacturing industry exceeded CNY100 billion, and exceeded CNY200 billion in 2008, and the growth rate surpassed the national average level by 22.2 per cent, ranked third in the PRC.

(5) Promoted energy conservation and emission reduction

Fiscal and tax policy encouraged the enterprises to reduce energy consumption and gas emission, thus improved efficiency of resources utilization. By the end of 2008, the effective utilization ratio climbed to 75 per cent.

3. Problems

(1) Narrow covering

First, battery and plastic products that greatly destroy the environment are outside of the tax administration.

Second, some materials like stone coal and boiler waste are not included in the list of wasteful materials in the preferential policy. Also, cements including cement clinker, produced with the vertical kiln method, are not allowed to profit from the
preferential tax policy. This greatly influenced the cement industry.

Third, some other resources utilization products are also out of the lists of preferential policy. These products include fireproofing materials, temperature-constant and fire-resistant materials, etc.

(2) Inadequate stimulus
Some preferential fiscal policies, like 10 per cent deducted taxable income, are not very attractive to the enterprises.

(3) Strict conditions
First, many environment-friendly enterprises fail to profit from the accelerating depreciation preferential tax policy, as the tax law requires the assets of the enterprise to meet the following two conditions at the same time: one is quick upgrading asset due to technology innovation; the other is strong shakable and highly eroded asset.

Second, some applied conditions are too strict. For example, the vertical method is popular in Hunan, yet it is excluded from the list of preferential policy.

(4) Tough administration
During the process of implementation, administrators find it tough to carry out the preferential policy, particularly on the standard of energy conservation, water saving, and environment protection. Also, invoice management is also a tough job.

(5) Lack of Capacity
The tax administration authority requires the enterprises to arrange their own cars and other equipment, which goes against the development trend of the modern logistics industry.

(6) Heavy tax burdens in some industries
Some industries, particularly the logistics industry, still face heavy tax burdens. In the transportation, the enterprise only needs to submit 3 per cent sales tax, while the tax rate is raised to 5 per cent in the parts of storage, discharge, delivery. The logistics industry belongs to the labor-intensive and tiny profit industries, and should be treated equally in each part. Unfair tax rates will increase the tax burden on the logistics industry as a whole.

(V) Local fiscal reforms and policy design for the new industrialization
To promote new industrialization, Hunan needs to reform the local fiscal system and design reasonable fiscal and tax policies. The contents of the reform of the fiscal system are as follows: establishing a fiscal system under the provincial level and fiscal revenue and public expenditure system, increasing public investment input, managing to establish an intra-intergovernmental fiscal transfer system in Hunan and applying new management measures like PPP. Fiscal and tax policies are divided into medium and long-term policies, like cultivating human capital and attracting strategic investors, and short-term policies, like implementing subsidy and preferential tax policy, making full use of the current policy, establishing risk investment funds and accelerating rationalization.
1. Fiscal reforms

(1) Establishing a fiscal system under the provincial level, a fiscal revenue and a public expenditure system

Because of the regional development disparity, Hunan should not cut the local governmental levels. Under such a condition of maintaining local governmental levels, Hunan should change the notion of matching fiscal property right and expenditure. Instead, Hunan should improve the governmental functions and promote the fiscal system in the sub-provincial levels. In addition, the central governments should increase fiscal transfer to the Hunan province.

The main problems of the current local tax system are as follows: the structure of the local tax system is unreasonable, some taxes like cooperate income tax, resources tax, business tax and urban construction tax are affiliated to the level of governmental administration, many types of local tax and unclear main tax revenue resources, local governmental tax revenue are too small to meet their expenditure requirements. Thus, Hunan should gradually promote a main local tax, more specifically, promote the property tax as the main tax when maturing, increase the tax-sharing rate to local governments and increase the ratio of tax revenue compared to fiscal revenue as a whole.

Gradually adjust the expenditure structure, increase expenditure links with the peoples’ livelihood like social security, education and Medicare. Increase government purchases on the products supporting environment protection and resources conservation.

(2) Increasing public investment

First, increase preferential policies and adjust the orientation towards supporting the secondary industry, that is, from supporting concrete industrial enterprises to supporting industrial parks. Second, Hunan needs to establish logistics parks to serve the new industrialization. Third, Hunan needs to create a preferential land policy to support industrial parks and logistics parks.

(3) Constructing intra-government fiscal transfer in Hunan

As a developing nation, the PRC has a huge population and a wide variety of areas and natural conditions. The PRC has seen unbalanced social and economic regional development models. In addition, sub-regional disparity is quite obvious. For example, Changzhutan city groups, the so-called golden-three-angle in Hunan, contain 18.8 per cent of whole population and 13.3 per cent of the land areas in Hunan, they gather 35.2 fiscal revenue and 90 per cent of scientific researchers and more than 80 per cent of science and technology production11. In 2008, the above areas controlled 40.9 per cent of the whole GDP, 46.4 per cent of the whole fixed asset investment and 42.8 per cent of the whole social consumption production sale. Their

Urbanization rate is 12.89 per cent of the average urbanization rate of Hunan. Obviously, the Changzhutan city groups centralized the predominant resources and enjoy better public service. Meanwhile, the areas’ quick development brings some eco-environmental problems and polluted the water and air of the neighboring areas.

Currently, the regional fiscal disparity is mainly met by the transfer from the higher-level government. However, due to scientific standard and the lack of consideration of fiscal revenue capacity and expenditure among different regions, the current fiscal transfer sometimes cause bigger discrepancies between regional fiscal capacity and public service. In this regard, it is necessary for Hunan to learn from positive experiences from Germany and design and implement an intra-governmental fiscal system as a complement to the inter-governmental fiscal system. Under the new transfer system, Hunan may make efforts to guarantee the polluted areas environmental compensate from their neighbors, and make sure the citizens within Hunan enjoy relatively high living conditions and equivalent public service.

(4) Applying PPP (Private—Public—Partnership)

PPP is an investment and construction model to meet the requirements of urban infrastructure development via cooperation between the public sector and the private sector. In many cases, without private participation, urban infrastructure projects fail to operate. With help of the PPP model, the projects can operate well, given that the government spends less and the private investors get profits. In developed countries, the PPP model is widely used in infrastructure areas like water plants, electricity factory, prisons and schools. In spite of the advantage of the market mechanism, the PPP model is not necessarily suitable for all urban projects. Therefore, the urban governments in Hunan province should consider all the operating costs and benefits, avoiding interest conflicts between private sectors and public sectors.

2. Mid-term and long-term fiscal policies

(1) Actively cultivating human capital

The key issue of new industrialization is technology innovation, and the crucial point of technology innovation is expert education. Thus, the local government in Hunan should deal with the following issues. One is to continue support of basic education, and the second is to educate skilled employees welcomed by the market, including technology workers and senior managers. The third issue is to increase efforts for combining production and university and research.

(2) Actively introducing strategic investors

Many of Hunan’s equipment manufacturing industries, logistics industries and environmental industries are capital-intensive industries. So, the local government should encourage more enterprises to carry out international M & A activities and issue overseas, choose a set of manufacturing enterprises with small size and great

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market potential to finance via capital market. In addition, the local government can attract strategic investors via other financial resources like general budget, state-owned business budget and land transferring funds.

(3) Attracting private capital via the lever-effect of the financial resources

It is estimated that the Changzhutan city groups should invest at least CNY940 billion by 2010. Yet the fiscal revenue as a whole in Hunan province only amounted to a bit more than CNY100 billion, so that it is impossible for Hunan fiscal revenue to meet the eleventh development plan. Thus, Hunan needs to innovate its financial system to expand more capital resources, which includes establishing government-oriented funds, establishing local financial holding groups, establishing medium and small enterprise credit guarantee funds, supporting the local financial industry, etc.

(4) Making full use of both rights and policy on building comprehensive reform experimenting areas granted by the central government

Hunan should take advantage of all the fiscal and tax policy instruments granted by the central government to build a resources-conserving and environment-friendly society in some areas like industry, infrastructure and living environment.

(5) Improving the tax distribution system to increase the interest of both central government and local government

Regard the current environment-friendly tax as a sharing tax between the central government and the local governments, and the tax should be levied by the national tax bureau and then transferred to the localities.

3. Short-term fiscal policies

(1) Fiscal input policy

Fiscal subsidy. Considering the character of externality and investment risk, the government should increase the degree of support on the manufacturing industry and implement direct and indirect subsidy on R&D loan, investment loss and key technology introduction, absorption and re-innovation.

Further integrate current fiscal funds. Suggest relevant government sectors like development and reforming bureau, fiscal bureau, science and technology and give higher priority to technology innovation sectors.

Establishing a venture capital specific fund of the new industrialization. Venture capital is seen as the engine driving economic growth. Form the experience of the development, big high-tech enterprises develop from the venture capital and capital market. The government supports high-tech venture capital in the following ways. First, properly increase public input to establish high-tech Parks and high-tech venture service center. Second, centralize specific fiscal resources and other high-tech funds to support high-tech programs. Third, encourage the high-tech industry investment with the help of fiscal resources. Fourth, support the venture enterprise to get the loan from the commercial banks with the full or part subsidy. Fifth, establish a venture
guarantee mechanism and support medium and small enterprises to develop.

(2) Preferential tax policy

In order to fight the international crisis and promote economic growth, The PRC decided to implement ten big industry structuring and prospering plans, increase export rebate on some products like steel, colored metal, petrifaction and electric information products, and entirely implement the VAT transition policy. These plans and policies are favorable for Hunan’s new industrialization development. On the basis of such policies, Hunan should pick up a sustainable development fund prior to tax and implement differential tax policy or potstone preferential tax extension.

(3) Striving for stronger policy support from the central government

The new industrialization development in the middle areas should get support from the central government. Especially during the initial period, support from the central government is of great significance. To be concrete, the central governments’ support should come from the following areas. First, increase fiscal transfer for environmental projects. Second, increase the rate of national bond or local governmental bond issuance revenue for the development of Hunan province. Third, approve the test of issuing local government bond. Fourth, increase the support of core industries of Hunan. Fifth, implement tax policies, favorable to develop new industrialization and promote economic growth. Sixth, support the transition of state-owned enterprises within the territory of the Hunan province.
Subreports

1. Strategy for Equipment Manufacturing Industrial Development of Hunan Province

2. Strategy for Coordinated the Development of the Logistics Industry of Hunan Province

3. Strategy of Energy Conservation and Environmental Protection in Hunan Province
Subreport 1 Strategy for Equipment Manufacturing Industrial Development of Hunan Province

Summary

Equipment manufacturing industry of Hunan Province has relatively complete sub-industries and abundant products, and is a major provincial economic pillar, with the production and marketing volume of over two hundred billions CNY in 2008; furthermore, advanced sub-industries are unceasingly expanded, and a great number of enterprises which have relatively strong collective strength have emerged; innovation ability is continually rising, and core industrial competitiveness is keeping improved; a group of new equipment sub-industries are emerging, and the development potential of the whole industry is continually strengthened. In the scope of the PRC or even in the world, equipment manufacturing industry of Hunan Province has the advantages that some sub-industries take leading positions in the PRC and abroad, some sub-industries possess stronger innovation ability, the equipment manufacturing industry in the “3+5” urban agglomeration of Changsha, Zhuzhou and Xiangtan tends to be connected and integrated, the competition advantage of low cost will become more outstanding, and CCP Hunan Provincial Committee and Hunan Provincial Government attach great importance to the development of equipment manufacturing industry. On the other hand, the industry also has some disadvantages such as the scale of the industry being not large enough, the competitiveness of the industry in domestic market being modest, local supply capacity being relatively limited, key components being controlled by non-local enterprises, the industrial development being restricted by the energy bottleneck, and the “capital”, based on which the industry develops, being relatively scarce. The development of the equipment manufacturing industry of Hunan is facing not only great opportunities of accepting the transfer of equipment manufacturing industry in the world, entering of the national economy and society into an accelerated development phase creating huge market space, supportive policies given by government to equipment manufacturing industrial development creating a good macro-environment, and implementation by the national strategy for rising of central region, but also challenges of more and more fierce and cruel competition in international equipment manufacturing industry as well as in domestic market.
According to the overall strategic arrangement for reinvigoration of equipment manufacturing industry and the advantages, disadvantages, opportunities and challenges of the equipment manufacturing industrial development of Hunan Province, equipment manufacturing industry of Hunan Province is suggested to focus on forging an important equipment manufacturing industrial base, a national-level R & D and production base, a world-famous capital of construction machinery, a leader of independent research and production of rail traffic equipment and an important electric equipment developing base in the PRC. By implementing the concepts of scientific development and circular economy and complying with its own development rules of equipment manufacturing industry, a development layout with remarkable advantages, obvious features, cluster development and positive interaction is formed by means of focusing on one central task, aiming at two markets, attaching three keys, establishing four platforms and highlighting five key points so as to promote the transformation of economical development mode and the optimization of industrial structure of Hunan Province, accelerate the new industrialization process and realize good and fast economic and social development.

For the purpose of achieving the target, the suggestion is to promote fiscal and financial innovation and establish strong investment and financing supporting system for equipment manufacturing industrial development, establish supporting system and service system for technical innovation in equipment manufacturing industry and improve innovation ability, make effective use of human resources and provide guarantee for sufficient and qualified talent persons, raise level of logistics industry to promote equipment manufacturing industrial development, and strengthen resource saving and environmental protection to realize sustainable development. Meanwhile, we suggest, in the near future, putting emphasis on strengthening organization leadership and management and creating more relaxed policy environment on the basis of the implementation of national relevant polices; in the middle term, focusing on formulating and promulgating guiding catalog for investment in and development of equipment manufacturing industry in Hunan Province and issuing preferential policies which will win the feeling of talents; and in the forward future, making efforts to strengthen intellectual property rights protection of equipment manufacturing industry and vigorously cultivate regional brands of equipment manufacturing industry.

The main innovations of the report lie in:

According to the development foundation and environment of equipment manufacturing industry of Hunan Province and combining the development statue and trend of equipment manufacturing industry in the PRC and even the world, the report puts forward strategic orientation conformed to the reality of equipment manufacturing industrial development of Hunan Province: forging a important
equipment manufacturing industrial base and a national-level R & D and production base, a world-famous capital of construction machinery, a leader of independent development and manufacturing of rail traffic equipment and an important electric equipment developing base of the PRC.

The report puts forward a development thought: focusing on one central task, aiming at two markets, attaching three keys, establishing four platforms and highlighting five key points.

The report puts forward a development principle with “developing high-end equipment and semi-finished products and improving local supply rate; accepting transfer, cooperating with enterprises directly under central government and enlarging industrial scale; optimizing industrial organization and cultivating enterprise groups; making efforts to forge world-famous brands; developing industrial chain vertically and industrial clusters horizontally and making efforts to improve self-innovation ability”.

**Research Background**

(I) General Classification Method for Equipment Manufacturing Industry and Classification of Equipment Manufacturing Industry in Hunan Province

Equipment manufacturing industry is the general term of the industries that provide technical equipment for simple reproduction and expanded reproduction of the various departments of the national economy, and it is the manufacturing industry for production of investment type finished products, with its products scope covering the end-products of mechanical industry (including aviation, aerospace, and shipping), electronic industry and weaponry industry, equivalent to the capital goods of the industrial developed countries. The “Industrial Classification of the National Economy” (GB/T4754 2002) published in 2002 classifies the equipment manufacturing industry as 7 major categories, namely, metal products manufacturing, general-purpose equipment manufacturing, special-purpose equipment manufacturing, traffic and transport facilities manufacturing, electric mechanical and apparatus manufacturing, communication equipment and computer and other electronic equipment manufacturing, instrument and meter and cultural office use mechanical manufacturing. The 7 major categories are further divided into 56 mid categories and 209 small categories. This Report adopts this classification method.

According to the classification method as mentioned above, the equipment manufacturing industry in Hunan Province mainly covers the manufacturing of pump, valve, compressor and similar mechanical equipment of the metal products; manufacturing of bearing, gear, shaft and driving components; general-purpose equipment manufacturing such as wind turbine, weighing apparatus, and packaging equipment etc. Mining, metallurgy and construction special-purpose equipment
manufacturing; electronic and electric mechanical special-purpose equipment manufacturing; medical instruments, apparatus and appliance manufacturing; environmental protection, public security and other special-purpose equipment manufacturing. Railway equipment manufacturing of the traffic and transport equipment; manufacturing industry; automobile manufacturing; shipping and floating device manufacturing. Power transmission and distribution and control equipment manufacturing in the electric mechanical and equipment manufacturing industry; electric wire, cable, optical cable and electrical engineering equipment manufacturing; household electric power appliance manufacturing; and non-electric power household appliance manufacturing, and so on.

In this Report, key research will be focused on the mining, metallurgy and construction special-purpose equipment manufacturing, railway transport equipment manufacturing, automobile manufacturing, electric power transmission and distribution and control equipment manufacturing that boasts certain advantages. To facilitate acquisition of data and communication and exchange with the relevant departments of Hunan Province, the names of the above key research will adopt the local customary appellations or titles of the engineering machinery, rail traffic equipment, automobile and parts and components, and electrical equipment etc. respectively.

(II) Technical/Economic Characteristics of Equipment Manufacturing Industry

As for the equipment manufacturing industry, given the complexity of tasks and technical decomposability of the equipment manufacturing industry, and also the finiteness of the corporate capacity, enterprises cannot incorporate the whole production chain into the production system. Therefore, a system with specialized work division and socialized coordination should be established through networks between markets or enterprises, and this is an important characteristic of equipment manufacturing industry. In addition, as majority of the equipment manufacturing industries are of technological and capital intensive industries, with strong purpose of exclusive capital use and high barriers for access and exit, and also demand that their scaled economy should either be remarkable or in small market capacity, therefore, they are required to possess relatively higher industrial concentration. In other words, the reasonable mode of industrial organization of the equipment manufacturing industry should be of network-based and oligopoly-characterized network oligopoly industrial mode of organization. This Report takes the above-mentioned technical characteristics and economic characteristics of equipment manufacturing industry as one of the theoretical basis for the study on the strategy of equipment manufacturing industrial development of Hunan Province.

(III) Layout, Experience and Trend of International Equipment Manufacturing Industrial Development
Nowadays, USA, Japan, Germany and the PRC are major equipment manufacturing countries, with relative large scale in the aspects of overall production capacity and market volume of equipment manufacturing industry. At present, however, the scale of the PRC’s equipment manufacturing industry is only equivalent to 3/10 of that of USA, 1/2 of that of Japan and 3/5 of that of Germany. Technically, USA, Japan and Germany represent the highest level of equipment manufacturing industrial development in the world, and take the leading position in most industries. In addition, some other countries also enjoy certain advantages in some sectors of equipment manufacturing industry, representing the internationally advanced level, such as Russia’s heavy-duty machinery and weapon manufacturing, Canada’s rail vehicle and regional airplane manufacturing, Swiss’s precision machine tool and instrument/meter manufacturing, Sweden’s bearing manufacturing as well as Korea’s ship and electronic equipment manufacturing.

The development of the equipment manufacturing industry of the world has gone through a course from weak status to strong status. The development course of the countries with strong equipment manufacturing industry including USA, Germany and Japan reveals that, these countries attach much importance to cultivation of large enterprise groups, and mainly depend on large multinational companies to organize the construction of major engineering projects, the R&D of advanced product technologies and the foreign trade, such as General Electric, General Motors and Ford in USA, Mitsubishi, Toshiba, Hitachi, Toyota and Nissan in Japan, Siemens, Volkswagen and Daimler-Chrysler in Germany, Alstom in France, Bombardier in Canada as well as Hyundai and Samsung in Korea. These multinational companies own huge assets, have the strong ability to globally allocate resources, enjoy wide business scope, realize high level of technical R&D and system integration, generally possess the relatively strong financing ability, and can provide users with sales credit services. Meanwhile, these countries give strong support to their own equipment manufacturing industry. The supporting means mainly include government procurement, tax reduction/exemption, preferential loan, and capital input and market protection. Over recent years, the governments of many foreign countries have shifted forward the support to the link of technical development, they have attached much importance to the exertion of the role of government through intermediary institutions, and their supporting measures are becoming more and more concealed.

At present, to occupy the technologies for R&D and manufacturing of high-end products is becoming the focus of equipment manufacturing industrial development of these countries. The equipment manufacturing industry of USA has basically jumped out of the circle of medium/low grade products. Japan, Germany and some other countries continue to improve the overall quality of the industry, and use high technologies to optimize and upgrade the traditional equipment manufacturing industry. In some western developed countries, there even exist the enterprises which
are not engaged in the production of equipment but carry out product design and relevant service. These enterprises provide other manufacturing enterprises with product drawings and technical consultation services and then charge patent license fee. For example, MAN-B&W and Wartsila-sulzer, two leading marine diesel engine manufacturing enterprises in the world, now are mainly engaged in product development, product design, patent and standard services, and supplying product drawings and technical consultation services to the manufacturing enterprises in the three major shipbuilding countries including Japan, Korea and the PRC.

The development course, current status and experience of the major equipment manufacturing countries in the world are the important background against which the strategy of equipment manufacturing industrial development of Hunan Province is studied, and are also the important reference for Hunan Province to determine the strategic objectives and strategic thinking for equipment manufacturing industrial development.

(IV) Current Status of Equipment Manufacturing Industrial Development in the PRC

Since 2001, the scale of equipment manufacturing industry in the PRC has expanded quickly, and the pushing effect on growth of industrial economy has also continuously increased. At present, both the production output and sales volume of main products of equipment manufacturing industry have been ranked top in the world. In 2006, the production output of generating equipment in the PRC reached 116 million kilowatt hour, once again ranked No.1 in the world in consecutive years. The production output of automobile reach 7.28 million sets, ranked No. 3 in the world; the sales volume of new car in the PRC was over 3.8 million sets, exceeding that of Japan (3.5879 million sets), ranked No.2 in the world, only second to that of USA. The production output of machine tool reached 590 thousand sets, including 85 thousand sets of numerically-controlled machine tools, and this has made the PRC become a major machine tool manufacturing country in the world.

Meanwhile, breakthrough has been made in the independent development of a batch of major equipment: The first 1,000MW ultra-supercritical generating unit in the PRC has been included into the electricity grid and has started to generate-electricity; the 600MW circulating fluidized bed boiler has been independently developed, the localization rate of the 600MW nuclear generating unit reaches 70%; the domestically-manufactured 1.5MW wind turbines have been put into operation; the design and manufacturing of 500kV power transmission/transformation equipment have reached international level; the manufacturing technologies for 750kV AC power transmission/transformation equipment have been mastered; localization has been realized for the key components (including compressor) of 40,000 square meter level large air separation equipment, 300 thousand ton synthetic ammonia production equipment, 520 thousand ton
carbamide production equipment and 600 thousand to 700 thousand ton ethylene renovation engineering as well as the main equipment of oil refining facility; the technical level and market share of domestically-manufactured numerically-controlled machine tools are continuously increased, and the medium/low-end numerically-controlled machine tools have won wide recognition from users and can basically meet the demands in the PRC; 90% of the economical-type numerically-controlled systems and some medium or high-graded numerically-controlled systems are manufactured domestically.

The adjustment of industrial structure and the system reform have made progress: Most of the State-owned equipment manufacturing enterprises have been re-organized into share-holding enterprises, so that the goal to lighten burden, reduce number of employees and peel off social functions is realized. A batch of private enterprises which have relatively high strength are developing and growing, and a batch of high-tech enterprises which are founded by universities and research institutions and have relatively high technical strength are emerging quickly. The foreign-funded enterprises in three forms still keep their advantageous position, but the situation of growth at high speed and increase in exclusive profit which occurred in past years changes obviously. As led by market competition and government, the allocation of industrial resources is further optimized, the progress of merger and reorganization is accelerated, and many enterprise groups are becoming bigger and stronger.

The equipment manufacturing industry enjoys rapid development in many regions, and the concentrating effect of industry has began to appear: Except for Hainan and Tibet, 29 of the 31 provinces, autonomous regions and municipalities directly under the Central Government in the PRC have seen their equipment manufacturing industry growing at a two-digit rate over recent years. As a whole, the equipment manufacturing industry in the PRC now can be divided into four major sectors, namely the communication equipment and computer in Pearl River Delta, the electronic information equipment, automobile and components thereof in Yangtze River Delta, the complete equipment, automobile and components thereof in Northeast part centering around Shenyang, as well as the military equipment in Northwest part (centering around Xi’an) and Southwest part of the PRC (centering around Chongqing).

Though the equipment manufacturing industry in the PRC has made obvious achievements, it also encounters some outstanding contradictions and problems. For example, the level of industrial concentration is still very low; there are only a few large enterprises which enjoy international competitiveness; the self-innovation ability is low, the equipment manufacturing industry in the PRC lags behind that in foreign countries in the aspect of independent intellectual property rights, technical contents as well as key components and basic elements, so that it is still under the control of others; the acquisition by foreign enterprises imposes relatively serious threat on the
security of equipment manufacturing industry in the PRC, some State-owned enterprises which have the ability to carry out independent research and development have become the processing plants of multinational companies, and the core technologies of those enterprises acquired have got lost.

The great achievements made by and the major problems existing in the equipment manufacturing industry in the PRC are the important precondition under which Hunan Province will determine the strategy of equipment manufacturing industrial development, and are the important reference on the basis of which the function and orientation of the equipment manufacturing industry in Hunan Province may be determined.

(V) Significance of Equipment Manufacturing Industrial Development of Hunan Province

The equipment manufacturing industry is an important pillar of the national economy, with advanced science and technology to transform traditional industries, which is an important link and carrier, basis of the high-tech industry and information industrial development, important guarantee for the nation's economic security and military security as well as important means to resolve labor employment. Therefore, to play great efforts to develop equipment manufacturing industry is of great significance to take a new road to industrialization in the PRC and Hunan Province. In particular, the equipment manufacturing industry in Hunan Province has become a multi-billion-dollar production and marketing of the largest industries. It is new engines of growth of industrialization. However, in comparison with other large provinces of equipment manufacturing industry and even with the central region, equipment manufacturing industry in Hunan Province is still relatively weak. Deep study and formulation of strategy of equipment manufacturing industrial development are the requirements for accelerating the new industrialization in Hunan and realizing the rapid economic/social development in Hunan.

Research Purpose

(I) Provide support the new industrialization strategy of Hunan Province;

(II) Provide reference for other areas in the central province on developing strategies for the development of equipment manufacturing industry;

(III) Provide reference to 12FYP of economic and social development planning and the development of equipment manufacturing industry in Hunan Province;

(IV) Influence national policies of equipment manufacturing industries.

Methodology

(I) Theoretical Research. Via the Internet, newspapers and related books, such as the Statistical Yearbook, collect the relevant information and data of development of equipment manufacturing in Hunan Province.
(II) Comparative Study. In comparison with other five major central provinces, including nationwide, United States, Europe, Japan and South Korea.

(III) On-Site Inspection. Focus on business-related visits, such as Changsha, Zhuzhou, Xiangtan and Hengyang, Hunan and other key cities, mainly in the field of engineering machinery manufacturing, such as Zoomlion, Sany Heavy Industry, Hunan Sunward Intelligent Machinery Co., Ltd, Lu Jiang machinery. Rail transportation equipment manufacturing industry includes Zhuzhou Electric Locomotive Co., Ltd., Xiangtan Electric Group, Time Electricity, Zhuzhou \ Vehicle Factory, etc. Electrical appliances include Xiangtan Electric Manufacturing Group, Hengbian Company, Liling Torch Electric Porcelain Electrical Appliance Co., Ltd., Hunan Switch Co., Ltd., Changsha High-voltage Switch Co., Ltd., Changsha High Voltage Switch Co., Ltd., Changsha cable accessories Co., Ltd., etc. Auto manufacturing industry includes Changfeng (Group) Co., Ltd., Changsha FOTON Automobile Plant, Hunan Car Axle Plant, Hunan Tongxi Industry Co., Ltd, Hengyang, ASIMCO (Hengyang) Co., Ltd, Hunan Oil Pump Co., Ltd., Xiang Huoju Co., Ltd., Zhuzhou Gear Co., Ltd. etc.

Key findings of Research Literature

1. In the document entitled “Several Opinions of the State Council Concerning Accelerating and Invigorating Equipment Manufacturing Industry”, it is clearly pointed out that the state will support backbone equipment manufacturing enterprises with key roles in key technical equipment manufacturing fields to undergo cross-industrial, cross-regional and cross-ownership restructuring on the basis of state control abilities and dominance. Encourage alliance and recombination between equipment manufacturing enterprises, between associated enterprises, and between enterprises and scientific research institutions, and cultivate large-scale enterprise groups through multiple approaches. Bring into play of market orientation and the role of policy support, form a batch of cross-industrial and cross-regional engineering companies that integrate system design, system integration, engineering general contracting and full-course services, participate in key state engineering project construction and management, and actively expand overseas market.

2. Rejuvenation of the equipment manufacturing industry needs system and mechanism renovation. First, is the industrial management system innovation that needs an official constituent department for planning and management; second, set up a national synergy innovation system, integrating the resources and strengthen of the academy of sciences, the government department systems, higher learning institutions, enterprises, and scientific research systems for national defense; third, re-establish industrial common-property technological innovation system, focus on key development fields and advantageous items, recombine a batch of national engineering research centers, national engineering laboratories and enterprise
technological centers engaging in industrial common-property technological research, development and conversion. Fourth, organize and establish policy restructuring investment units, endow state development bank industrial stock investment functions, and carrying out system reform and restructuring towards equipment manufacturing industry is the best option to guarantee industry security. Fifth, establish occupation education and ongoing education talent training system; sixth, in training engineering companies, the government shall facilitate and support the establishment of a batch of large-scale equipment generating contractors or engineering companies operating according to market economic system with capital as the link.( Lu Yansun 2007)

3. The key for equipment manufacturing industrial reforming lines in adherence of the two innovations, namely, mechanical system innovation and technological independent innovation, but most importantly, it is still mechanism system innovation. However, as most of the key and important technological equipment have the following characteristics: single products, in small batch, strongly for exclusive use, with big preliminary inputs, long manufacturing cycle, used for key national engineering project, involving multi-faceted interests, with major defects if relying only on market mechanism for adjustment, and the opinions of various relevant departments need to be well coordinated whether for determination of major equipment autonomy dependency engineering projects, or user’s support to domestically manufactured equipment, or implementation of laws, rules and regulations, as well as supporting policies, therefore, the operating and coordinating mechanism for rejuvenation of the equipment manufacturing industry should continue be established and improved.( Li Ye 2007)
I  Current Status and Characteristics of Equipment Manufacturing Industry of Hunan Province

(I) Becoming Pillar Industry with the Production and Marketing Volume of Over CNY Two Hundreds Billions

In 2008, 1,790 large-scale enterprises in equipment manufacturing industry of Hunan Province realized the gross value of industrial output amounting to CNY211.493 billions (current rate), increasing 45.62% over the previous year; realized the main business revenue CNY198.089 billions, increasing 46% over previous year; and realized the industrial added value of CNY57.6 billions, accounting for 13.5% whole provincial industrial added value, 5.2% of GDP, and has been one of pillar industries of Hunan Province. Affected by financial crisis, in 2008, the PRC’s machinery industry increasing speed drops greatly, but the increasing speed of gross value for machinery industry of Hunan Province does not slow down, but increases 2.5 and 3.6 percentages points over previous year respectively, higher over 20 percentage points than the average increasing speed of the PRC.

(II) Relatively Complete Industries and Abundant Products

An industrial system including relative complete industries has been established in Hunan Province. The major industries include construction machinery equipment, rail traffic equipment, power transmission/ transformation supporting equipment, general petrochemical equipment, metallurgical mine equipment, agricultural machinery equipment, new-type energy equipment, energy-saving and environmental protection equipment, aerospace equipment, ship equipment, numerical control equipment, electronic information equipment, chemical engineering equipment, light industrial equipment and textile machinery equipment. The major products include about 80 categories such as Concrete and road construction machinery, high-power AC drive freight/passenger electric locomotive, 500KV and lower ultra-high-voltage current and voltage transformer, blower, drilling equipment, crop cultivation and harvest entire mechanization equipment, MW class wind power equipment, flue gas desulfurization and denitrification dust-removing equipment for power station, general aerospace equipment, engineering ship, high-grade numerical control gear-grinding machine tool, key equipment for integrated circuit, large-scale rubber plastics blending molding equipment, etc.

(III) Continually expanding advantaged industries and emerging a great number of enterprises which have relatively strong collective strength

By adhering to the principle of “to do and not to do”, the equipment manufacturing industry of Hunan Province has developed three major advantaged industrial clusters. Firstly, they are focused on the Changsha engineering mechanical manufacturing industry as represented by construction mechanical and pavement construction mechanical products. In 2007, the cluster realized value of industrial output amounting to CNY25.23 billion, sales revenue CNY26.16 billion, profit
payment and tax turnover CNY7.49 billion. At present, there are already two enterprises with value of production output exceeding CNY10 billion. In 2008, provincial market share of construction machinery reaches to 26%, ranked fourth in the PRC.

Secondly, they are mainly distributed in the rail traffic equipment manufacturing industry of Zhuzhou as represented by trunk line electric locomotive vehicles, urban rail vehicles (subway). Zhuzhou is branded with title of the “Capital of Electric Locomotive of the PRC”, and about 60% of the PRC’s electric locomotives are manufactured in Hunan Province. In 2008, 49 large-scale enterprises realized the gross value of industrial output amounting to CNY17.033 billion, the main business revenue CNY14.830 billion and the profit payment and tax turnover CNY2.159 billion, an increase of 52.88%, 38.70% and 68.12% over the previous year respectively.

Thirdly, they are mainly distributed in the electric equipment manufacturing industries of Hengyang and Xiangtan as represented by 1,000KV ultra-high-voltage power transmission/transformation equipment, In 2007, the cluster realized gross value of industrial output totaled at CNY34.2 billion, main business revenue CNY32.765 billion, profits CNY1.208 billion, and profit payment and tax turnover CNY2.401 billion.

In construction machinery field, Zoomlion group and Sany group realized the gross production value and main business revenue of over CNY 20 billion in 2008 after becoming first CNY ten-billion enterprises of Hunan machinery industry in 2007; in rail traffic field, Zhuzhou Electric Locomotive Co., Ltd realized the production value and main business revenue of over CNY 5 billion; and in electric equipment field, enterprises such as Xiangtan Electric Manufacturing Group, Tebian Electrical Hengyang Transformer Co., Ltd., etc. realized the production value and main business revenue of over CNY 3 billion. Along with the increasing strength of the enterprises and their push effect, the influence of equipment manufacturing industry of Hunan Province has been increasing all over the country.

(IV) Continually Raised Self-innovation Ability and Continually Improved Core Industrial Competitiveness

Equipment manufacturing industry of Hunan Province has been developed 10 national-level technology centers and 46 provincial-level enterprise technology centers. R & D investment of core enterprises accounts for over 6% of sales income. Through technology introduction, digestion and absorption and self-innovation, Hunan Province has been mastered some key technologies having self-owned intellectual property right, continually upgrades industrial technologies, realized high parametric equipment and continuously increases performance-price ration of products. Industrial core competitiveness continually enhances, the gap with products of famous international brand continually reduces, and its domestic and overseas
market share steadily increases. In 2008, the large-scale enterprises in equipment manufacturing industry of Hunan Province realized the new product output of CNY56.388 billion, an increase of 44.3% over the previous year, and the new product output rate reached 26.66%, and breakthrough was made in the R&D of products in some key fields. Zoomlion successfully developed the C100 concrete pump which enjoys the highest conveying capacity in the world; Sany Heavy Industry successfully developed the concrete pump truck which has the longest arm support (76m) in the world; Xiangtan Electric Group successfully developed the first 220-ton motorized wheel dump truck in the PRC; the six-axle AC drive type electric locomotive which enjoys the highest power in the world and the A-type metro vehicle which is the first metro vehicle with independent intellectual property rights in the PRC were successfully developed by South Locomotive Group Zhuzhou Electric Locomotive; the first batch of light-duty airplanes in three models developed by Hunan Sunward Intelligent Machinery passes the trial flight successfully; the 4 sets of million-volt-class UHV shunt reactor which are to be used in the “first 1000kV UHV AC power transmission exemplary engineering in the PRC” and represent the highest level in the world were successfully developed by Hengbian Company in one attempt. A batch of new products at the high end of the value chain will make huge room for the growth of equipment manufacturing industry.

(V) A Batch of Equipment Manufacturing Industries Emerging, and Aftereffects of Whole Industrial Development Continually Boosting up

In view of the ever-intensifying constraints of energy, environmental protection and raw materials, and huge demand of national economy, the equipment manufacturing industry of Hunan Province is committed to cultivating and strengthen six kinds of new-type equipment: firstly, new-type energy equipment which takes MW class wind power equipment, pump and valve for nuclear power, solar photovoltaic cell manufacturing equipment and biological resource utilization equipment as core; secondly, energy-saving and environment protection equipment which takes flue gas desulfurization and denitrification dust-removing equipment for power station, heat-power cogeneration equipment, garbage treatment equipment, energy-saving variable-frequency motor, energy-saving boiler with new-type medium, water treating equipment, new-type energy city environment protection equipment and environment monitoring instrument as core; thirdly, aerospace equipment which takes general aerospace equipment, middle and small aeroengine, aerospace gearing down system, aircraft landing gear system, near space vehicle, satellite application product and satellite ground equipment as core; fourthly, forging characteristic ship brands of engineering ship, special workboat, inland river and coastal transport ship and novel ship made of composite material and making efforts to develop ship equipment which takes ship supporting industry and ocean engineering equipment industry as core; fifthly, numerical control equipment which takes high-grade
II Advantages, Disadvantages, Strategic Opportunity and Challenge of Equipment Manufacturing Industrial Development of Hunan Province

(I) Advantages

1. Some industries take leading position in the PRC.

Firstly, track traffic equipment manufacturing industry in Hunan Province takes the leading position in the PRC by virtue of its overall strength, and the supporting effect exerted by the relevant supporting industries on the main industry is very obvious. Till now, a batch of renowned enterprises including South Locomotive Group Zhuzhou Electric Locomotive Co., Ltd., Zhuzhou Time Group, Xiangtan Electric Group, Zhuzhou Vehicle Factory, Changsha Heavy Machinery Works, Yiyang Gears Co., Ltd. and Zhuzhou Machine Tool Gear Factory have emerged in the track traffic equipment manufacturing industry of Hunan Province. Among these enterprises, Zhuzhou Time Group is an on-board electric system integrator and supplier which takes the leading position in the track traffic industry of the PRC, and is the largest researcher, manufacturer and supplier of high-power semiconductor devices on railway locomotive in the PRC.

Secondly, the construction machinery industry of Hunan Province grows rapidly and has remarkable comparative advantages and competition advantages. Zoomlion, Sany Heavy Industry, Hunan Sunward Intelligent Machinery and other enterprises have become the leading enterprises in the construction machinery industry of the PRC. Among these enterprises, Zoomlion and Sany Heavy Industry have for two consecutive years been listed in top-50 construction machinery manufacturing enterprises of the world. Till now, Hunan Province has become the “Capital of Construction Machinery” with the highest competitiveness in South of the PRC, and the products including concrete pump and crawler crane have reached internationally advanced level.

Thirdly, the electric equipment industry of Hunan Province, by virtue of its strength, enjoys leading position in the PRC. Tebian Electrical Hengyang Transformer Co., Ltd. has become the core backbone enterprise in SHV/UHV transformer product manufacturing in the PRC, and is one of the four leading enterprises in the
The questionnaire survey reveals that, in the equipment manufacturing industry of Hunan Province, the sectors of which the technologies reach internationally leading and internationally advanced level account for 18.2% of the whole industry, the sectors of which the technologies reach domestically leading and domestically advanced level account for 77.3% of the whole industry, and the sectors of which the technologies reach medium level account for 4.5% of the whole industry. The sectors of which the technologies reach internationally leading and internationally advanced level include electrics, construction machinery and track traffic\textsuperscript{13}.

2. The equipment manufacturing industry in the “3+5” urban agglomeration of Changsha, Zhuzhou and Xiangtan tends to connection and integration.

The development of regional economy depends on the openness and integration of industry. If the industry enjoys high openness and integration, the cohesion and growth power of regional economy is also high. The “3+5” urban agglomeration of Changsha, Zhuzhou and Xiangtan, as one of the 4 State-supported urban agglomerations in the six provinces in the central region, has been stated in the document of CPC Central Committee. This upgrades the development of the urban agglomeration of Changsha, Zhuzhou and Xiangtan from local strategy to national strategy, and leads to the situation of joint action of all areas in the development of Hunan Province. All the eight cities in the “3+5” urban agglomeration of Changsha, Zhuzhou and Xiangtan have certain foundation of equipment manufacturing industry, and Changsha, Zhuzhou and Xiangtan are core growth poles and radiation sources and are properly complementary to Changde, Yueyang, Yiyang, Loudi and Henyang. These eight cities will foster strengths and circumvent weaknesses in the industry, especially the equipment manufacturing industry, promote the continuous integration of advantageous industries, realize the harmonized development and rapid development, accelerate the development of equipment manufacturing industry in Hunan Province, build up the brand “Made in Hunan,” and forge an equipment manufacturing industrial base which enjoys important influence in the PRC.

3. The urban agglomeration of Changsha, Zhuzhou and Xiangtan is likely to become the regional logistics center in the PRC.

Equipment manufacturing industry is an industry with high transportation load, and has high requirements on traffic/transportation conditions and logistics. At present, there are 7 railway trunk lines including Beijing-Guangzhou, Hunan-Sichuan Railway,

\textsuperscript{13} During February and April 2009, the Topic Team, through the Policy Study Office of CPC Hunan Provincial Committee, carried out the questionnaire survey among the enterprises in the equipment manufacturing industry in Hunan Province. A total of 80 electronic-version questionnaires were sent, and then 22 valid questionnaires were returned. The enterprises surveyed include large-sized, medium-sized and small-sized enterprises in main sectors of equipment manufacturing industry in Hunan Province, and are highly representative.
Hunan-Guizhou Railway, Zhejiang-Jiangxi Railway, Shimen-Changsha Railway, 
Jiaozuo-Liuzhou Railway and Luoyang-Zhanjiang Railway as well as 9 highways 
including National Highways No. 106, No. 107, No. 207, No. 209, No. 319 and No. 
320 in Hunan Province, and a comprehensive traffic & transportation system which 
takes Changsha Highway, Changsha Port, Huanghua Airport and Zhuzhou Railway as 
the center, takes highway trunk lines, railway trunk lines, trunk water way in 
Xiangjiang River and Huanghua Airport as frame, have the reasonable composition of 
highway transportation, railway transportation, water transportation and air 
transportation and can provide quick and convenient transportation services has come 
into being. The urban agglomeration of Changsha, Zhuzhou and Xiangtan is the 
junction of Beijing-Guangzhou Economic Belt, Pan Pearl River Delta Economic Zone, 
Yangtze Economic Belt in the PRC, enjoys excellent geographic conditions and 
outstanding strategic position, and is likely to become the regional logistics center in 
the PRC. Hunan Province has planned to develop Changsha, Zhuzhou and Xiangtan 
as well as Yueyang, Huaihua and Henyang into 4 regional logistics centers. At present, 
the deep-water wharf in Xianing Port at the northern part of Changsha has 11 
thousand-ton-class berths, realizes the annual throughput capacity of 5 million tons, 
and has become one of the largest modern inland-river ports in the PRC; it is expected 
that, after being constructed, Changsha Railway Goods Station will realize the annual 
throughput capacity of 20 million tons; after being set up, Jinxia Bonded Logistics 
Center and Jinxia Logistics Park will realize the annual throughput capacity of 21 
million tons in 2010, 32 million tons in 2015 and over 50 million tons in 2020, and 
thus become the core logistics park in Changsha, Hunan Province and even the central 
region.

It is estimated that, after the urban agglomeration of Changsha, Zhuzhou and 
Xiangtan is developed into the regional logistics center in the PRC, the distribution 
capacity of traditional warehousing enterprises will be increased by 20% to 30%, the 
accuracy of stock and gods delivery will exceed 99%, the labor costs will be reduced 
by about 50%, the production capacity will be increased by 30% to 40%, and the 
logistics costs will be reduced by about 10%14. This will give important support to the 
development of equipment manufacturing industry in Hunan Province.

4. The competition advantage of low cost will become more outstanding.

As a whole, the price of production factors including land and labor force has 
risen rapidly in the PRC over recent years, and the advantage of low production factor 
price has been impaired in international market. However, the weakening and 
disappearance of the advantage of low cost will be a long course. Since the PRC 
stretches across a vast area and there are large differences in development level 
among various regions, the PRC will, in a relatively long period, still keep various 

14 Su Yi: Logistics Pivot in Hunan, Constitution of New Layout of Development, Shangsha Evening Newspaper, 
September 17, 2008.
competition advantages. According to the statistics, the labor costs of Hunan Province is 40% to 50% lower than that of Guangdong; the housing price and housing rental are lower than those in the neighboring province Hubei; the price of industrial water is about 30% lower than that in developed areas in East part of the PRC such as Shanghai and Guangzhou; the price of non-industrial and ordinary-industry electricity is 15.6% lower than that in Hubei, and the price of large-industry electricity is about 7% lower than that in Hubei, and is more lower than that in developed eastern areas (about CNY0.8-0.9 per kilowatt hour). With the rapid increase in the price of production factors in the eastern coastal region, the low-cost advantage of Hunan Province will not only be remained, but also become more outstanding owing to the base and growth rate of production factor price lower than those in eastern coastal areas.

5. Hunan Provincial CPC Committee and Hunan Provincial Government attach great importance to the development of equipment manufacturing industry.

Both the provincial Party Committee and the provincial government of Hunan Province have attached high importance to the strategic position of equipment manufacturing industry, and listed it as one of the three provincial pillar industries, to which, a number of documents have been issued, including “Several Opinions of the Hunan Provincial People’s Government Concerning Support for the Auto Industrial Development”, the “Several Opinions of the Hunan Provincial People’s Government Concerning Support for the Engineering Mechanical Industrial Development”; documents that will soon be issued include “Opinions for Implementation of Hunan Provincial People’s Government Concerning Accelerating and Invigorating the Equipment Manufacturing Industry”. Attention from the leadership and the issuance of a series of local industrial policies will certainly promote the concentration of such elements of production towards the equipment manufacturing industry as land, capital, and human resources etc.

(II) Disadvantage

1. The scale of equipment manufacturing industry is not large; the competitiveness in domestic market is at medium level.

In 2007, through both the gross output value and main business revenue of the equipment manufacturing industry in Hunan Province exceeded CNY100 billion, the gross output value was only ranked No. 4 among the six provinces in the central region (See Table Subreport1-1); the main business revenue was ranked No. 14 among the 28 main equipment manufacturing provinces (autonomous regions, autonomous cities, autonomous counties) of the country. However, in the same year, Hunan Province ranked No. 5 on the list of provinces with the highest level of economic development, No. 3 on the list of provinces with the highest level of development potential, No. 17 on the list of provinces with the highest level of economic efficiency, No. 3 on the list of provinces with the lowest level of economic risk, and No. 18 on the list of provinces with the highest level of economic diversity. This indicates that there is still a large gap between the development of equipment manufacturing industry in Hunan Province and the national average level.

16 Zeng Bingqiu: Orientation of Hunan’s Industrial Development under Background of Rising of Central Region. http://www.chinavalue.net/Article/Archive/2006/12/18/51736_3.html
municipalities directly under the Central Government) in the PRC, CNY1,251.633 billion less than that of Jiangsu which is ranked No. 1 and only 9.7% thereof. In 2008, the main business income of the equipment manufacturing industry in Hunan Province accounts for only 2.3% of that of the PRC.

The questionnaire survey reveals that, in 2007, there were 2 enterprises each of which realized the sales revenue of more than CNY10 billion, accounting for 9.1%; there was no enterprise which realized the sales revenue between CNY500 million and CNY1 billion; there were 3 enterprises each of which realized the sales revenue between CNY1 billion and CNY5 billion, accounting for 13.6%; there were 12 enterprises each of which realized the sales revenue between CNY100 million and CNY1 billion, accounting for 54.5%; there were 5 enterprises each of which realized the sales revenue of less than CNY100 million, accounting for 22.7%. The sales revenue of near 80% of all enterprises prize is less than CNY1 billion.

**Table Subreport1-1  Comparison of Equipment Manufacturing Industry in Six Provinces in Central Region in 2007 (Unit: CNY100 million, %)**

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Industrial added value</th>
<th>Industrial total output value</th>
<th>Total profits</th>
<th>Enterprises for large-scale</th>
<th>Enterprises for sales above 100 million</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amoun<strong>t</strong></td>
<td>Growth</td>
<td>Amount</td>
<td>Growth</td>
<td>Amount</td>
</tr>
<tr>
<td>Shanxi</td>
<td>150.01</td>
<td>39.98</td>
<td>487.60</td>
<td>22.58</td>
<td>16.99</td>
</tr>
<tr>
<td>Anhui</td>
<td>507.6</td>
<td>1,692</td>
<td>678.27</td>
<td>42.4</td>
<td>257.03</td>
</tr>
<tr>
<td>Jiangxi</td>
<td>201.97</td>
<td>43.5</td>
<td>678.27</td>
<td>42.4</td>
<td>257.03</td>
</tr>
<tr>
<td>Henan</td>
<td>680.4</td>
<td>26.79</td>
<td>2,620.95</td>
<td>31.42</td>
<td>95.2</td>
</tr>
<tr>
<td>Hubei</td>
<td>747</td>
<td>44.9</td>
<td>2347</td>
<td>31.42</td>
<td>95.2</td>
</tr>
<tr>
<td>Hunan</td>
<td>418.5</td>
<td>34.34</td>
<td>1,400.44</td>
<td>43.16</td>
<td>117.09</td>
</tr>
</tbody>
</table>

Note: a Refers to product sales income;  
  b Refers to estimate amount of added rate by 30%;  
  c Refers to enterprises which sales incomes over CNY500,000,000;  
  d Refers to main business income;  
  e Refers to enterprises which sales incomes over CNY200,000,000.


With respect to the competitiveness in domestic market, it is estimated that in 2004, among the 30 provinces, autonomous regions and municipalities directly under the Central Government in the PRC, Hunan Province saw the scale competitiveness of its equipment manufacturing industry ranked No. 18, the efficiency competitiveness ranked No. 13 and the comprehensive competitiveness ranked No. 18**17** (See Table 3-3).

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The questionnaire survey reveals that, there are 9 provinces whose sales revenue is ranked in top 3, accounting for 40.91%; 3 provinces whose sales revenue is ranked between No. 4 and No. 10; 6 provinces whose sales revenue is ranked below No. 10; 4 provinces whose sales revenue is available. This indicates that the sales revenue of the equipment manufacturing industry in Hunan Province is ranked in top 10 and accounts for about 50%, staying at the medium level.

2. Local supporting ability is relatively low and key components are controlled by others.

In recent years, the industrial supporting level of equipment manufacturing industry in Hunan Province has gradually increased. For example, with respect to the production of electric locomotive, there are more than 20 components enterprises in Zhuzhou; there are more than 120 supporting factories for Changsha FOTON Automobile Plant in Hunan, among which more than 100 are in Changsha, with the value of supporting components exceeding CNY1.8 billion. As a whole, however, the local supporting rate of parts and components for equipment manufacturing industry in Hunan Province is less than 40%. The survey carried out by Hunan Provincial Machinery Industry Administration Office on the main parts and components (exclusive of steel products) of the three leading products of construction machinery (concrete pump truck, automobile crane and concrete pump) reveals that, as calculated by value, the local supporting rate in Hunan Province is only 10%, the external supporting rate is 28.6% and the foreign supporting rate is 61.4%. In addition, the supply of raw materials in this province can’t meet the demands. According to the survey carried out in the construction machinery industry of Hunan Province, the high-strength steel products consumed by this industry in 2007 amount to CNY1.4 billion, and the ordinary steel products and section steel amount to CNY820 million. Though the production output of steel products in Hunan Province is not low, all steel products required are purchased from other provinces or imported from foreign countries owing to incomplete types and models. The low local supporting rate of parts and components has prevented the equipment manufacturing industry of Hunan Province from developing into a higher level. In particular, the key parts and components which are controlled by others, including hydraulic parts, high-powered engine, heavy-duty automobile chassis and high-strength steel plate, have become the obstacle for the further development and growth of equipment manufacturing industry in Hunan Province.

3. The industrial development is restricted by energy bottleneck.

Hunan Province has no oil reservoir and only a few coal reservoirs. In addition, the coal is of low quality, has high sulfur contents, is difficult to exploit, and thus can’t meet the demands of this province on power coal. Though it is feasible to

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18 China.com: Hunan to Reinvigorate Equipment Manufacturing Industry by Settling Weakness in Local Supporting Ability.  
purchase coal from other provinces for generating electricity, the energy source structure which takes coal as the core will exert huge environmental pressure on this province, in addition to the dual pressure arising from coal system reform and railway system reform. The statistics of Hunan Provincial Environmental Protection Bureau reveals that, owing to extensive use of fossil fuel, the 13 cities and prefectures other than Chenzhou in Hunan Province are suffering from the population of acid rain to various extents, and the frequency of acid rain has increased slightly over recent years. In addition, the room for Hunan Province to develop water power generation is very limited. By the end of 2005, the capacity of the water power generation units installed in Hunan Province reaches 7.9 million kW, accounting for 80% of the economically developable capacity. As a whole, Hunan Province is very weak in the aspects of total capacity, grid adjusting ability and layout of power supply. In addition, the structure of power supply is unreasonable, and the problem of seasonal power shortage caused by the high proportion of water power generation is also serious.

4. The “assets” on the basis of which the industry develops are relatively scarce.

Compared with the eastern coastal region, Hunan is an under-developed province with scarce “assets” and limited financial ability. In 2007, the local fiscal income of Hunan Province was CNY60.318 billion, only equivalent to 28.69% of that of Shanghai, 36.56% of that of Zhejiang and 40.41% of that of Beijing. The fiscal capital which can be used in industrial development is very limited.

(III) Opportunities

1. Transformation of Equipment Manufacturing Industry in the World and Transfer of Manufacturing Favorable for Acceptance by Hunan of Transfer and Realization by Hunan of Rapid Development

At present, the focus of international competition has been replaced from the manufacturing of products to the innovation ability of country and enterprise. In order to obtain exorbitant profits, the multinational equipment manufacturing groups pay more and more attention to the links of value chain which have high technical contents and added value such as technical development, process design, brand marketing and user service, and, in accordance with the principle of minimized costs, externally transfer the manufacturing of a lot of parts and components to the developing countries which have good market prospect, rich resources and relatively low labor costs. In addition, the international division of labor is also carried out on the basis of different links in production of a same product or different technical contents of parts and components. Normally, the multinational companies only keep the processes with high technical contents and the core parts with high added value, and transfer the manufacturing of primary parts and components with low added value to developing countries. The PRC has quickly developed itself into a major equipment manufacturing country, ranked fourth in the world, only second to USA, Japan and
Germany, and it has the industrial foundation and market conditions necessary for accepting the equipment manufacturing industry transferred by developed countries. In addition, when attracting the equipment manufacturing industry transferred from USA, Japan and other countries in Europe, the PRC also enjoys the advantage of relatively low production costs. The adjustment of industrial structure in the developed southeast coastal areas including Yangtze River Delta and Pearl River Delta as well as the increase in costs of production factors including land and labor force have provided Hunan Province in the central region an strategic opportunity to accept the transfer. The equipment manufacturing industry of Hunan Province can use its comparative advantages, initiatively select the industry transferred from developed countries, quickly absorb and master foreign advanced manufacturing technologies and management experience, and realize the upgrading of products and industry. In addition, this also bring an opportunity for the equipment manufacturing industry of Hunan Province to, by virtue of its own advantages, correctly select the entry point, occupy the commanding point and get itself gradually integrated with international equipment manufacturing system.

2. Entry by the PRC’s Economy and Society into Accelerated Development Phase Creating Huge Demands for Equipment Manufacturing Industrial Development of Hunan Province

Firstly, the accelerated progress of industrialization in the PRC has provided a huge room for the development of equipment manufacturing industry in Hunan Province.

At present, industrialization in the PRC has entered middle phase, and the rapid development of heavy chemical industry becomes an important characteristic. On the aspect of the future trend of the development, as the progress of the industrialization in the PRC is further accelerated, the heavy industrialization of the PRC will change from the phase taking the raw material industry as the center to the phase taking the further processing and assembly industry as the center. In the process, making great efforts to develop the high-tech industry and accelerating transform of the traditional industry are the emphasis. If the transform of the traditional industry is needed to be accelerated to realize the optimization and upgrading of industry structure, the advanced development of the equipment manufacturing industry must be the basis. Meanwhile, as the development of the PRC’s economy and society enters a new phase, energy conservation and emission reduction become an important task for the industrial development. Therefore, the need of all walks of life to the technical equipment is greatly increased. In addition, the development of the high-tech industry also needs a great deal of high-tech equipment, and the equipment manufacturing industry in Hunan Province will receive a spring of development.

Secondly, accelerating boost of urbanization and modernization of the PRC provides a large market for the development of the equipment manufacturing industry
in Hunan Province. In 2007, GDP per capita of the PRC reaches 2,700 dollars, but the urbanization level of the PRC only accounts for 43.9 percent. Therefore, in the near future, the PRC will enter the accelerated development phase of urbanization. As a new round of climax of city construction and infrastructure construction raises, the needs for steel products, cement, traffic, communication, power supply, gas supply and water supply greatly grow to accelerate the rapid development of the equipment manufacturing industry. On the aspect of scale, in 2030, the national urbanization ratio of the PRC will reach above 65 percent, and the city population will reach about 10 hundred million. Thus it is clear that the equipment manufacturing industry of the PRC still has increase at high speed for several tens of years. Construction machinery, track traffic, automobiles and manufacturing of parts and components in Hunan Province will rapidly develop along with the accelerating boost of urbanization and modernization of the PRC.

3. Support Given by the PRC to Development of Equipment Manufacturing Industry Creating a Good Macro-environment for Equipment Manufacturing Industrial Development of Hunan Province

In Eleventh Five-year Program For National Economy and Social Development, Some Opinions of the State Council on Accelerating Promotion of Equipment Manufacturing Industry, etc. of the PRC, the development level of the equipment manufacturing industry is treated as the concentrated representative of national economic strength and competitiveness from a strategic viewpoint, to develop equipment manufacturing industry is regarded as a major measure to boost the development of national economy and realize the optimization and upgrading of industry structure, and the direction, key points and policies of the equipment manufacturing industrial development of the PRC are set forth; the implementation of the national strategy to promote the localization of major equipment through construction of major engineering will constitute an important support for the equipment manufacturing industrial development. In order to cope with the international financial crisis, the Chinese government promulgated 10 major industrial reinvigoration planning, including the Planning for Adjustment and Reinvigoration of Equipment Manufacturing Industry in 2009.

It is set forth in the Planning for Adjustment and Reinvigoration of Equipment Manufacturing Industry that, a batch of major equipment such as one-mega kilowatt nuclear power generating equipment, new energy power generating equipment, high-speed motor train units, high-grade numerically-controlled machine tool, basic manufacturing equipment, and the like realizes automation; depending on UHV AC/DC power transmission demonstration projects, and taking AC transformers, DC convertor transformers, reactors, current transformators, fully-closed combined

electrical apparatus, and the like as the emphasis, the automation of equipment of 750kV AC power transmission/transformation equipment, 1,000kV AC power transmission/transformation equipment and plus/minus 800kV DC power transmission/transformation equipment is boosted; depending on nearly 70 passage engineering project in 17 cities covering Beijing, Shanghai, Canton, Shenzhen, and the like, the automation of electromechanical equipment covering city track traffic automobiles, signal systems, train networked control systems, braking systems, main-accessorial inverters, and the like are emphatically implemented.

The measures mentioned above have created a favorable micro-environment for the development of equipment manufacturing industry in Hunan Province.

4. Implementation by the National Strategy for Rising of Central Region Bringing a Good Opportunity for Hunan Province to Accelerate the Development of Equipment Manufacturing Industry

In April 2006, the *Opinions of CPC Central Committee and State Council on Promoting the Rising of Central Region* (Zhong Fa [2006] No. 10) (hereinafter referred to as “Opinions”) were formally issued. The Opinions require the six provinces in the central region to strengthen the construction of energy source bases, raw material bases, modern equipment manufacturing bases and high-tech industrial bases, and to promote the optimization and upgrading of industrial structure. It is required to construct the modern equipment manufacturing bases which have the self-innovation ability. It is required to, by virtue of backbone enterprises, develop clean and high-efficiency generating technologies, high-voltage power transmission/transformation equipment, large-sized mine equipment, petrochemical equipment, large-sized construction machinery, numerically-controlled machine tool and key functional parts thereof, new agricultural equipment, high-speed train, high-power locomotive, new-type metro vehicle as well as automobile and components thereof. The PRC will strengthen the technical renovation for major enterprises, and will, be means of input in scientific and technological research, procurement of construction equipment and taxation policy, support the technical research of major complete equipment and the development of major industrial technologies.

Meanwhile, the Opinions have also set forth the strategic arrangement for the central region to improve the pivot status of traffic/transportation, promote the development of commercial, trade, circulation and tourist industries, increase the radiation function of central cities, facilitate the development of urban agglomeration and county-level economy, further open up to outside world, accelerate the innovation on system and mechanism, accelerate the development of socialist cause and raise public management level.

In May 2006, the General Office of the State Council issued the *Circular on Implementation of Policies and Measures Relating to the Opinions of CPC Central*
Committee and State Council on Promoting the Rising of Central Region (Guo Ban Han [2006] No. 38), and required the National Development and Reform Commission, the Ministry of Science and Technology, the Commission on Science, the Technology and Industry for National Defense, the Ministry of Railways and other relevant departments to formulate and implement the policies relating to the Opinions. The implementation of the strategy for rising of central region will provide Hunan Province with a series of favorable conditions for improving the development environment of and accelerating the development of equipment manufacturing industry.

(IV) Challenge

1. Competition in International Equipment Manufacturing Industry Becoming More Fierce and Cruel

From international competition forces, with the progress of economic globalization, an open market throughout the world will come into being gradually. The entry by the equipment manufacturing products from various countries into the international market will lead to more fierce competition in international market. In particular, with domestication of international competition, the direct entry by the products of multinational companies into Chinese market, domestic market share of equipment manufacturing industry of Hunan Province may be seized.

From the domestic competitive forces, over recent years, except for Hainan and Tibet, the other 29 provinces, autonomous regions and municipalities directly under the Central Government in the PRC have seen their equipment manufacturing industry growing at a two-digit rate. Shanghai and Yangtze River Delta are the important equipment manufacturing industrial bases in the PRC, and more than 1/3 of the total output of the equipment manufacturing industry comes from Yangtze River Delta. The gross value of industrial output of metal product industry, traffic/transportation equipment manufacturing industry, ordinary machinery and special equipment manufacturing industry in Yangtze River Delta is ranked No. 1 in the PRC. The only enterprise which has the ability to manufacture 900MW steam turbine generator is domiciled in Shanghai, and it has produced the generating units of which the total generation capacity exceeds 80,000MW. The products from Jiangsu Province including small-sized diesel engine, urban bus and excavator enjoy the largest market share in the PRC. Zhejiang is the major instrument/meter manufacturing province, and since 2000, the output value, sales revenue, profit payments and tax turnover are ranked No.1 in the PRC. In addition, many equipment manufacturing enterprises in Yangtze River Delta have established plants in Southeast Asia, Europe and North America, set up R&D institutions in USA and other developed countries in Europe, and made solid progress in introducing foreign advanced technologies and carrying out foreign cooperation.

The old industrial bases in Northeast part of the PRC have already established
the industrial system which takes equipment industry as main body and covers various industries, their heavy-duty equipment and complete equipment still enjoy irreplaceable advantages, their machine tool and power transmission/transformation equipment industries are still ranked top in the PRC, and their heavy-duty machinery, locomotive, automobile and airplane manufacturing industries still occupy an important position in the PRC. In this area, Liaoning enjoys the advantages in machine tool manufacturing industry, environmental protection machinery manufacturing industry, ship manufacturing industry, mine equipment manufacturing industry, bearing manufacturing industry, metal cutting machine tool manufacturing industry, power transmission/distribution/control equipment manufacturing industry and cast part manufacturing industry; Jilin enjoys the advantages in transportation equipment manufacturing industry which takes automobile as representative; Heilongjiang enjoys the advantages in truck manufacturing industry, steam turbine manufacturing industry, generator manufacturing industry, airplane manufacturing industry, boiler manufacturing industry, metallurgical equipment manufacturing industry, railway transportation equipment manufacturing industry, agricultural machinery manufacturing industry and mini-automobile manufacturing industry.

The main products of the equipment manufacturing industry in Hunan Province, including construction machinery, power transmission/transformation equipment and automobile, are similar with and in competition with those of Yangtze River Delta and old industrial bases in Northeast part of the PRC. Furthermore, with the implementation of the strategy for reinvigoration of old industrial bases in Northeast part of the PRC and the strategy for rising of East part of the PRC, the fund, policy, talent and other resources to be input into the equipment manufacturing industrial development of Hunan Province will be diluted objectively.

2. Strengthened international vertical division

Generally speaking, the equipment manufacturing industry in Hunan will remain peripheral and downstream industry chain at longer period of time in the future although the equipment manufacturing industry in Hunan has some advantages in the field. Therefore, the rapid development of industry in Hunan depends not only the rapid self innovation, but also depends on to accept international transfer. However, the international equipment manufacturing industry only transfers the manufacturing, processing and assembly of the parts and components with few technical contents and low added value and then strengthens the vertical labor division system. If things continue this way, the parties which accept such transfer will inevitably get involved in technical dependence, get their innovation ability restricted, and thus get their position weakened in international competition.

3. The green manufacturing requiring higher R&D capabilities

To realize green manufacturing in the whole life cycle of a product is the
development trend of equipment manufacturing industry. The green manufacturing requires that the following factors should be taken into consideration in the course of design: the product must be detachable, maintainable and recoverable; the pollution, emission and impact to the environment in the course of manufacturing must be minimized; the product must be recovered and recycled upon the end of its life cycle. In the aspect of green manufacturing, the equipment manufacturing industry of Hunan Province lads behind to certain extent, the industrial level is not high enough, R & D is not strong enough, this makes it difficult to meet the international environmental management standard and thus the competitiveness in international market is lost.

However, since there are huge demands on equipment manufacturing industry both at home and abroad in the future, and the transformation and transfer of the equipment manufacturing industry of the world as well as the micro environment in the PRC are favorable for the equipment manufacturing industrial development of Hunan Province, it can be concluded that, as for the equipment manufacturing industrial development of Hunan Province, the opportunity is greater than challenge.

III Strategic Thoughts on Equipment Manufacturing Industrial Development of Hunan Province

Hunan Province is an important province of the central region in the PRC, the development strategy of the equipment manufacturing industry thereof should be subsumed under the whole industrial development scheme for the rising of the central region and the development strategy framework of the equipment manufacturing industry in the PRC to fully consider regional advantages and the existing industrial advantages of Hunan Province, and grasp the international trend of the development of the equipment manufacturing industry. From the strategic height, industrial development location is hatched to determine the development thought and direction, and formulate reasonable development objectives.

(I) Strategic Orientation

From now up to 2020, Hunan Province is in the middle phase of industrialization as a whole. In this phase, the core task of equipment manufacturing industrial development of Hunan Province is to increase the gross output by great margin, improve the quality, optimize the structure, raise the comprehensive competitiveness, and become the power engine for new industrialization in Hunan Province. According to this overall requirement, the equipment manufacturing industry in Hunan Province should bring its comprehensive advantages into full play, take the market as direction, take enterprises as main body, take technical innovation as driving force, take the improvement of competitiveness of industry and products as core, take the possession of key technologies and core technologies as breakthrough, take the proper and rapid development of economy and society in Hunan Province as objective, and play a more important role in promoting
the integration between industrialization and informationization. Therefore, in the coming 10 to 15 years, the strategic orientation of the equipment manufacturing industry in Hunan Province is:

1. **Important Equipment Manufacturing Industrial Base and National-level Development and Production Base in the PRC**

   By virtue of three advantageous industries (track traffic, construction machinery, electric equipment, automobile and components), three attractions (attraction of international large scale equipment manufacturing enterprises, attraction of international famous research institution, and import of excellent managing and scientific talent for the equipment manufacturing industry) are strengthened, two services are well done (local enterprise service is well done, and matching service for importing enterprises and talents is well done), and an objective is realized (forging Hunan Province to be an important major equipment manufacturing base and national-level development and production base in the PRC).

<table>
<thead>
<tr>
<th>Box Subreport1-1 Strategic Orientation of Equipment Manufacturing Industry of Hunan Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>‣ Important equipment manufacturing industrial base and national-level development and production base in the PRC;</td>
</tr>
<tr>
<td>‣ World-influential Capital of Construction Machinery;</td>
</tr>
<tr>
<td>‣ Leader of Independent Development Manufacturing for Track Traffic Equipment in the PRC;</td>
</tr>
<tr>
<td>‣ Important electric equipment developing base in the PRC;</td>
</tr>
</tbody>
</table>

2. **World-influential Capital of Construction Machinery**

   Depending on the backbone enterprises including Zoomlion, Sany Heavy Industry, Hunan Sunward Intelligent Machinery, Jianglu Machinery, and the like, global resources are integrated, and technical innovation is strengthened. The backbone enterprises develop towards intelligence, energy conservation, high efficiency, reliability and environmental protection, widely apply high technology covering mechanical-electrical-hydraulic integration, and the like, develop towards maximization and miniaturization to enhance technical advancement of mating power, and attaches importance to ergonomics application; the attraction and the cultivation of a batch of construction machinery advantageous enterprises are accelerated, and the existing product market advantages of concrete machinery, and the like are further strengthened with working hard in new product development and industry matching. Through further extension of industrial chain and increase of industrial concentration degree, promotion of industrial core competitiveness and international
competitiveness is accelerated, and Hunan Province is forged to be a world-influential capital of construction machinery.

3. Leader of independent development manufacturing for track traffic equipment in the PRC

Depending on the backbone enterprises including Zhuzhou Electric Locomotive Co., Ltd., Xiangtan Electric Group, Time Electricity and Zhuzhou Vehicle Factory, “master world-class technologies, manufacture world-class products and set up world-class bases.” Great effort should be made for Hunan Province to become a leader of independent development manufacturing for track traffic equipment in the PRC

4. Important electric equipment developing base in the PRC

Depending on the representative enterprises including Tebian Electrical Hengyang Transformer Co., Ltd, Xiangtan Electric Group Co., Ltd., Hunan Switch Co., Ltd., Hengyang Cable and Wire Co., Ltd., Changsha High-voltage Switch Co., Ltd. and Changsha Cable Accessories Co., Ltd., develop high-voltage power transmission/transformation equipment and clean & high-efficiency generating equipment (MW class wind power equipment as well as cooling pump and valves for nuclear power station), and forge the regional industrial clusters for clean & high-efficiency generating equipment and power transmission/transformation equipment.

(II) Basic Thought

Equipment manufacturing industry is an industry of which the resources are allocated throughout the world, and the independent development of this industry should be realized in an open environment. According to the overall strategic arrangement made by the PRC, it is a good opportunity for reinvigoration of equipment manufacturing industry. The advantages, the disadvantages, the opportunity and the challenge of the development of the equipment manufacturing industry in Hunan Province, and the development location of the equipment manufacturing industry in Hunan Province, the basic development thought of the equipment manufacturing industry in Hunan Province is that the equipment manufacturing industry is taken as a strategic industry which promotes the conversion of economy development mode as well as the optimization and upgrading of industry structure, takes a new road to industrialization, and realizes strategic industry with sustainable, rapid and coordinated development of economy to implement Theory of Scientific Development and the circular economy concept, complies with its own development regularity of equipment manufacturing industry, focusing on one center, aiming at two markets, grasping three key issues, constructing four platforms, and emphasizing five focal points, a development layout with remarkable advantages, obvious features, cluster development and positive interaction is formed through
efforts for five years to ten years, and Hunan Province is forged to be an important advanced manufacturing industrial base in the PRC.

**Focusing on one center:** promoting Hunan Province to accelerate the new industrialization progress.

**Aiming at two markets:** firstly, the real market. Basing upon the international current demand which has been formed and rapidly increases, industries with remarkable advantages and rich foundation are taken as an emphasis to accelerate the development and the growth. The second is potential market. Scanning widely in an international great potential demand to be formed, development input is strengthened, industrialization promotion is accelerated, and cultivation strength is strengthened to form new economic growth points.

**Grasping three key issues:** the first is technical innovation. The technical innovation is taken as a magic weapon for the equipment manufacturing industry in Hunan Province to win sustained competitiveness and promote core competitiveness, and a technical innovation system which takes enterprises as a main body and market as a guide, and tightly integrates production, teaching and research is accelerated to be established; enterprise technology alliance is vigorously supported and developed, the enterprises are conducted to be combined with research institutions and universities to establish common technology development base and complete industry skill development systems; various intermediary institutions providing technical innovation and technology transfer service for enterprises are actively cultivated, and the important functions of industrial associations and intermediary institutions are fulfilled to form a technology service system of socialization, specialization and networking with openness, convenience and high efficiency; patenting, patent standardization and standard internationalization of autonomous innovative achievements are vigorously promoted. The second is talent concentration. Talent concentration is the most important production factor of depending on comparative advantages, digging late-development advantages and creating competition advantages for the equipment manufacturing industry in Hunan Province, human resource development strength is strengthened, effort is made to attract, cultivate and create a team of technical talents with high level and high quality, a team of high-level business management talents knowing business operation and management as well as a team of skilled workers with high skill and high quality. The third is investment promotion. The investment promotion is a constant subject and a lifeline for the equipment manufacturing industry in Hunan Province, and factors on a global scale is widely admitted with global vision and heart to make a road of globalization development.

**Constructing four platforms:** the first is innovation and entrepreneurship platform to emphasize on aiming at, attracting and developing high-end projects including high-tech industrialization, and the like, and concentrate innovation and
entrepreneurship resources; complete technical innovation support platforms including specialized incubators, public pilot bases, national engineering research centers, national key laboratories, and the like for the equipment manufacturing industry, and improve a public service platform operating mechanism with high-efficiency management and open service; accelerate development of technology intermediary service organization, professional consultation mechanism, and the like, construct an open specialized intermediary service system which is adapted to the development of the equipment manufacturing industry and accords with the international practice. The second is financing platform to innovate financial products, and dig the existing local financial enterprise potential; attract international financial institutions, and strengthen financial support systems; by making use of capital markets covering shares, bonds, and the like, actively utilize global capitals; promote mechanism innovation, establish small-loan company for small and medium enterprises, vigorously develop industry or venture investment funds, strengthen financial intermediary service mechanisms, and the like, and establish a new-type financial service platform. The third is talent concentration platform to vigorously implement flexible talent attracting construction through flexible modes including setting up rostrums, short-term employment, technological breakthrough, special consultants invitation, business doctors, and the like; integrate various teaching and cultivating resources, and strengthen talent cultivation strength; complete competition incentive mechanisms for talents, and constructing a favorable staffing environment for attracting, retaining and activating the talents. The fourth is policy environment platform to make effort to create the most preferential policy environment; construct the service environment with high quality and high efficiency; establish the humanistic environment of cherishing business, pro-business, supporting business, protecting business, stabilizing business and rich business; create favorable public environment and economic order; strengthen intellectual property protection.

Emphasizing five focal points: the first is to accelerate the development of three advantageous equipments. Construction machinery equipment needs to conduct backbone enterprises including Zoomlion, Sany Heavy Industry, Hunan Sunward Intelligent Machinery, Jianglu Machinery, XENC reshipment, and the like to divide into market and develop with diversification, and has an emphasis around further development and production of products of new-type earthmoving machinery, water construction machinery, logistics complete equipment, large-sized hoisting machinery, large-sized pavement construction machinery, large-sized strip mine fully-mechanized equipment, energy-saving and environment-friendly construction machinery, military construction machinery, and the like, to become bigger and stronger. The track traffic equipment conducts accelerating technical innovation as well as restructuring and reorganization of Zhuzhou Electric Locomotive Co., Ltd., Zhuzhou Time Group, CSR Times Elec, Xiangtan Electric Group and Zhuzhou Vehicle Factory, and has an
emphasis on developing products including large-power AC transmission goods traffic, passenger electric locomotives, motor train units, heavy-duty high-speed locomotives, AC transmission urban track traffic equipment, large-sized maintenance machinery, urban track traffic automobiles, train networked control systems, braking systems, signal systems, and the like. Power transmission/transformation complete equipment takes Henyang Tebian Electrical Apparatus as a leader, vigorously cultivate enterprises including Henyang South Transformer, Changgao Group, Hunan Switch, Xiangneng Electrical Industry, Lujing Electrical Porcelain And Electrical Appliance, Hunan Guangxin, and the like, strengthens industrial chain extension and industrial technical alliance, has an emphasis on developing extra-high voltage current of 500KV or below, voltage transformators, breaker, combined electrical apparatuses, and AC/DC power transmission/transformation equipment of 1000KV or below, comprises products including AC transformers, DC convertor transformers, reactors, isolating switches, current transformators, fully-closed combined electrical apparatuses, and the like, and building a complete system of Hunan power transmission/transformation equipment.

Secondly is to vigorously cultivate six newly-emerging equipments. New energy equipment needs to support Xiangtan Electric Group and Times Group to lead to establish wind power generation industry alliance; depending on the National Power Investment Corporation, solar photovoltaic cell manufacturing equipment is developed, and products including MW class wind power equipment, nuclear power pump valve equipment, solar photovoltaic cell manufacturing equipment, biological resource utilizing equipment, and the like are emphasized to develop. Energy-saving and environment-friendly equipment takes Xiangtan Electric Group as a core, vigorously supports small and medium enterprises including Yonker Group, Kaitian Environmental TECH, Wellington, Changsha Boiler, Changsha Motor, Kejing Motor, and the like, and emphasizes on developing products including power station gas decarbolizing, denitrating and dust removing complete equipment, heat and power cogenerating equipment, refuse treatment complete equipment, energy-saving variable-frequency motors, new media energy-saving boilers, water treatment equipment, new energy urban environment-friendly equipment, environment monitoring instruments, and the like. Aerospace equipment establishes production bases of medium/small-sized aero engines and undercarriages depending on undercarriages of South Airlines and Air China, promotes the industrialization of light-duty airplanes depending on Hunan Sunward Intelligent Machinery, and emphasizes on developing products including general aviation equipment, medium/small-sized aero engines, aero reduction and transmission systems, undercarriage systems, near space vehicles, satellite application products, satellite ground equipment, and the like. Ship equipment needs to conduct Sino Shipping, Damen Shipyards, Sunbird Yachts and Changsha Shipyards to forge ship products
with band characteristics, and emphasizes on developing products including engineering ships, special work ships, inland-river and coastal transport ships, new-type composite ships, and the like. Numerical control equipment takes enterprises including Yuhuan Tongxin TECH, Huda Haijie, ZDCY, Hunan Hefeng, and the like as the core, and emphasizes on developing products including high-grade numerically-controlled gear grinders, numerically-controlled gear milling machine tools, numerically-controlled twin surface grinders, high-speed and high-precision numerically-controlled crankshafts, horizontal processing centers, camshaft grinding machines, numerically-controlled slotting machines, functional parts of high-grade numerically-controlled machine tools, and the like. Electronic information equipment emphasizes on developing products including integrated circuit key equipment, new-type element production equipment, electronic special equipment, tool and mould, and the like.

Thirdly, make great efforts to reconstruct and improve the four specialty equipments. Rely on such enterprises as Hunan Electricity and Changsha Pump Manufacturing Co., Ltd., Changsha Blast Blower Factory Co., Ltd., Xiangtan Centrifuge Co., Ltd., Woci Valve (Changsha) Co., Ltd., etc. to prioritize the development of the energy-saving blaster blowers, centrifuges, compressors, larger water pumps and valves (which is known as “three machines and one pump”), and other universal petrifaction equipment. Rely on such enterprises as Zhonggang Balance Weight Equipment Co., Ltd., MCC (Xiangtan) Heavy Industrial Equipment Co., Ltd. etc. to prioritize the development of drilling equipment, heavy excavating equipment, wide/medium thick plate equipment, cold and thermal continuous rolling auxiliary equipment, metallurgical equipment auxiliary control system, afterheat recovering equipment, auxiliary conveying equipment with special use, nonferrous metal deep processing equipment and other metallurgical mine equipment. Rely on such enterprises as Zhongtian Technologies Co.,Ltd., Modern Agricultural Equipment Co., Ltd., Hengyang Hengtuo Farm Machinery Manufacture Co.,Ltd., etc. to prioritize the development of crop growing and harvesting whole-process mechanical devices, rice refining auxiliary equipment, large- and medium-sized tractors, water-saving spraying, dripping and irrigating auxiliary equipment, rural safe drinking water purifying equipment and light diesel engines, and other agricultural mechanical equipment. Rely on such enterprises as Yiyang Rubber & Plastics Machinery Group Co., Ltd., Guotai Tissue Machine Co., Ltd., Changde Huali Smoke Machine Fittings Co., Ltd., Changde Textile Machinery Co., Ltd., Shaoyang Textile Machinery Co., Ltd., etc. to prioritize the development of large rubber and plastic mixing and forming auxiliary equipment, food machines, paper-making machines, packaging equipment, food security detecting equipment, high- and medium-level cigarette packaging machine auxiliary equipment, new textile equipment, and other equipment used in chemical engineering, light industry, textile industry and other industries.
Fourthly, focus on the development of advanced matching parts industry. Rely on such enterprises as Hunan Teli Hydraulic Pressure Co., Ltd., Zhonglian Xincheng Hydraulic Pressure Co., Ltd., Zhuzhou World Special Gear Co., Ltd., Hunan Guangxin Duty Co., Ltd., etc. to prioritize the development of high-power functional modules, large precision bearings, high-strength tightening elements, high-performance hydraulic units, hydraulic systems, engines, driving bridges, hydraulic transmission cases, pneumatic units, large crankshafts, castings and forgings for cold and thermal continuous rolling units, high-precision gears, 500KV or higher insulating paper boards and insulating formed parts.

Fifthly, proactively develop reconstruction. Establish research and development funds to support the research and development of key technologies for reconstruction and speed up the breakthrough in advanced self-repair and reconstruction key technologies which are based on information technology, micro-nanotechnology, biotechnology, etc. and which have independent intellectual property, as well as in advanced material manufacturing technologies with self adaptability and self repair capability and in advanced intelligent self-repair detection and control technologies. Attach great importance to the reconstruction, upgrading and transformation of old-dated products such as waste and old construction machines, waste and old rail transportation equipment, waste and old vehicles, waste and old ships, waste and old machine tools and waste and old agricultural machines, for the sake of informatization.

(III) Development Principle

1. Developing High-end Equipment and Semi-finished Products and Improving Local Supporting Rate

The term “high-end equipment” means the high-tech key equipment for which the government is to increase input and give more support. In Hunan Province, the sectors including track traffic equipment and electric equipment are technically advanced, and more efforts will be made to develop high-end products in construction machinery, automobile and components thereof in the future, so as to form the industrial structure which takes technology/knowledge-intensified high-end equipment manufacturing industry as core. In particular, breakthrough should be made in the high-tech key equipment which will not be transferred by foreign countries to the PRC, so as to cultivate the major technical equipment with independent intellectual property rights.

At the same time, the situation that only a single product is technically advanced should be avoided. It is required to, centering around the improvement of local supporting rate, develop the relevant semi-finished product industry. The semi-finished product industry means the manufacturing industry for parts, components, elements and intermediate materials which is between raw material manufacturing industry and final product manufacturing industry, wherein the key and highly-functional parts, components, elements and intermediate materials enjoy huge
semi-finished product industry is mainly composed of labor-intensified small and medium enterprises, and is the core of basic equipment and the foundation for the whole equipment manufacturing industry. At present, the local supporting rate of parts and components in the equipment manufacturing industry of Hunan Province is less than 40%, which not only seriously restricts the further development of the equipment manufacturing industry in this province, but also prevents the increase of employment opportunities and the improvement of urbanization level. Therefore, Hunan Province should, by means of introduction, joint venture and reorganization, optimize the organizational structure of enterprises, enlarge the industrial scale of those semi-finished products which enjoys good market demands, improve the level of technologies, and develop a batch of small and medium component manufacturing enterprises and specialized manufacturing bases, so as to supply high-quality parts and components for complete equipment and main machines in this province, other provinces and even foreign countries and form a new growth point.

In this way, make great efforts to develop the industry of high-end equipment and semi-finished products, and obtain the pushing effect, so as to realize the rapid development of large/medium-sized capital-intensified equipment.

2. Accepting Transfer, Cooperating with Enterprises Directly under Central Government, and Enlarging Industrial Scale

Seize the opportunity arising from the structural adjustment and transfer of equipment manufacturing industry in the world and in eastern coastal areas of the PRC, actively accept the transfer. Make efforts to strengthen the cooperation with multinational companies and enterprises directly under the Central Government which have rich strength in technology and capital, accelerate the merger and reorganization of enterprises, improve the production technologies, processes and management which stay at lower level, and cultivate more advantageous enterprises and products; accelerate the introduction of R&D institutions at home and abroad which have rich strength, continuously consolidate and perfect the technical innovation system, and develop series of new products. Therefore, accelerate the expansion of the existing output and the increase of added value, so as to increasingly enlarge the scale of equipment manufacturing industry in Hunan Province.

3. Optimization of Industrial Organizations and Development of Enterprise Groups and Make Efforts to Forge World-famous Brands

In accordance with the principle of specialized labor division and scale economy and rule of market economy, accelerate the adjustment in organizational structure of enterprises, and, by taking assets as the connecting element and by means of equity participation, share holding, acquisition, reorganization, joint venture and specialized cooperation, drive various resource elements to concentrate in competitive enterprises and promote the reasonable allocation of the resources and the optimization and profit room.
reorganization of the system to develop a batch of major technical equipment manufacturing enterprise groups which have outstanding main business, have certain scale in the industry and enjoys core competitiveness into “aircraft carrier” enterprises, to create an opening and advanced organization mode with high efficiency, information sharing and flexible structure, so as to facilitate the transition of industrial structure from the mode of small and medium enterprise intensive competition to large enterprise-dominated mode of network oligopoly, and form a lot of backbone enterprises which participate in the competition at home and abroad in the equipment manufacturing industry of Hunan Province.

Meanwhile, cultivate a batch of “small giant” enterprises which have unique advantages, realize the change of industrial structure from “olive type” to “dumbbell type,” and constitute the new industrial organization structure system for the equipment manufacturing industry of Hunan Province. On this basis, depend on “carrier type” and “small giant” enterprises. According to the organization principle of a virtual enterprise and the principle of functional compensation, core competitiveness of each is brought into full place, and the industrial dynamic coalition is formed to realize higher, wider and more effective cooperation. Finally, it is required to take the cultivation of name brands as the core and strengthen the adjustment of product structure. On one hand, it is required to accelerate the development of a batch of name-brand products with independent intellectual property rights, high technical contents, high added value and high market share, On the other hand, it is required to emancipate the minds and introduce a batch of famous brands at home and abroad, so as to realize the development based on name brands.

A virtual enterprise consists of two or more resource-compensatory advantageous enterprises which make use of the information integration technology and bring their own core capabilities into full play so as to form dynamic and temporary network type economic organization (known as the virtual enterprise) on a basis of cooperation. According to virtual enterprise theorists, firstly, a virtual enterprise does not need to reinvest in HR, production field or production equipment or set up any organizations in real sense, and it is simply a project-oriented virtual enterprise union; secondly, a virtual enterprise emphasizes very much the technical coalition, and the members, based on core capabilities, preconditioned by technical cooperation and communicating through know-how information, undertake equally the technical risks, with a final aim on sharing the high-tech industrialization interest; and finally, a virtual enterprise adopts the parallel work mode of the partners and can greatly shorten the input-output period by performing interaction between research-based production and market development. Meanwhile, members of the virtual enterprise are in the short-term cooperation relationship. Once their aim is achieved, the organization is dismissed. Therefore, compared with other modes of corporation coalition, a virtual enterprise is more flexible and can quickly capture an
instant market opportunity and adjust the constitution of the members in the network according to the latest change of the market demand. For this reason, the virtual enterprise is a dynamic, self-adaptive and random coalition.

4. Developing Industrial Chain Vertically and Industrial Clusters Horizontally, and Making Efforts to Improve Self-innovation Ability

Depending on high-tech industrial development zones, economic & technological development zones and various industrial parks, take advantageous industries as the key points promote the disintegration thereof and set up several specialized parks or sub-bases. The adjustment to the existing equipment manufacturing industry, new projects of investment promotion and capital attraction as well as the new construction/reconstruction engineering must be in line with the re-integration and layout of the equipment manufacturing industry throughout this province. In addition, it is required to, in accordance with the goals to make the leading enterprises stronger and improve the supporting ability of small and medium enterprises and by taking large backbone enterprise groups and name-brand products as the leading elements, take the market-based measures, so as to extend the industrial chain, increase the supporting ability and supporting radius of large/small and medium enterprises, and cultivate and establish the highly specialized industrial clusters. In addition, it is required to cultivate a lot of social intermediary service institutions (industry, including industrial associations, financing institutions and consultation service institutions) for the equipment manufacturing, increase the industrial concentrating effect and self-innovation ability, and forge several industrial clusters which have unique features.

(IV) Strategic Objectives

According to the development strategy of the countries throughout the world, the added value of the manufacturing industry in the middle phase of industrialization normally accounts for 40%~60% of GDP, while the equipment manufacturing industry accounts for 40%~60% of manufacturing industry. Therefore, the added value of equipment manufacturing industry accounts for 16%~36% of GDP. In 2007, the machinery industry of the PRC realized the added value of CNY195 million billion, accounting for 7.58% of GDP; however, the added value realized by the equipment manufacturing industry of Hunan Province accounts for only 4.55% of local gross output value, and accounts for only 2.1% of the added value realized by the equipment manufacturing industry in the PRC. During the period from 2002 to 2007, the added value of the equipment manufacturing industry in the PRC increases from CNY 380 billion to CNY 1,953.3 billion, with an average annual growth rate of 38.74%. The equipment manufacturing industry of Hunan Province made up the deficits and got surpluses till 2000, realized the industrial added value of CNY21.593 billion in 2005, and got its added value growing at an average annual rate of 39.22% during the period from 2005 to 2007. On the basis of the industrial foundation,
development opportunity, challenge, advantages and disadvantages of equipment manufacturing industry in Hunan Province, the strategic objectives of the equipment manufacturing industrial development of Hunan Province in the coming 10 to 15 years are as follows:

1. Overall Objectives of Development

Through 10 to 15 years’ efforts, establish the equipment manufacturing industry system which is supported by the name-brand products with independent intellectual property rights, high technical contents and high added value and enjoys relatively strong matching ability and international competitiveness; establish the industrial technical innovation system which takes the enterprise as main body, involves the close cooperation among enterprises, universities and research institutions and has important international influence; create the policy system and comprehensive environment which is favorable to the accelerated development and sustainable development of equipment manufacturing industry, so as to develop Hunan Province into the important equipment manufacturing center, equipment R&D center and equipment manufacturing information center in the PRC. In 2017, the added value of the large-scale equipment manufacturing enterprises in Hunan Province should account for about 10% of the local gross output value and account for about 4% of the added value of large-scale equipment manufacturing enterprises in the PRC; in 2022, the two figures mentioned above should be 16% and 6% respectively.

2. Objectives of Increase in Gross Output Value

In 2017, the gross output value of large-scale equipment manufacturing enterprises should increase from CNY140 billion in 2007 to CNY1,000 billion, with an average annual growth rate of 21.7%; the added value should increase from CNY41.85 billion in 2007 to CNY320 billion, with an average annual growth rate of 22.6%; the profit payments and tax turnover should increase from CNY17.75 billion in 2007 to CNY42 billion, with an average annual growth rate of 9%.

In 2022, the gross output value, added value, profit payments and tax turnover of the gross output value of large-scale equipment manufacturing enterprises should reach CNY1,700 billion, CNY561 billion and CNY56.3 billion respectively, with an average annual growth rate of 18.1%, 18.9% and 8% respectively (See Table Subreport1-2).

21 All anticipated data in this Report are obtained by applying the trend extrapolation method.
### Table Subreport1-2  Annual Development Objectives of Equipment Manufacturing Industry in Hunan Province

<table>
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<tr>
<th>Item</th>
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<td>Added Value</td>
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<td>38</td>
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<td>22.6</td>
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<td>Gross Output Value</td>
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<td>2,750</td>
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<td>Annual Growth Rate (%)</td>
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<td>36.0</td>
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<tr>
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</table>

Note: A refers to the estimated value on the basis of the added value rate of 30%.

### 3. Objectives of Development of Major Industries

1. **Track traffic.** In 2017, the industrial output value realized by large-scale enterprises should increase from CNY17.733 billion in 2008 to CNY125 billion, with an average annual growth rate of about 24%. Great efforts should be made so as to ensure that the industrial output value reaches CNY150 billion.

2. **Construction machinery.** In 2017, the industrial output value realized should increase from CNY25.23 billion in 2007 to CNY250 billion, with an average annual growth rate of about 26%. Great efforts should be made so as to ensure that the industrial output value reaches CNY300 billion.

3. **Electric equipment.** In 2017, the industrial output value realized should increase from CNY34.2 billion in 2007 to CNY270 billion, with an average annual growth rate of about 23%. Great efforts should be made so as to ensure that the industrial output value reaches CNY300 billion.

4. **Automobile and components thereof.** In 2017, the industrial output value realized should increase from CNY22.3 billion in 2007 to CNY160 billion, with an average annual growth rate of about 22%. Great efforts should be made so as to ensure that the industrial output value reaches CNY200 billion.

In 2017, the industrial output value realized by the aforesaid four major industries should reach CNY805 billion. Great efforts should be made so as to ensure that the industrial output value reaches CNY950 billion.

### 4. Objectives of Optimization of Industrial Structure
By 2017, the equipment manufacturing industry in Hunan Province should have got the industrial concentration degree increased by great margin, 3 large multinational enterprise groups each of which has the annual sales revenue exceeds CNY100 billion and obtains the international competitiveness, five large companies realizes annual sales income of over CNY50 billion and are of great importance in the industry.

10 large enterprises each of which has the annual sales revenue exceeds CNY10 billion and enjoys important industrial position, and 20 major enterprises each of which has the annual sales revenue exceeds CNY1 billion should have been cultivated, the equipment manufacturing industry which is supported by major unique equipment, famous brands and backbone enterprise and is supplemented by a batch of small and medium enterprises should have been set up, and 8 to 10 equipment manufacturing areas which have obvious features and relatively large scale should have been forged.

5. Objectives of Improvement of Technical Level

By 2022, the advantageous sectors in the equipment manufacturing industry of Hunan Province should have basically mastered the key technologies and core technologies, breakthrough should have been made in main basic equipment, basic elements and key components, and the situation that key components are under the control of others should have been changed. The application of information technology in the links including equipment production, operation and management should have been generalized, and the advanced technologies including modern design technology, numerical control technology, flexible manufacturing technology, industrial process automation technology, precision forming technology and system management technology should have been applied extensively. A batch of national-level engineering technology research centers and enterprise technology centers which reach internationally advanced as well as a batch of provincial-level engineering technology research centers and enterprise technology centers which reach domestically advanced level should have been set up. The new product output rate of the equipment manufacturing industry in Hunan Province should exceed 50%, and the objectives of energy saving and emission reduction should have been achieved.

(V) Strategic Step

1. Phase of Growth and Integration (2010~2015)

Take the further expansion of industrial scale as key point, take four advantageous industries as the core, take the improvement of industrial concentration degree as acting point, take the expansion of scale of semi-finished product industry as breakthrough point, and make great efforts to extend the industrial chain and expand the industrial clusters.

2. Phase of Industrial Upgrading (2016~2020)

Take the improvement of innovation ability and industrial technical level as the
key points, take the cultivation of independent brands as acting points, take the promotion of industrial integration as breakthrough point, and push the optimization and upgrading of the structure of equipment manufacturing industry in Hunan Province.

(VI) Strategic Emphasis

Nowadays, the equipment manufacturing industry of the world is developing towards informationized manufacturing, green manufacturing, integrated manufacturing and service-based manufacturing, which is mainly embodied by the development and application of flexible manufacturing system (FMS) and computer integrated manufacturing system (DIMS) as well as the development towards intelligent manufacturing. In the aspect of feature of technology development, this is manifested by integration of technology; in the aspect of product development, this is manifested by high technical contents of products, namely high added value, intelligent manufacturing and systematic manufacturing; in the aspect of system management, this is manifested by integrated manufacturing (including system integration, software integration, technology integration and interface integration) and network-based manufacturing. In addition, the trend of globalization and cluster in the development of the equipment manufacturing industry of the world becomes more obvious. According to the new trend of equipment manufacturing industrial development and the strategic objectives of equipment manufacturing industrial development of Hunan Province, the strategic emphasis of the equipment manufacturing industrial development of Hunan Province in the future is to implement the following three “integration & optimization” engineering.

1. Integration with High Technologies and Optimization of Industry Structure

Break through the scope of traditional products, and accelerate the development of newly-emerging equipment manufacturing industry while transforming and upgrading the traditional equipment manufacturing industry. Make great efforts to develop the new equipment which is used to manufacture new products, push the industrialization of advanced manufacturing technologies and the industrialization of the electro mechanic-information products based on integration of mechanical technology and information technology, form the high-tech equipment manufacturing industry which has international competitiveness in the advantageous sectors, and thus cultivate new economic growth points, create new employment opportunities and push the upgrading of industrial structure. Meanwhile, use high technologies (information technologies in particular) to renovate and upgrade the traditional equipment manufacturing industry in Hunan Province, push the development of the equipment manufacturing industry in Hunan Province towards automatic manufacturing, intelligent manufacturing and systematic manufacturing, realize the information integration in production, management, sales and R&D as well as the
network-based supply chain, and promote the rapid expansion of equipment manufacturing industry in Hunan Province.

2. Integration of Internal Reorganization and Optimization of Product Structure

Renovate and reorganize the production/operation mode which features in “large and complete as well as small and complete,” push the close integration and mutual promotion between machinery industry and electronics industry, and improve the complete equipment manufacturing ability and local supporting ability. Place the focus on the integration of various technologies including mechanical technology, electronic technology, information technology, automatic control technology, sensing & testing technology and software programming technology, push the development of equipment manufacturing industry in Hunan Province towards human-oriented, mini-sized and integrated manufacturing, accelerate the cultivation of several large engineering companies and system integration companies which have the functions including system design, system integration and engineering contract, and provide users with the services covering the full life cycle of products, including design, manufacturing, purchase, installation, commissioning and after-sales services. Meanwhile, make great efforts to develop the semi-finished product industry covering key components, functional parts and elements, greatly expand the scale of semi-finished product industry, improve the specialized level of semi-finished product industry, and form a batch of semi-finished product manufacturers which have competition advantages.

3. Integration with Service Industry and Optimization of Value Chain

Integrate, perfect and extend the industrial chain, further improve the processing & manufacturing level of the equipment manufacturing industry in Hunan Province, and realize the services covering the whole life cycle. Promote the integration of the equipment manufacturing industry in Hunan Province with the producer service industries including finance, engineering service, information consultation, scientific consultation, and realize the expansion of operation scope from manufacturing of product to development of complete technology and undertaking of complete engineering and complete project; promote the extensive application of information technologies, network technologies and communication technologies in products, realize the remote information acquisition, and provide the services including remote operation monitoring, parameter adjustment, program updating and troubleshooting; develop the individualized services including client consultation, product design, process design, appearance design and after-sales service as well as the socialized services including market survey, professional conference & exhibition, equipment lease, equipment testing, routine operation and maintenance of complete equipment, and logistics intermediary service, and increase by great margin the added value and competitiveness of the equipment manufacturing industry in Hunan Province.
IV Strategic Guarantee Measures for Equipment Manufacturing Industrial Development of Hunan Province

(I) Promoting Fiscal/Financial Innovation and Establishing Strong Investment/Financing Supporting System for Equipment Manufacturing Industrial Development

Seize the favorable opportunity arising from the adjustment and development by the equipment manufacturing industry, increase the fiscal input, actively lead the input from private capitals, continuously broaden the financing channels, and establish the powerful investment/financing supporting system for promoting the further development of equipment manufacturing industry.

1. Setting up the special fund for equipment manufacturing industrial development

It is advised to integrate the relevant fiscal capitals and set up the special fund for equipment manufacturing industrial development of Hunan Province. This fund should be mainly used for supporting and encouraging the technical innovation, technical renovation, scientific & technological research, industrial cluster, industrial matching, and product marketing network construction, professional talent training, product standardization and informationization in the equipment manufacturing industry. As for those equipment manufacturing enterprises which make great contribution to local fiscal income, it is advised to grant award instead of subsidy, so as to encourage the enterprises to carry out technical R&D and industrialize scientific & technological achievements.

2. Bringing the leverage and directing role of public capitals into full play

As for those R&D activities for equipment manufacturing technologies which enjoy good market prospect but have relatively high risks, it is advised to provide guarantee on the basis of the fiscal credit of the government. As for the scientific & technological projects relating to the manufacturing of major equipment which are in the R&D phase, it is advised to, by means of loan at discount interest and rolling support, provide the continuous support; as for the technical enterprises in the equipment manufacturing industry, it is advised to, by using the direct support methods including provision of equipment and service and establishment of incubator as well as the indirect support methods including loan at discount interest, help shorten the start-up period; actively organize the implementation of national program for adjustment and reinvigoration of equipment manufacturing industry as well as the national plan for development of high-tech industry, and increase the capital input in improving local supporting ability in Hunan Province.

3. Promoting the self-innovation in equipment manufacturing industry by means of government procurement

It is advised that, as for those projects to be constructed by using fiscal capitals,
priority should be given to the high-tech equipment and services from Hunan Province under the condition of the same performance price ratio; in the key equipment manufacturing sectors, the government may carry out bidding-based purchase for the intermediate research results (including sample and prototype, know-how and key technical components obtained in the course of technical innovation.

4. Setting up the venture capital & investment system which is primarily supported by private input and supplemented by governmental input

Set up the fund for leading venture and investment in equipment manufacturing industry of Hunan Province, so as to support the high-tech equipment manufacturing industry, especially the innovative-type small and medium manufacturing enterprises; actively lead and encourage the input of private capitals into equipment manufacturing industry, and encourage multinational companies or large enterprise groups to invest in equipment manufacturing industry of Hunan Province by means of sole investment, share holding, acquisition and merger.

5. Continuously broadening the diversified financing channels

Make great efforts to develop the direct financing, actively support the equipment manufacturing enterprises which enjoy favorable conditions to raise fund from the capital markets at home and abroad, and try best to develop diversified financing channels; actively develop the backup resources in the equipment manufacturing industry for going public, and assist those high-tech equipment manufacturing enterprises which possess rich strengthen in going public; support those equipment manufacturing enterprises which meet the relevant conditions to apply with the central government for issuance of corporate bonds; accelerate the progress of financial innovation, continuously bring the stimulation effect imposed by indirect financing on equipment manufacturing industrial development into full play, lead and encourage the financial institutions at various levels to support the equipment manufacturing industrial development, generalize the financial products which aim at high-tech equipment manufacturing enterprises, including the domestic seller credit and domestic letter of credit, and grant the joint-guarantee loan to high-tech equipment manufacturing enterprises; further optimize the investment environment, extensive absorb the credit capitals from international financial market, actively use the preferential loans from World Bank, ADB and foreign governments.

(II) Establishing Support System and Service System for Technical Innovation in Equipment Manufacturing Industry and Improving Self-innovation Ability

Equipment manufacturing industry is a capital-intensified and technology-intensified industry. The equipment manufacturing enterprises in Hunan Province is weak in the aspects of experimental equipment, high-end talent and advanced software system. Therefore, it is required to, taking the market demands as
the direction, keep close to market demands, keep close to industrial development, keep close to enterprises’ difficulties, take the promotion of technical innovation and the upgrading of products as objectives, integrate the scientific & technological resources scattered in the organizations including government, enterprises, research institutions and intermediary institutions, and construct the technical supporting system and technical service system for the technical innovation in equipment manufacturing industry of Hunan Province.

1. Setting up the technical innovation system which takes enterprises as main body and wherein the enterprises, universities and research institutions cooperate with each other

Centering around the advantageous sectors including track traffic, construction machinery and electric equipment and depending on the leading enterprises, actively apply for and accelerate the construction of national-level technology centers, engineering technology centers and engineering laboratories; make great efforts to promote the cooperation among enterprises, universities and research institutions, and introduce the R&D forces of universities and research institutions into enterprises and carry out joint R&D, so as to accelerate the industrialization of scientific and technological achievements. Under appropriate conditions, the R&D centers may be jointly established, so as to jointly carry out the research and development of key technologies.

2. Setting up the informationized public innovation service platform

The first is to set up the ASP network platform for technical services in equipment manufacturing industry of Hunan Province. Integrate in a highly efficient manner the resources existing in the relevant organizations including technical achievements, design tools, training courses, standard database, equipment manufacturing technology database and national scientific & technological development expert database, set up the high-speed network based technology sharing service system, provide the enterprises with the services including information integration & sharing, technical integration, enterprise integration and real-time interactive platform, and enable the enterprises and research institutions to realize the mutual supplement of resources or the joint development of key technology in scientific & technological activities, so as to reduce the innovation costs and risks.

The second is to constitute the technical service system for equipment manufacturing industry in Hunan Province. The main contents of the construction include advanced technology laboratory, service center for diagnosis and development strategy, service center for product quality management system certification, service center for standard and patent, service center for product inspection/testing as well as training center for engineering technology talent.

(III) Efforts for HR development so as to ensure the supply of enough high-level talents
The equipment manufacturing industry has relatively high requirements on quality of technical talents and labor force. Therefore, it is required to firmly seize the three links of attraction, cultivation and use, take the construction of skilled worker team and technician team as the key point, attract high-level talents, accelerate the construction of the team of operation management talent, the team of professional technical talent and the team of skilled worker, and fully improve the quality of human resources.

1. Implementing global talents gathering strategy and making great efforts to introduce outstanding talents both at home and abroad

Firstly, flexible talents introducing project is implemented under great efforts. Beyond the talents attraction through payment, a variety of measures such as in terms of speech-makers, short-term employees, technological breakthrough participants, specially-invited consultants, enterprise consultants, etc. to attract the higher-level talents in the fields of development, production, management, etc. of the equipment manufacturing industry from aboard to Hunan Province for short- or long-term service, with their human relations and registered residence information remained in the places they come from.

Secondly, proactively adopt a policy to motivate high quality talents with high payment. Make a policy so that special subsidiary and awards are accordingly given to the high-level experts. A special allowance of CNY10,000 per month is provided for the high-level experts. High-level scientific and technical personnel are allowed to take 10% as service charge from the funds for their finished provincial scientific and technological programs. Business establishing fund is provided for high-level talents, with motivation policies such as options enjoyed at the same time. Urgently needed talents introduced for key projects can enjoy the payment according to their posts, tasks or performances.

Thirdly, international talent exchange service is widely carried out. Cooperation is established with the international talent exchange center under the leadership of State Bureau of Foreign Experts Affairs, developing multi-level and diversified activities such as international talent exchange, talent cultivation (training), project negotiation, and the like for the purpose of integrating global intelligence and seeking for cooperative development.

2. Integrating various teaching and training resources to make greater efforts to develop talents

Firstly, bring the vocational education, as a main channel, into full play through great efforts. The rich education resources both at home and abroad and the measures such as information network are required to be made full use of, and various vocational training institutes must be well-planned. It is also required to proactively develop remote education and network education, devote more to the middle vocational education, prioritize post-high-school vocational education and tertiary
vocational education, and encourage and support non-governmental schools so as to cultivate a great number of outstanding talents and lead the scale and level of the vocational and technical education to serve as a solid prop for the product quality, economic benefits and development speed of Hunan’s equipment manufacturing industry.

Secondly, promote initatively commissioned and directed education for relevant talents. On one hand, relevant enterprises are encouraged to commission relevant colleges and universities across the country or the province to recruit and cultivate undergraduates and postgraduates meeting their needs, and these undergraduates and postgraduates work for these enterprises after their graduation. On the other hand, relevant enterprises are organized to select talents into relevant colleges and universities, as well as large companies, for post-orientated training and directed education.

Thirdly, emphasize the market- and society-oriented talent development. First of all, enhance the construction of the market- and society-oriented vocational training system, scientifically integrate the social training institute, and ensure the reasonable arrangement of the training institutes. With an eye on the key points and weak points of Hunan’s equipment manufacturing industry and by reasonably arranging the training courses, develop practical training programs, establish the information linkage channels between the training institutions and the companies carrying out order-based and directed training and rotational training, and reinforce the pertinence and effectiveness of the training. Secondly, proactively select and dispatch outstanding young and middle-aged talents to relevant companies in Beijing, Shanghai, Jiangsu, and so on for advanced study or receiving training at the forefront with the posts retained so as to master the latest information and technological development both at home and abroad and to learn from the advanced business running and management experience. Finally, enhance the linkage and cooperation with overseas vocational education and training institutes, for purpose of allowing more high-level talents to participate in the international communications, develop the internationally universal qualities and improve the internationalized management capability.

3. Completing the competition motivating mechanism adapted for talents and creating a favorable talent employing mechanism capable of attracting, remaining and activating talents

Firstly, establish a mechanism for fair talent competition. Put forward the professional technical personnel employment system, give up life-long tenure of the professional technical personnel, select persons according to the post requirements and through competition, pay the persons according to the posts, award the outstanding employees and punish those failed to fulfill their tasks, and form a mechanism in which a person can be employed and dismissed and promoted and
demoted, the payment can be increased and decreased and outstanding talents can be recognized. As for the management talents of the enterprises, the improvement of the quality and the talent evaluation are important, and the marketization and professionalization of the business running and management personnel are required to be speeded up.

Secondly, establish a diversified distribution system combining the method of distribution according to work and the method of distribution based on production factors. Encourage enterprises and units to put capitals, technologies, management and other production factors into the distribution. Boldly seek and practice the distribution forms transformed from the scientific and technological achievements, encourage the professional technical personnel to participate in the scientific and technological achievement transformation, capitalize the knowledge, and motivate the invention and innovation capability of the professional technical personnel. Encourage the enterprises to adopt special distribution methods when it comes to the special talents and to try a variety of forms such as annual salary system, share holding, option, and the like. Make more efforts to motivate the entrepreneurs, technology innovators, etc. who are needed during the development of the enterprise, so as to finally realize top-grade payment for top-grade talents who make greatest contributions and to lead the personal interest goal of the talents to meet the long-term development goal of the enterprises.

Thirdly, reform and complete the evaluation and recruit system for personnel holding professional technical posts. Reform the current evaluation method for personnel holding professional technical posts. Well evaluate the professional titles of technical personnel by following an innovative thinking. Greater priority is given to professional technical personnel in non-publicly owned enterprises and to middle-aged and young talents with great contributions. Set up a professional title evaluation method, i.e. individual voluntary declaration, social quantification evaluation, company voluntary employment and general guidance of HR sector of the government. Break the old rule of experience-based promotion, emphasize the innovation awareness, and stick to performance and capability evaluation, and select talents with fairness.

Fourthly, constantly improve the quality of the city. Complete various functions of the city improve the living conditions and enrich the cultural content of the city.

(IV) Raising Level of Logistics Industry and Promoting Equipment Manufacturing Industrial Development

On the one hand, equipment manufacturing industry is an industry with large transportation load; on the other hand, the target markets of the products of equipment manufacturing industry in Hunan Province are the regions outside Hunan Province and foreign countries, and the transportation radius is relatively long. Therefore, the improvement of level of logistics industry, the establishment of multi-layer and
multi-functional modern logistics network service system which can provide logistics service in a quick, timely, safe and highly efficient manner as well as the improvement of socialized, specialized and green level of logistics are of strategic significance for reducing the logistics costs of equipment manufacturing industry in Hunan Province and raising the competitiveness of equipment manufacturing industry in Hunan Province.

1. Accelerating the establishment of modern logistics service system

Firstly, encourage the traditional large warehousing enterprises and transportation enterprises to become the operators of logistics system. Reform the traditional operation mode, actively probe into the new mode of social/public logistics, use the existing equipment and facilities to establish logistics bases, and form the logistics body which has the functions including warehousing, transportation, handling, distribution, supply of raw materials, purchase of parts and component and information service.

Secondly, improve the investment environment and strengthen the investment promotion and capital attraction, so as to attract a batch of large logistics enterprises at home and abroad. As for some social/public logistics resources such as airport, port and relevant facilities, it is advised to, on the basis of sufficient demonstration and by means of lease, sales and transfer, bring these superior assets into society and market, and make them become the main media for attracting investment from enterprise at home and abroad, so as to realize the leap-forward development of the logistics industry in Hunan Province.

Thirdly, by carrying out technical renovation and upgrading for those logistics enterprises which have certain market basis or by carrying out strategic cooperation among traditional logistics enterprises and under the direction of government and relevant policies, cultivate a batch of modern logistics enterprises which adopts the advanced logistics concepts, and form a batch of third-party logistics enterprises which have certain market basis.

2. Strengthening the construction of logistics supporting media

Firstly, strengthen the construction of logistics infrastructure. The proper construction of traffic facilities is the precondition and basis for the development of logistics industry in Hunan Province. The first is to properly plan the transportation network throughout this province, optimize the allocation of transportation resources, and avoid the occurrence of repeated construction and the waste of resources. The second is to raise funds through various channels and methods, input such funds into the construction of traffic facilities, properly complete the construction of traffic/transportation network, accelerate the reconstruction of railway bed, construct high-grade highways, and perfect the facilities including ports, harbors, airports and railway stations. The third is to accelerate the construction of logistics nodes. Intensify the reconstruction and upgrading of the logistics nodes including goods
station, forward station and warehouse. Multifunctional logistics centers and distribution centers are the important links of modern logistics, and it is required to set up in a planned manner a batch of new-type multifunctional logistics centers and distribution centers in some important commodity production bases and traffic/transportation pivots.

Secondly, set up the information platform for logistics resources in Hunan Province. The first is to establish the logistics communication network throughout this province. On the basis of the national, provincial and national-defense communication networks, basically realize the optical cable based and programme controlled communication among main logistics institutions or organizations, and, by means of satellite and microwave, settle the problem relating to communication channel for individual organizations which are located in remote areas; the second is to establish the logistics resource management information network throughout this province. On the basis of the construction of information port of Hunan Province, settle the problems relating to network access for logistics enterprises or organizations. According to the preliminary conception, the local area network will extend to the relevant government departments, large logistics enterprises, large-sized warehouses, and main traffic pivots and goods stations; normally, the terminals will be established in basic units such as warehouse and dock in important locations; the third is to set up the real-time source data acquisition system. In accordance with the requirements on function of logistics resource information platform, install bar code labeling devices, automatic identification devices and automatic data acquisition devices at the end nodes such as warehouse, port, and harbor, dock, loading platform, vehicle and container. In addition, it is required to settle the problems relating to processing of GPS information; the fourth is to set up information standard system. Research into and formulate the standards and codes for goods information classification, indicator system and information coding; the fifth is to set up the technology system and technology platform. On the basis of the needs on integration between electronic commerce and logistics, accelerate the formulation of electronic data exchange standards including basic standard, code standard, telegram standard, document standard, management standard, application standard, communication standard and security & confidentiality standard, and set up the integrated information processing system; the sixth is to develop the relevant application software. Take the logistics resource information management software system as the key point, carry out top-level design and overall planning for various application software required by logistics resource information platform, determine the detailed catalog for development, and then organize the development by class, specialty and year.

Thirdly, formulate and perfect the procedure systems for various logistics activities at all levels. The first is to lead enterprises to set up comprehensive logistics service system and strengthen the service ability. Encourage enterprises to expand the
marketing network through the construction and operation of logistics centers and distribution centers. The second is to reduce the logistics links and optimize the logistics procedure system. Instruct the logistics enterprises to carry out the innovation for logistics procedures and increase the actual configuration efficiency of products in the course of marketing activities, so as to fundamentally settle the problems relating to high stock level of clients’ finished products and too many capitals occupied. The third is to increase by great margin the technical contents in each link of logistics procedure system. Actively generalize various technologies applicable to logistics activities, including transportation technology, warehousing technology, packing technology and information technology. The fourth is to promote standardization and thus uniform and perfect the logistics procedure systems. By promoting the standardization of logistics activities, realize the harmonization, uniform and seamless connection of logistics procedure systems.

Fourthly, develop and improve the organization mode of logistics system. The first is to push the conversion from first-party logistics to second-party or third-party logistics. Improve and update the existing organization mode of logistics activity, push the conversion from first-party logistics into second-party or third-party logistics, and gradually increase the proportion of second-party or third-party logistics in the logistics activities in Hunan. The second is to push the conversion of organization mode from distribution for single enterprise to distribution for various enterprises. The third is to push the conversion from ordinary logistics to electronic logistics. It is advised to, on the basis of the construction of information port, push the enterprises to become internally electronized, set up the electronic supply chain composed of electronic enterprises and a lot of electronic enterprises, generalize the electronic logistics mode, and accelerate the development of modern logistics industry in Hunan Province. The fourth is to push the conversion from second-party, third-party logistics to fourth-party logistics.

3. Optimizing the spatial layout of logistics industry

In consideration of the factors including market demands, industrial layout, commodity flow, resource conditions, traffic conditions and local planning, the focus should be placed on the development of “one core, three rings and three passages” when determining the spatial layout of the logistics industry in Hunan Province. Of which, one core. This means to develop the urban agglomeration of Changsha, Zhuzhou and Xiangtan into the core growth pole of the logistics industry in Hunan Province. “Three rings”. The three rings are the Dongting Lake Logistics Ring which centers around Yueyang, the Southern Hunan logistics ring which centers around Henyang and the Big Western Hunan Logistics Ring which centers around Huaihua. “Three passages”. The south-north logistics passage is mainly composed of Beijing-Guangzhou Railway, Luoyang-Zhanjiang Railway, Beijing-Zhuhai Expressway, Beijing-Zhuhai Railway, Erlianhaote-Guangzhou Expressway, National

(V) Strengthening Resource Saving and Environmental Protection and Realizing Sustainable Development

Over recent years, the contradiction between rapid economic/social development and limited population resources in Hunan Province has become increasingly outstanding. The emission quantity of many pollutants is ranked top in the PRC, the environmental capacity in some areas is almost used up, the task to prevent and control pollution in key areas and river basins is very herculean, the ecological environment in some areas has been damaged to various extents, the natural disasters occur frequently, and the environment situation through this province is relatively unfavorable. Therefore, in the course of the development of equipment manufacturing industry, more attention should be paid to resource saving and environmental protection.

1. Attaching importance to water saving and energy saving

When developing the equipment manufacturing industry, it is required to, adhering to the tenet of “Save sources, control pollution and improve utilization efficiency” and by virtue of technical improvement, perfect the relevant policies and regulations and strengthen the management on water saving and energy saving. (1) Organize the implementation of the engineers for generalizing key water-saving technologies, equipment and processes, so as to raise the water-saving level of the industry. In accordance with the concept of ecological industrial park, apply the water network integration technology in each park, so as to collect and recycle the water and sewage in each park and realize zero emission of sewage. (2) Make great efforts to promote the development and utilization of non-traditional water sources including intermediate water and rain water, and bring these water sources under the uniform management and allocation. (3) Generalize and apply the new technologies, new products and new materials which can save energy, raise the technical level of the industry, reduce the energy consumption per production unit, and urge each enterprise to strengthen the works relating to energy saving. (4) Perfect the management on energy saving. Promulgate the measures for evaluating, examining and approving the energy-saving performance of fixed asset investment projects in equipment manufacturing industry; strengthen the implementation of award & punishment mechanism for energy saving; formulate the compulsory standards for energy saving and set up energy efficiency labeling system.

2. Encouraging enterprises to carry out circular production
At the beginning of the construction of an enterprise, it is required to: in accordance with the concept for developing circular economic, pay attention to circular production, minimize the resources used and raise the level of recycling of resources; support a batch of exemplary projects of circular economy, encourage enterprise to adopt advanced technologies and equipment, and make efforts to generalize clean production; actively generalize the recovery of residue heat and residue pressure, the innocent treatment for waste and other advanced technologies, realize the cascade utilization of energy and the cyclic utilization of resources within each enterprise, and gradually establish among the enterprises the cooperative development mechanism which may lead to low consumption, high output, low pollutant emission and resource recycling. Great efforts should be made so as to ensure that all enterprises realize clean production by 2020.

3. Strengthening the control and protection of environment

The first is to formulate and implement the planning for environmental protection, and ensure that the ecological protection keeps pace with environmental protection and base construction; the second is to strictly carry out pre-construction examination and approval of environmental protection, perfect project environmental protection review system, strictly implement the environment impact evaluation and “three simultaneity” examination and approval system, ensure that the national policies relating to environmental protection are fully implemented in each base, and prohibit any project which fails to meet the provisions on environmental protection from being carried out; the third is to properly carry out the pollution prevention in major industries, and control pollution source, so as to ensure that the collection & treatment rate of waste water exceed 85%, the air quality at least reaches the class-2 standard and the noise control at least reaches the class-3 standard; the fourth is to make great efforts to promote the ISO 14000 international environmental management system. Base the preferential and supporting policies granted to enterprises on the fact whether such enterprises pass ISO 14000 system certification. By 2015, the enterprises which pass the certification should account for more than 70% of all industrial enterprises; great efforts should be made so as to ensure that all enterprises pass the ISO 14000 certification by 2020.

V Supporting Policies for Strategy of Equipment Manufacturing Industrial Development of Hunan Province

(I) Short-term supplementary policies

1. Strengthening Organization Leadership and Management

(1) Establishment of Leading Group for Equipment Manufacturing Industrial Development of Hunan Province

The leader should be assumed by the provincial leader in charge of industry, and the members should be the persons in charge of provincial commission for
development and reform, provincial commission for economy and trade, provincial finance department, provincial science and technology department, provincial land and resource department, provincial state tax bureau, provincial local tax bureau, provincial statistics bureau, customs office and other relevant functional departments. The main task of the leading group is: to formulate and organize the implementation of the planning for equipment manufacturing industrial development, formulate the relevant policies for promoting the equipment manufacturing industrial development, formulate the measures for identification and administration of equipment manufacturing enterprises to be supported, and settle in a timely manner the problems arising from the development of equipment manufacturing industry. The executive office of the leading group is composed of the persons designated by the provincial commission of development and reform, and the Industrial Office will participate in and be responsible for coordination and management of resources.

(2) Establishment of Hunan Provincial Expert Advisory Committee for Equipment Manufacturing Industrial Development

Employ the relevant experts from the research department under the relevant ministries and commissions of the PRC, Chinese Academy of Social Sciences, the Machinery Industry Federation, Policy Study Offices of CPC Hunan Provincial Committee and Hunan Provincial Government, Hunan Academy of Social Sciences and Hunan Information Centers as well as the relevant colleges and universities, and then set up Hunan Provincial Expert Advisory Committee for Equipment Manufacturing Industrial Development. Give full play to the role of evaluation, demonstration, consulting and recommendation of the expert committee in formulation and revision of industrial development planning and key project investments, and provide bases for scientific decision-making for equipment manufacturing industrial development and formulation of supporting policies.

2. Implementation of National Relevant Policies

It is set forth in the Planning for Adjustment and Reinvigoration of Equipment Manufacturing Industry that, the stimulation effect imposed by the value added tax reform policy on technical improvement of enterprises should be brought into full play, and all enterprises should be encouraged to carry out technological transformation, accelerate the updating of equipment, adjust the product structure and improve their technologies. The investment projects within the central budgets should support the independently innovated technical equipment; perfect the export tax rebate policies, appropriately raise the export tax rebate rate for some equipment products with high technical contents and high added value; encourage the financial institutions to input more funds in export credit, and support domestic enterprises to undertake major foreign engineering, so as to boost the export of complete equipment and construction machinery; encourage enterprise to introduce, digest and absorb new technologies and then carry out re-innovation, and exempt the key components and
raw materials which are used to manufacture those State-supported major technical equipment and products and must be imported from the custom duties and the value added tax in import link; formulate the relevant policies to encourage domestic enterprises to carry out intra-region, intra-industry and intra-ownership re-organization, and properly settle the problems including re-arrangement of redundant employees, determination and disposal of debt as well as distribution of fiscal revenue and tax; support the re-organized enterprises to issue shares, enterprise bonds, corporate bonds, medium/long-term debt instruments and short-term financing bonds as well as apply for loan; grant the loan at discount interest to domestic enterprises for acquiring overseas manufacturing enterprises and R&D institutions; properly use the subsidy fund for energy-saving products, grant subsidy to the end users which purchase highly-efficient energy-saving equipment products (the subsidy will be granted firstly for generalization and use of high-efficiency motor in 2009).

The above policies will play a very important role for the development of Hunan’s equipment manufacturing industry in the recent years. Hunan Province should actively implement and make full use of the policies mentioned above. Resuscitation Implementing Plan for Hunan’s Equipment manufacturing industry (2009-2011) has also put forward the all-round implementation of national and provincial policies.

3. Creation of More Relaxed Policy Environment

Firstly, the relevant preferential policies issued by the Central Government and Provincial Government should be actively implemented for and the support in the aspect of land quota and reduction/exemption of land tax should be given to the key products, key enterprises and key projects in equipment manufacturing industry as well as the projects relating to industrial transfer;

Secondly, the depreciation rate for all fixed assets other than building of enterprises in equipment manufacturing industry should be appropriately raised, and the amortization period for all intangible assets of enterprises in equipment manufacturing industry should be appropriately shortened;

Thirdly, the existing public companies should be encouraged to boost the development of equipment manufacturing enterprises by means of capital operation, and a batch of equipment manufacturing enterprises which meet the relevant conditions should be actively supported to reorganize themselves and go public;

Fourthly, as for the equipment manufacturing enterprises to be set up in Hunan by those equipment manufacturing enterprises which have domestically/internationally famous brands or the investment in equipment of which the amount exceeds CNY100 million, more preferential policies should be separately formulated by the provincial government, so as to give support and assistance.

(II) Middle-term supporting policies

1. Formulation and Promulgation of Guiding Catalog for Investment in and
Development of Equipment Manufacturing Industry in Hunan Province

The focus should be placed on development of key industries and key products, intensity of investment, advanced degree of technology, preferential policies for investment and etc. Hunan Province should, by promulgating and implementing the catalog, properly carry out investment promotion and capital attraction; direct the capital flow and the development of industrial clusters.

2. Issuance of Preferential Policies Which Will Win the Feeling of Talents

Hunan Province should set up the special fund for development of human resources in equipment manufacturing industry; actively introduce technical leaders, technical personnel and excellent marketing talents which are familiar with international trade as well as equipment manufacturing industry at home and abroad. Settling-in allowance, venture capitals and other supports should be given to the talents introduced, and preferential policies should be issued for permanent residence, schooling of children and house for production and scientific research.

(III) Long-term supporting policies

1. Enhancing the work on intellectual property development of the equipment manufacturing industry

Equipment manufacturing industry management departments and intellectual property management authorities should attach great importance to the work on intellectual property development of the equipment manufacturing industry. Under the close cooperation with each other, these departments and authorities should enhance the professionalization of the intellectual property service organizations and the talent pool in the equipment manufacturing industry, the construction of the intellectual property coalition of the equipment manufacturing industry, and the development of the intellectual property information service in the equipment manufacturing industry, and make great effort to promote the intellectual property training and communication of the equipment manufacturing industry in the whole province and to organize activities in the presence of intellectual property demonstration enterprises as well as the reporting, declaration, approval and recommendation of provincial-level patentable new products. These departments and authorities should alsoinitiatively lead the enterprises’ emphasis on the intellectual property development and guide key and backbone enterprises to consciously follow relative laws and regulations on intellectual property so as to finally complete and improve the rules and regulations on intellectual property management, protection, examination, distribution, awarding, etc. within enterprises. Leaders and fulltime (part-time) staff are clear about their own work. Intellectual property service institutions are established. Funds needed during the work are ensured. Therefore, the leadership, system, institutions, staff and expenditure are all realized. Priority should be given to advantageous enterprises with key and core technologies and competitiveness in terms of independent intellectual property and also to independent brands with high international prestige. The
development of a set of new patentable products and technologies which are highly scientific, technological, characteristic and competitive in the market shall be support. A set of new patentable products from Hunan’s equipment manufacturing industry should be certified. A number of intellectual property talents in the enterprises of the equipment manufacturing industry should be cultivated. Hunan will set up its own equipment manufacturing industry intellectual property service center and gradually complete its equipment manufacturing industry intellectual property service system and service network so as to promote the intellectual property work of Hunan’s equipment manufacturing industry to make a great-leap-forward development.

2. Great efforts to develop regional brands of the equipment manufacturing industry

To create competitive regional brands serves as a key measure to improve the comprehensive competitiveness and international competitiveness of Hunan’s equipment manufacturing industry and the product profit potential. Quality strategy should be deeply implemented. Under the guidance of the thought of creating brand products-brand enterprises and brand industry and through government guidance, enterprise management and industrial assistance, the enterprises are encouraged for orderly competition and cooperative development.

The local regulations for protecting the brands are completed so as to form a brand protection system which is a trinity of enterprises’ self-protection, industrial cooperative protection and legal and administrative protection. Law-enforcement cooperation mechanism should be established and improved and cooperation with other regions should be reinforced, so as to initiatives seek to establish a cooperative brand-protecting cooperation mechanism and network system. Unfair competition, faking and invasion of the intellectual properties should be severely punished so as to regulate the order of the market economy for the better.

Enterprises committed to the regional brand development and supporting service organizations such as technological innovation center, etc. should be provided with funds for supporting the technological reform and potential improvement, special fund for SME development, science and technology development special fund, Torch Program, and other relative fund subsidiaries. Governmental quality awarding system should be proactively fought for so as to praise and award those enterprises outstanding in brand development and quality management. Brand awarding policies should be established and completed, and more work will be done in brand awarding. Internal quality awarding system of an enterprise is encouraged and supported. Great importance is attached to the publicizing and spreading of the typical experiences of the awarded enterprises.
Subreport 2 Strategy for Coordinated Development of the Logistics Industry of Hunan Province

Summary

In recent years, Hunan logistics industry is growing rapidly. In 2007 and 2008, the total amounts of social logistics of the whole province were CNY1.71843 trillion and CNY2.26226 trillion respectively, having grown by 26.7% and 31.7% than the previous year. By the end of 2008, in the province's logistics industry business registration, there have been registered 2910 enterprises and 48404 individual businesses, totally having employed 1.2 million people. In 2008 the added value of the logistics industry of Hunan was CNY72.183 billion, accounting for 6.47% of the regional gross product.

However, due to the influence and restrictions of the traditional concepts, systems, management techniques and some other factors, for the moment, the logistics and manufacturing industries of Hunan develop independently. Different regional logistics bodies fail to form an effective division and cooperation, and the small and medium enterprises within the industry were loosely linked. Therefore, the key solutions to promote the new industrialization and the enrichment of Hunan Province lie in how to apply advanced logistics management theories and techniques and learn from successful experiences of developed countries for the coordinated development of the logistics industry in Hunan Province.

The report points out the following six main problems existing in the current logistics industry based on detailed analysis of the development status quo of Hunan logistics industry: unsmooth logistics management systems, great difficulty in macro-management and overall coordination; the operation and management of logistics enterprises and service quality needing to be improved; the slow development of the third-party logistics; poor supporting of logistics infrastructure; weak coordination between the logistics industry and the manufacturing industry; policy environment for the development of logistics enterprises needing to be further improved.

The report, integrating the development status quo of Hunan logistics industry and its developing trends, and according to national adjustment and revitalization planning of logistics industry and the requirements of new industrialization in Hunan, has discussed the development ideas and goals of logistics industry in Hunan. This
The report presents the coordinated development of the logistics industry in Hunan Province, the general idea is: Sticking to business-oriented and market demand to mainly promote the coordinated development of the logistics industry and the manufacturing industry, taking Changsha, Zhuzhou and Xiangtan city group as a leader, to make Hunan a modern regional logistics center linking the east and the west. Through the integration and penetration of the logistics industry and the manufacturing industry, it is necessary to promote joint collaboration among various types of enterprises on the basis of professional labor division, and to strengthen the synergy linkage of the regional logistics industry, and finally this will contribute to the overall coordination sustainable development of the logistics industry in Hunan.

The report suggests that the coordinated development of the logistics industry in Hunan should focus on four key points: First, accelerating the construction of modern logistics service system; second, fostering multi-channel logistics service market; third, strengthening the construction of supporting carrier of logistics industry; fourth, optimizing the spatial layout of the logistics industry to form a spatial structure focused on “one core, three circles, three channels”.

Finally, this report, from the points of establishing a sound organization and management institution and strengthening coordination, puts out that the following eight aspects shall be included as the focus of policies: to relax registration conditions; to standardize fee management and the market order; to implement tax concessions; to support land use; to accelerate the integration of existing social logistics resources; to increase its input into the development of the logistics industry; to speed up the training of personnel for logistics industry in Hunan.

**Background and objective**

In Apr. 2006 the State Council released *Several Opinions on the Rising of the Middle Region of the PRC*, clearly brought forward the target “build the central region as a foodstuff production base, energy base, raw material base and equipment & high-tech. base of the nation and a comprehensive communication joint”. Logistics costs account for the proportion of GDP higher than the national average level. In 2007, social logistics were total cost of CNY173,700,000,000 in the province, which increased 22.9 %.Its increase amplitude was faster than 4.7 %.The rate between social logistics costs and GDP increased from 18.68% to 18.88% in 2006.It was higher than the national 0.48 %. Due to the traditional concept, structure, technology and other factors, manufacturing and logistics industry is still “each does things in his own way”, which is an important reason why the region’s share of GDP which Hunan manufacturing industry accounted for is the lower than the national average. Therefore, how to use advanced logistics management theory and technology, learn successful experiences from developed countries, promote organic combination of logistics and manufacturing industry and coordinated development, has become the
problem to be solved for promoting new industrialization and achieving and enriching the people in Hunan.

In 2007, the General Office of the Provincial Government promulgated the Number of Opinions on Further Speeding up the Development of Modern Logistics Services (2007 No. 41), becoming a programmatic document for development of logistics industry in Hunan. Vigorous expansion in logistics industry and forming development pattern of a large logistics and industry make the logistics industry in Hunan become new economic growth point and the “third profit source”. With the “win-win” in logistics and the manufacturing industry, it provides support to lay the foundation for new industrialization strategy in Hunan Province. At the same time, give full play to the advantage of location and transportation, integrating logistics resources, enlarging and strengthening the logistics industry, efforts to make Hunan become important logistics hub in central part of the PRC, which providing support for central cooperation.

**Methodology**

The subject will use principles of scientific systems and combine qualitative analysis with quantitative analysis methods for research. In the diagnosis of the status quo, we shall focus on statistical analysis and combine comparison and analysis with correlation analysis. In forecasting trends, regression analysis predicts the change in supply and demand trends. By the SWOT analysis method, the logistics industry in Hunan Province is analyzed with respect to opportunities and challenges. In the formulation of strategies and routing, we will focus on multi-objective decision-making, structural optimization theory and use of methods. Through the use of a combination of a number of ways, we improve scientific and strategic nature, forward-looking and applicability.

**Key findings of Research Literature**

1. Development of the logistics industry in Hunan needs to strengthen coordination and cooperation to strengthen the overall planning, the establishment of coordination mechanism, see reference 1.
2. Hunan modern logistics industry carries out the implementation of priority development, eco-development, co-development, globalization development strategy PECG mode, as well as specific strategies, see reference 4.
3. By adopting the construction of the logistics network and logistics infrastructure network, and logistics information network among the organic integration of the logistics network, integration and sharing of logistics resources will be achieved.

I Current Status and Main Problems Encountered in Development of Logistics
Industry in Hunan

(I) Current Status of Development

After entering into the new century, the logistics industry in Hunan has enlarged its total scale rapidly and its service level raised steadily, and the conditions and environment for development have been improved continuously, which has laid a solid foundation for the further development of this industry.

1. Rapidly Enlarged Scale of Logistics Industry  From 2001 to 2008, the gross domestic product of Hunan was increased from CNY383.19 billion to CNY1,115.664 billion, with the average annual growth rate reaching 13.3%. The rapid development of economy spurs the continuous increase in the demands on logistics services. According to the statistics of Hunan Provincial Economy Commission and Statistical Bureau, the total amount of social logistics services in this province reached CNY1,718.43 billion in 2007 and CNY22,626.26 billion in 2008, increased by 26.7% and 31.7% respectively over previous year; in 2008, the total logistics costs of the society reached CNY208 billion, an increase of 19.81% on the basis of the CNY173.679 billion in 2007, and the proportion taken by the total logistics costs of the society in the gross domestic product of Hunan is decreased from 18.88% in 2007 to 18.63%; the added value realized by the logistics industry in 2008 reached CNY72.68 billion, accounting to 6.47% of the gross domestic product of Hunan Province.

2. Obviously Raised Development Level of Logistics Industry  Through the adoption by manufacturing enterprises and commercial enterprises of the management concept, methods and techniques of modern logistics, the realization of process reengineering and service outsourcing as well as the accelerated transformation by traditional transportation, warehousing and freight agency enterprises towards modern logistics enterprises, the development level of logistics industry is raised obviously. By the end of 2008, there were 2,910 corporate entities and 48,404 individual business units registered in the logistics industry of this province, with the number of employees reaching 1.2 million; in addition, 7 logistics enterprises were awarded as “Top-100 Logistics Enterprises in the PRC” and 12 logistics enterprises have passed the class-A standard certification of the PRC.

3. Continuously Improved Conditions of Logistics Infrastructure  By the end of 2008, provincial railway operation mileage reached 2,802km; the highway traffic mileage reached more than 185,000km, with 2,001km being expressway; there were 285 navigable inland channels, with the total length reaching 11,900km, the number of port berth reaching 105, the length of thousand-ton-class navigable channels reaching 610km and the number of thousand-ton-class berths reaching 65; there were 5 civil airports; the number of fixed telephone users reached 12573 million, the number of mobile phone subscribers reached 22,606 million, the number of broadband Internet access users reached 2.22 million. Hunan Jinxia Modern Logistics
Park began to take shape; Changsha Jinxia Bonded Logistics Center has been put into operation formally; Chenzhou Export Processing Zone has been approved for developing the function of bonded logistics. A batch of logistics parks, bonded warehouses, modern logistics centers and distribution centers have been put into service.

4. Gradually Optimized Environment for Development of Logistics Industry

In 2007, CPC Hunan Provincial Committee and Hunan Provincial Government issued the Guideline for Promoting the Development of Producer service Industry, the General Office of Hunan Provincial Government promulgated the Several Opinions on Further Speeding up the Development of Modern Logistics Industry, and the coordination mechanism for the works relating to development of logistics industry was established. Both the state and this province have given a lot of support to some key logistics projects, great progress was made in the education and training on logistics, and a number of logistics talents were cultivated. The logistics cooperation among different areas was further strengthened, and the cooperation agreement for logistics development was signed with relevant areas.

(II) Main Problems Encountered

Although the trend of accelerated development was shown in the logistics industry in Hunan over recent years, the modern logistics industry in Hunan, as a whole, is still in its starting phase, the overall level of development is still relatively low, and there is great difference between the development trend of modern logistics industry and the requirements made by economic development. The existing problems are mainly embodied in the following aspects:

1. Unsmooth Administration Regime for Logistics Industry and Difficulty in Coordination for Macro-administration. As that of the PRC, the logistics industry of Hunan is subject to the decentralized administration, and the specialized departments such as railway department, transportation department, civil navigation department and commercial department as well as the comprehensive departments such as development & reform commission and economy commission have the duties and functions to carry out administration on logistics industry, so that the administration can’t be carried out in a uniform manner and there exists serious local/industrial protection. Under this decentralized administration regime, separate systems are set up among the logistics administration departments and enterprises, separate administration is carried out, no good information communication mechanism is established, the layout is disordered, and the logistics resources are randomly allocated, so that a lot of logistics resources are wasted and the development of logistics industry is seriously affected.

2. Operation/Management Skills and Service Quality of Enterprises to be improved. Firstly, the modes and means of services are outdated and simple. At present, most of the enterprises engaged in logistics services can only provide the
simple transportation (delivery) and warehousing services, but have not been involved in value-added logistics services such as distribution processing, logistics information services, stock management, logistics cost control, especially the logistics services at higher level such as logistics program design and full-process logistics service. Secondly, most of the enterprises engaged in logistics services have not established the necessary service specifications and internal management regulations, so that it is difficult for them to offer standardized logistics services. In the course of logistics services, some enterprises can’t deliver the goods on schedule, and the phenomenon that the goods supply is interrupted and no response is made to clients often occurs, seriously affecting the overall development of logistics industry. They compete for clients by virtue of low price rather than service quality, so that both the economic benefits and profitability of most enterprises stand at a low level.

3. Decelerated Development of Third-party Logistics. Firstly, most logistics enterprises have not adopted the concept of modern logistics, lag far behind advanced level at home and abroad in the aspects of service concept, service design, service specification and service contents, especially in the aspects of design of comprehensive logistics service, integration of third party logistics and enterprise production and quality standard for social logistics services; secondly, the modern logistics of Hunan is in the starting phase, the problems such as small scale, decentralized distribution and poor quality are outstanding among the third party logistics enterprises which act as the service providers, and their operation mode, service quality and working efficiency can’t meet the ever-increasing demands on logistics services; thirdly, under the influence of traditional business mode, some enterprises are accustomed to carrying out logistics by themselves, and the socialization degree of logistics is still low. In addition, the demands from enterprises on third-party logistics services are still at a low level, most demands focus on conventional services such as transportation, warehousing and distribution rather than those comprehensive logistics services which have high added value, and these have prevented third party logistics enterprises from becoming bigger and stronger.

4. Low Supporting Ability of Logistics Infrastructure. Although the construction of logistics infrastructure in Hunan was accelerated over recent years, the problems such as insufficient quantity, unreasonable layout, low supporting ability and low compatibility still exist. These problems are mainly embodied in the absence of large comprehensive modern logistics center, the low technical level of logistics facilities and equipment, the low working efficiency, the unreasonable facility structure, the inconsistent equipment standards among various transportation modes, the absence of effective connection between logistics packing standards and logistics facility standards, the absence of provincial or regional logistics information platform which is standardized and uniform, the absence of connection between the information systems of various administration departments and various industries, and
the low sharing degree of logistics information.

5. Policy Environment Favorable to Development of Logistics Enterprises to be further Improved. Although Hunan Province has promulgated some policies and supporting measures for pushing the development of modern logistics industry, the logistics enterprises still encounter many difficulties in the course of operation, including difficulty in coordination among various administration departments, difficulty in financing by enterprises and the difficulty in implementation of policy. In addition, the problems such as abnormal market competition, limitation on travel in urban area for goods-distributing vehicles, high-level highway toll for vehicles as well as short supply and high price of land resources also exist and no powerful policy support is given.

II Analysis on Change Trend of Demand and Supply in Logistics Industry of Hunan

(I) Accelerated Progress of New industrialization and High Potential of Demands on Industrial Logistics

After the strategy for promoting new industrialization was brought forth at the 9TH CPC Representative Conference of Hunan Province in 2006, the industry of Hunan has developed at an unprecedented speed. With the progress of new industrialization, the scale of the market for industrial logistics is increasingly enlarged. With respect to the consumption by industrial enterprises of energy resources, a total of 91,046,600 tons of standard coal were consumed throughout this province in 2007, an increase of 13.8% over the previous year, among which 90,502,400 tons were consumed by production, an increase of 18.9% over the previous year. From 2001 to 2007, the energy sources consumed by the industrial enterprises throughout this province were increased from 46,423,400 tons of standard coal to 91,046,600 tons of standard coal, with the average annual growth rate reaching 10.1% (See Table Subreport 2-1 and Figure Subreport 2-1). The accelerated development of industry caused the growth of consumption of energy source, and this has created a huge market for the development of industrial logistics.

Table Subreport 2-1 Consumption of Energy Resources by Industrial Enterprises in Hunan Province (2001-2007)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Energy Consumption</th>
<th>Productive Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>4,642.34</td>
<td>4,544.31</td>
</tr>
<tr>
<td>2002</td>
<td>4,943.51</td>
<td>4,876.67</td>
</tr>
<tr>
<td>2003</td>
<td>5,442.80</td>
<td>5,378.96</td>
</tr>
<tr>
<td>2004</td>
<td>5,579.18</td>
<td>5,510.30</td>
</tr>
<tr>
<td>2005</td>
<td>6,994.85</td>
<td>6,943.28</td>
</tr>
<tr>
<td>2006</td>
<td>8,002.96</td>
<td>7,611.07</td>
</tr>
<tr>
<td>2007</td>
<td>9,104.66</td>
<td>9,050.24</td>
</tr>
</tbody>
</table>

Unit: 10 thousand tons of standard coal

During the period of the 11th Five-year Program, Hunan Province is in the middle phase of industrialization as well as the key phase for adjustment of economic structure and transformation of economic development mode. The expansion of modern logistics from producer service industry into the fields including production, construction and trade is the important support for adjustment of economic structure and transformation of economic development mode. With the stable and rapid development of society and economy throughout this province, the demands on logistics services will be increased continuously.

(II) Continuously Enlarged Scale of Consumption and Import/Export, and Further Developed Commercial Logistics and Import/Export Logistics

With respect to the total retail amount of commodities, the retail amount of commodities totaling CNY411.966 billion was realized throughout this province in 2008, a year-on-year increase of 25.1%. From 2001 to 2007, the total retail amount of commodities of Hunan Province was increased from CNY151.107 billion to CNY335.649 billion, with the average annual growth rate reaching 12.1% (See Table Subreport 2-2 and Figure Subreport 2-2). The continuous development of consumption market causes the continuous enlargement of consumption scale, and this has created much room for the growth of demands on logistics services in Hunan.

Table Subreport 2-2 Total Retail Amount of Commodities in Hunan Province From 2001 to 2007 (CNY100 million)

<table>
<thead>
<tr>
<th>Year Index</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>1,511.07</td>
<td>1,678.86</td>
<td>1,816.30</td>
<td>2,069.84</td>
<td>2,459.12</td>
<td>2,834.22</td>
<td>3,356.49</td>
</tr>
</tbody>
</table>

With respect to import/export trade, the import/export volume realized by Hunan Province in the period from January to October in 2008 totaled $10.719 billion, an increase of 34.9%, among which the import volume reached $3.564 billion, an increase of 36.8%, and the export volume reached $7.155 billion, and increase of 34%. From 2001 to 2007, the import/export volume of Hunan was increased from $2.758 billion to $9.69 billion (See Table Subreport 2- 3 and Figure Subreport 2-3), with the annual growth rate reaching 19.66%. Without doubt, the rapid development of foreign trade has further promoted the enlargement of the import/export logistics market in Hunan Province.

Table Subreport 2-3  Import/Export Trade in Hunan Province (2001-2007) ($ 100 million)

<table>
<thead>
<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Import and Export Volume</td>
<td>27.58</td>
<td>28.76</td>
<td>37.36</td>
<td>54.38</td>
<td>60.05</td>
<td>73.53</td>
<td>96.9</td>
</tr>
<tr>
<td>Export Volume</td>
<td>17.54</td>
<td>17.95</td>
<td>21.46</td>
<td>30.98</td>
<td>37.47</td>
<td>50.94</td>
<td>65.23</td>
</tr>
<tr>
<td>Import Volume</td>
<td>10.04</td>
<td>10.81</td>
<td>15.9</td>
<td>23.40</td>
<td>22.58</td>
<td>22.59</td>
<td>31.66</td>
</tr>
</tbody>
</table>

Source: Hunan Statistical Yearbook 2008
(III) Main Logistics Going from Strength to Strength and Cost of Logistics Increasing Simultaneously

The rapid growth of specialized logistics enterprises and logistics parks reveals that the main logistics are going from strength to strength. Firstly, the third-party logistics speeds up the pace of development, mainly in traditional flow of goods and materials, transportation. Through restructuring or transformation, warehousing enterprises have been gradually transformed to the third-party logistics companies, such as Changsha transport logistics, Changsha business storage and transportation logistics, Hunan Province Postal Logistics, Hunan Power Logistics, Changsha-Zhuzhou-Xiangtan International Logistics, Zhuzhou (State Reserve) Logistics center become strong enterprises in logistics industry; secondly, the private logistics enterprises developed rapidly, such as Kinglory Group, Apower Logistics, Jingyang Logistics, Shitai Logistics, these private logistics enterprises gradually grow strongly; Thirdly, logistics enterprises make effect cooperation with foreign enterprises, such as Merchants Logistics, Datian International Freight Transport, Home Delivery, Guangzhou South Logistics. These enterprises have entered Hunan to invest in the development of modern logistics. Recently, there has been a joint development pattern of specialized logistics enterprises with different ownership systems, different business models and different operation scales. The number of registered logistics enterprises has reached more than 2000 until 2007, revenue up to CNY10 billion has been created by these enterprises, Hunan Power Logistics and Lung Cheong Logistics Co., Ltd. has ranked in the “2008 Top 100 Logistics enterprises list of the PRC”. Advanced features, large-scale modern logistics park, logistics centers, distribution centers have become the leading force in the development of logistics of Hunan Province. Such as the logistics parks of Changsha Jinxia, Apower have reached a certain scale; the logistics parks such as Hunan modern
grain logistics park, Yueyang Chenglingji Port, Grain and oil trading center in Huaihua, Hunan Province progressed smoothly; ever since “Logistics Distribution Center in Central Part of the PRC” of A Best has been put into use, the product cost is greatly reduced by the realization of one-stop service, which integrated the goods receipt with goods delivery and settlement; the first industrial goods supermarket in the PRC- enterprises supermarket in Wanbo port, Xiangtan was put into use. The rapid development of modern logistics park provides a good platform for specialized logistics enterprises to gather and develop.

With the rapid development of the logistics industry of Hunan Province, the social logistics cost grows simultaneously. In 2007, social logistics were total cost of CNY 173,679,000,000, which increased 22.9%, its increase amplitude was faster 4.7% than the national average level. The rate between social logistics cost and GDP increased from 18.68% to 18.88%, it was higher than the national 0.48%. From social logistics cost structure of the province, we can see the proportion of transport cost accounted for logistics cost decreased. In 2007, transport cost was CNY 96,284,000,000, increased 21.5%, accounted for 55.4% logistics cost, and decreased 0.7 percent than previous year’s. highway transport cost was CNY83,760,000,000, increased 23.1%, accounted for 87% of transport cost, up 1.2 percent over the same period of last year; railway transport cost was CNY10,997,000,000, increased 8.9%, accounted for 11.4% of transport cost, down 1.3 percent over the same period of last year; water transport cost was CNY1,423,000,000, increased 37.2%, accounted for 1.5% of transport cost, up 0.2 percent over the same period of last year; air transport cost was CNY104,000,000, increased 30%, accounted for 0.1% of transport cost; storage cost increases fairly rapidly. In 2007, storage cost was CNY55,685,000,000, increased 25.3%, accounted for 32.1% of social logistics cost, up 0.7 percent over the same period of last year. Interest cost was CNY32,978,000,000, increased 28.8%, accounted for 59.2% of storage cost, other cost is CNY22,707,000,000, increased 20.5%, accounted for 40.8% of storage cost. Administrative cost grows steadily. In 2007, the Administrative cost was CNY 21,710,000,000, increased 22.9%, accounted for 12.5% of social logistics cost, equal to the previous year. (Please see Figure Subreport 2-4 for details of administrative cost.)
(IV) Accelerated Construction of Logistics Facilities and Steady Growth in Freight Capacity

The traffic facility plays an important role in the national economy; it also lays the foundation for modern logistics development. The accelerated development in traffic facilities in Hunan Province presents a developed structure of railway, highway, air and water transport. Railway transport network become better and better. There is Beijing-Guangzhou and Jiaozuo-Liuzhou railway in Hunan, running from north to south, Xiang-Qian, Xiang-Guizhou, Zhejiang-Jiangxi, Sichuan railway link east and west. By the end of 2008, operating mileage of railways in province is 2802 km. There are access railroads of more than 1,200 km, at the same time, there are large freight marshalling yards in Zhuzhou, Hengyang and Huaihua. Accelerate the pace of road construction. There are 4 existing vertical and 3 horizontal national territories in Hunan, with more than 70 provincial highways connecting a number of counties and township (town) highway. By the end of 2008, the highway mileage reached 185,000 km (including rural roads), in which road pavement was up to 97,471 km road, grade road was up to 11,900 km, and the highway traffic mileage reached 2001 km. Synchronous development of civil aviation and water transport. By the end of 2008, Hunan Province built nearly 60 berths over thousands of tons. Navigable mileage of the province is 11,398 km and the number of airports increased to 5. Route mileage of pipeline is 168 km. At present, the basic form of railways, highways is as the trunk, civil aviation and water transport supplement the three-dimensional transportation network. Besides, on the basis of modern information technology and network-based logistics information platform, the Internet is gradually mature in the application of the logistics industry. Gradual popularization of information technology pushes to accelerate the pace of obvious development in order to promote the logistics industry. Logistics infrastructure speed up the pace of modern logistics industry to provide strong support in the province.
The accelerated development in traffic facilities greatly promotes the growth in freight capacity of Hunan Province. In 2008, the total traffic volume and the total volume of the circular flow of goods in our province respectively reached 1,081,549,200 tons and 208,275,000,000 ton-kilometers, increasing 9.1 percent and 4.9 percent in comparison with last year. Among these transport modes, highway transport accounted for 85.2% of the total traffic volume, it presents that highway transport was the main transport mode in the province. Meanwhile the volume of the circular flow of goods of railway transport accounted for 49.7% of the total volume of the circular flow of goods in the province, highway transport with a 37.1% took a second place. For water transport and civil aviation freight, their proportion of the traffic volume and the volume of the circular flow of goods are small, however, according to recent statistics, the growing speed of traffic volume of water transport is the fastest.

From 2001 to 2007, the total traffic volume of Hunan Province grown from 530,350,000 tons to 995,010,000 tons, with an average annual increase of 9.4 percent, railways, highways, water transport and civil aviation were an average annual increase of 5.1%, 9.8%, 12.7%, and 9.4%. Water volume was relatively high average annual growth in recent years due to rapid growth in water transport. Total freight volume of the province increased from 113,218,000,000 ton-kilometers to 198,163,000,000 ton, with an average annual growth of 8.3 percent. Railways, highways, civil aviation, water transport and cargo volume reached the average annual growth rate of 6.4%, 11.6%, 9.1% and 18.2% (Please see Table Subreport 2-4, Figure Subreport 2-5 and Table Subreport 2-5, Figure Subreport 2-6).

Table Subreport 2-4   Table of Traffic Volume in Hunan Province from 2001 to 2007 Unit: 10 thousand tons

<table>
<thead>
<tr>
<th>Year Means of Transport</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railway</td>
<td>4,695</td>
<td>4,942</td>
<td>5,214</td>
<td>5,400</td>
<td>5,218</td>
<td>5,643</td>
<td>5,831</td>
</tr>
<tr>
<td>Highway</td>
<td>44,340</td>
<td>42,982</td>
<td>51,136</td>
<td>60,291</td>
<td>67,040</td>
<td>72,457</td>
<td>85,432</td>
</tr>
<tr>
<td>Water Transport</td>
<td>3,572</td>
<td>3,760</td>
<td>3,600</td>
<td>3,986</td>
<td>4,615</td>
<td>6,894</td>
<td>8,234</td>
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<tr>
<td>Civil Aviation</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.74</td>
<td>3.77</td>
</tr>
<tr>
<td>Total Traffic Volume</td>
<td>53,035</td>
<td>52,156</td>
<td>59,952</td>
<td>69,680</td>
<td>76,876</td>
<td>84,998</td>
<td>99,501</td>
</tr>
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</table>

Sources: *Hunan Province Statistical Yearbook 2008*
Figure Subreport 2-5  Growing Tendency Chart of Total Volume in Hunan Province (2001-2007) (10 thousand tons)

Table Subreport 2-5  Table of Total Volume of the Circular flow of Goods in Hunan Province (2001-2007)
(10 million ton-kilometers)

<table>
<thead>
<tr>
<th>Year</th>
<th>Means of Transport</th>
<th>2001</th>
<th>2002</th>
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<th>2005</th>
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<th>2007</th>
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<tbody>
<tr>
<td></td>
<td>Railway</td>
<td>674.39</td>
<td>730.86</td>
<td>782.60</td>
<td>896.49</td>
<td>930.29</td>
<td>951.66</td>
<td>1038.39</td>
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<td></td>
<td>Highway</td>
<td>316.03</td>
<td>355.96</td>
<td>455.45</td>
<td>513.45</td>
<td>538.57</td>
<td>592.37</td>
<td>682.69</td>
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<tr>
<td></td>
<td>Water transport</td>
<td>141.22</td>
<td>135.48</td>
<td>121.74</td>
<td>162.21</td>
<td>190.32</td>
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<td>0.38</td>
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<tr>
<td></td>
<td>Total Volume of</td>
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<td>1,223.09</td>
<td>1,361.12</td>
<td>1,574.21</td>
<td>1,661.97</td>
<td>1,781.11</td>
<td>1,981.63</td>
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<td></td>
<td>the circular flow</td>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Sources: Hunan Province Statistical Yearbook 2008
Figure Subreport 2-6  Growing Tendency Chart of Total Volume of the Circular Flow of Goods in Hunan Province (2001 – 2007) (10 million ton-kilometers)

III International Experience and Implications for Hunan Province
(I) International Experience
1. Logistics in USA
The United States is not only one of the world’s largest countries, but also one of the world’s important logistics countries. The US is connected by a well developed highway and rail networks as well as an advanced aviation system. The logistics centers also provide an ideal location for logistics cluster and concentration, thus promote the development of logistics industry.

In the USA, there is no a centralized government department in charge of logistics. Instead, the government function on logistics is assumed by various government departments. Similarly there is not unified logistics act in the US. Instead, there are various acts and regulations related logistics at both federal and state levels.

Logistics planning is also important in facilitating the development of logistics in US. The US Government has established several strategic plans for logistics: (i) Strategic Plan for 1997-2002; (ii) Strategic Plan for Fiscal Years 2005-2009; and (3) Strategic Plan for Fiscal Years 2006–2011.

Third Party Logistics (3PL)/Fourth Party Logistics (4PL) is the backbone of the logistics system in the US. In the US, some logistics associations, firms and schools are providing various training programs for professionals. Some universities, such as Northwest University, have offered educational programs on logistics.

2. Logistics in Japan
For last decades, Japan has developed itself into an economic giant and has also established a highly developed logistics system in spite of challenging geographic conditions. The most important facilities for freight transportation in Japan are highway transportation and coastal shipping. International air transportation on
trans-Pacific routes has grown dramatically. The logistics centre in Japan is located in the triangle around the cities of Tokyo, Nagoya and Osaka on the island of Honshu since the country’s major manufacturing area lies in there.

Government planning plays an essential role in the development of Japanese logistics. The most recent plans are: (i) New Logistics Plan in 2001; (ii) Program for Efficient Distribution and Logistics - focusing on the use of information technology in 2001; and (iii) the New Comprehensive Program of Logistics Policies in 2005.

The supports from both central and local governments also attribute to the development of logistics in Japan. For the important logistics infrastructure, the Governments make planning and investment, and get the return from tolls. In addition, MLIT supports the Intelligent Transport Systems and Information Collection and Dissemination Sytem.

There are many research organizations who are actively conducting research on logistics in Japan. The Japanese logistics is also characterized by its developed e-logistics.

3. Logistics in Singapore

The logistics industry is an integral to the Singapore’s economy and offers a wide range of opportunities to companies seeking to offer logistics services. Singapore has the world’s busiest port with largest container transshipment and top bunkering and excellent network connected to more than 130 countries. Singapore Changi Airport is considered as one of the best airports in the world. Singapore is well connected by roads and expressways across the country. Singapore’s land logistics is characterized by its developed logistics parks.

The Singapore’s logistics firms have developed from traditional business to higher value added business.

The Singapore’s Government has considered logistics as one of the four pillar industries and released a series of policies and programs to promote the development of logistics. In Singapore, there are also many programs for promoting the Logistics SMEs. In order to promote the e-logistics in Singapore, an integral initiative has been the development of electronic platforms for supporting the various logistics segments and ensuring the efficiency of logistics services. The Singapore’s Government provides the tax benefits to facilitate the development of the maritime hub based on Budget 2008 Key Budget Initiatives.

A significant opportunity for logistics services in Singapore comes from the increased outsourcing of logistics business or the growth of third party logistics (3PL) / fourth party logistics (4PL). Singapore has upgraded its logistics infrastructure, not only in terms of the hardware but also of the “software” such as the skills and knowledge of practitioners. In Singapore, there are two kinds of training programs: educational program and professional certificate program. Logistics park is an important component of logistics industry in Singapore.
4. Logistics in Germany

In terms of Geographical location, Germany lies at the centre of Europe. It is the continent’s commercial hub, connecting North to South, and East to West. The German is the continent’s largest economy and the world’s third largest economy. Germany is ranked the second only to the US in terms of both export and import. The growth of German export and import has facilitated the development of logistics related to international trade for last decades.

The water logistics facility in Germany is characterized by its efficient ports, expansive rivers and an extensive coastline. In Germany, there are about 60 airports, of which 17 are international airports connecting to 800 airports in the world. Germany has well developed land transportation systems with a length of 40,327 km for railway and 12,000 km for highway respectively, much longer than that in France. In terms of freight traffic, Germany is ranked the first among EU countries.

Federal Ministry of Transport established Freight Transport and Logistics Masterplan in 2007, aiming at making Germany more attractive as a location for production and logistics; and enhancing the efficiency of the entire freight transport system.

The third party logistics has become the driving force of the German logistics industry.

The German government has worked with logistics firms to establish the cargo support centres known as freight villages or CVZ in German in order to improve the efficiency of the country’s distribution network. Traditionally, Germany is famous for its technology. German government has been working hard with the industry, academic institutions and trade unions to develop a platform for promoting innovation. In Germany, more than 50% of the job applicants have received professional training. Almost all educational and training programs are offered by the schools in partnership with local logistics firms.

(II) Implications for Hunan Province

Based on the analysis above, we can derive the following important implications for Hunan Province.

1. Well Developed Logistics Infrastructure

From the experience of the four countries (US, Japan, Germany and Singapore) above, one common factor for successful logistics development is well developed logistics facilities.

The US has an excellent network of highway, railway, as well as aviation system, which not only connects different regions inside the US, but also links the US to the rest of the world. Japan has well developed road transports, coastal shipping, and air transport system. Singapore has the world’s busiest port, one of Asia’s largest cargo airports, and well connected roads and expressways. Germany has efficient ports, busiest cargo airports, well advanced land transportation systems.
However, the logistics infrastructure in Hunan is currently not well developed as compared to the eastern provinces in the PRC.

The length of Hunan’s railways and highways were 2,906 km and 184,605 km respectively while the Length of navigable inland waterway was 11,968 km in 2008.

Although Hunan was ranked the sixth among provinces in the PRC in terms of length of roads (175,415 km), it was ranked the 16th and 20th in terms of length of expressways and highway II respectively in 2007. This clearly indicates that Hunan still lacks qualitative roads for timely transportation. In addition, the airfreight through Changsha Airport was only 38,000 tons in 2007, which was very small among the airports in the PRC.

Therefore, Hunan Government should focus on its logistics infrastructure development in order to promote logistics industry in the province.

2. Government Planning


In theory, the Hunan Government has not established a strategic plan on logistics up to now although logistics is considered by the government as one of the pillar industries in Hunan. Moreover, it issued Proposal on Further Promotion of Modern Logistics in August, 2007 (the Proposal). The objective of this Proposal is to establish a modern logistics service framework (including logistics parks, distribution centers, and logistics centers) in Hunan consistent with its economic development plan by 2010.

The Proposal in fact is an official document, but not a strategic plan. Therefore, it is necessary for Hunan Government to establish a 5 year strategic plan for logistics industry. In the same time, the Hunan Government needs to convert this 5 year plan into annual plan for implementation purpose.

3. Laws and Regulations

There is a logistics law in Japan, but not in the US, Germany and Singapore, where the articles related to logistics are reflected in other acts, such as series of transportation acts. In the US, the acts on logistics in fact are acts on railway, highway, maritime shipping such as Rail Revitalization and regulatory Reform Act, Revised Federal Aviation Act, 1977, Airline Deregulation Act 1978, Motor Carrier Act in 1980, Railway Act in 1980, Maritime Act in 1984, and ICC termination Act in 1995.
Those acts had significant impacts on the logistics development in the US since they lifted the restrictions on the transportation sectors. There are also laws and regulations related to logistics industry at state level.

Based on the existing political system in the PRC, provinces do not have power to enact laws to guide the logistics industry. Therefore, the Hunan Government can use regulations to boost the local logistics development.

As mentioned above, the Hunan Government has issued a Proposal on Further Promotion of Modern Logistics on August 1, 2007. Detailed scopes of this Proposal include:

- construct 1 or 2 logistics parks with annual turn over of ¥5 billion
- support 10 big logistics firms with annual turnover of ¥500 million
- restructuring 20 big logistics firms with annual turnover of ¥100 million
- increase of proportion of 3PL
- total cost of logistics accounts for GDP decrease by 2-3% from 18.9% in 2005.

The measures to achieve the above objectives include: (1) market entry; (2) operating environments; (3) logistics market; (4) open to the rest of the world; (5) tax benefits; (6) land support; (7) government subsidy; (8) technology; (9) attraction of skilled labor force; (10) coordination and planning

4. Government Direct Investment in Logistics

In Japan, the Government directly invests in the logistics infrastructure such as airports, highway, ports, and base for warehouses. The Government is also involved in the logistics infrastructure in association with private sector. In addition, the Government supports the Intelligent Transport Systems, or ITS, and Information Collection and Dissemination System. In Singapore, the Government supports the development of electronic platforms and ensuring the efficiency of logistics services. The platforms cover Trade Net, Port Net, Jurong Port Online, Marinet, and Cargo Community Network. The Government has established the Logistics Enhancement and Applications Program (LEAP) with logistics industry.

In the last decades, the Hunan Government has invested significantly in the transport system and other logistics facilities. The Government has also established a grain logistics park with capacity of 4.45 million tons, logistics parks, market for industrial goods, and food trading centers in the province. However, no electronic platform has been built in Hunan.

Therefore, the Hunan Government should continue to support the development of logistics facilities. More importantly, the Government should invest in some kinds of electronic platforms for the promotion of e-logistics in Hunan Province.

5. Government Promotion through Taxation Incentives

In order to promote the development of the Maritime hub, the Singapore’s Government provides the two major tax benefits: (i) effective from 1 April 2008, a
container investment firm will enjoy a concessionary tax rate of either 5% or 10% on its entire onshore and offshore container leasing income. (ii) All gains from the sale of vessels will not be subject to income tax.

Georgia provides the following incentive programs: (i) tax credits, applicable to corporate income tax liability and in some case payroll withholding, (ii) state tax exemptions, applicable to property and sales tax, and (iii) federal tax exemption, applicable to customs duties.

Based on the Proposal on Logistics in Hunan on Further Promotion of Modern Logistics on August 1, 2007, the Hunan Government currently offers:(1) tax credit, applicable to land utilization tax, real estate tax for logistics firms, and also applicable to corporate income tax for joint ventures with 15 years of operating years; (2) 150% of R&D is tax deductible, tariff exemptions and VAT exemptions for equipment import; (3) corporate income tax exemptions for newly established logistics firms for the first 2 years

It seems that the Hunan Government has some good promotion programs on the development of logistics industry in the province. However, those tax benefits are not enough to attract logistics firms from other provinces. The Government needs to provide better tax benefits for inward investment of logistics firms outside Hunan so as to encourage the clusters of logistics since Hunan is an inland province.

6. Educational and Professional Trainings

In the US, Singapore, Germany and Japan, there are two kinds of training programs on logistics: educational and professional programs. Some universities provide educational programs for students while some logistics associations and companies offer professional training programs for practitioners.

Only one university from Hunan offers a graduate program on logistics and three universities (Institute for Central South Forestry, Changsha Science and Technology University, Hunan Business School) from Hunan offer degree programs on logistics.

Training Centre of the PRC’s Logistics and Purchasing Association, Hunan Xindongfang Training Centre, Hunan Human Resource Department Training Centre, Changsha South Vocational School, Changsha Heli Business Co., and Hunan Railway Vocational School provide professional training programs on logistics. Hunan Logistics Vocational School is the first professional logistics school in the PRC.

However, few logistics firms have their own training schools with training programs, especially on-job training programs. Therefore, the Hunan Government should encourage big logistics firms to establish their own schools and provide on-job training on logistics.

7. Third Party Logistics (3PL)/Fourth Party Logistics (4PL)

Third Party Logistics (3PL)/Fourth Party Logistics (4PL) is the foundation of the logistics industry in the four countries. The growing complexity of the logistics function has led many manufacturers in the US, Japan, Singapore and Germany to
outsource logistics services to cover even greater range of activities and has come to be known as the provision of Third Party Logistics or Fourth Party Logistics. By utilizing 3PLs / 4PLs, manufactures reduce the working capital in warehouses, trucks, containers, etc. In addition, as firms expand their markets outside the country, the need for more sophisticated outsourcing services like multi-modal transport and international trade rules compliance increases.

The Hunan Government realizes the importance of 3PL/4PL in facilitating the development of logistics industry in the province. The Proposal clearly indicates that 3PL providers are encouraged in Hunan Province. However, the Proposal does not provide detailed measures for the promotion of 3PL. As already known, the strong economy and foreign trade are the base for 3PLs / 4PLs. As discussed below, the relatively small economy and less developed international trade in Hunan will hinder the development of outsource logistics services at home and abroad.

8. High Value-Added Logistics Business

The logistics firms in the four countries have completed the transition from traditional logistics business such as transportation and warehousing to higher value added business such as management of inventories, inventory tracking, reverse logistics, use of e-commerce systems, and possess worldwide network system.

An important development of logistics business in Japan and Singapore has been the emergence of the e-logistics business. The processes of logistics business through electronic means of moving, storing and manipulating data have enabled firms to provide not only the services that meet the needs of customers, but also the value added products.

However, the Proposal does not mention the high value-added logistics business. No doubt, management of inventories, inventory tracking, reverse logistics, use of e-commerce systems, and worldwide network system are the logistics services the firms in Hunan should target in the near future.

IV Total Strategy for Coordinated Development of Logistics Industry in Hunan Province

(I) Overall Plan

According to the Adjusting and Revitalization Plan about the Logistics Industry in the PRC and the requirement of enriching the people and enlarging Hunan Province, considering current situation and characteristics of the development of the logistics industry in Hunan Province, we put forward the overall plan for coordinated development of the logistics industry in Hunan Province: Give full play to the advantage of location and transportation (see Figure Subreport 2-7, 2-8), stick to the pursuit of comprehensive, coordinated and sustainable development strategy, follow the market, take coordinated progress of logistics industry and new industrialization
as a clue, maintain the status of enterprise as the mainstay, take reform and opening up as motivation, provide advanced technology as support, focus on the integration and information of logistics, work for a favorable policy environment for the development of modern logistics, upgrade and adjust traditional logistics industry, cultivate and develop modern logistics enterprises with international competitiveness, bring in and foster modern, specialized logistics groups in large scale, develop rapidly “Third-party logistics”, strengthen construction and integration of logistics infrastructure, rely on major traffic networks to establish a multimode transport system with highway, railway, water transport, airway, which links the east to the west from central part of the PRC, strengthen construction of logistics park and network-based logistics information platform, to lay a solid foundation for the development of logistics industry; on the basis of different regional characteristics, making the layout of logistics industry better to establish a rapid, on time and effective, multi-level and multifunctional modern logistics service network system, as to improve the socialized, specialized and green standard of logistics, to reduce social logistics cost, meanwhile, promote the development of other industries, provide firm logistics system foundation for promoting the new industrialization and new urbanization and constructing the “Bi-Pattern” society of Hunan Province.
(II) Basic Principles

1. Principle of Planning. In the development of modern logistics industry, we shall emphasize on the systematic and scientifically planning and compilation, to realize the overall planning and step-by-step implementation, to reduce repeated construction and resource waste. Especially we should take the construction of large-scale logistics infrastructure as the focus of planning and regulation, such as central cities, traffic hubs, material collecting and distributing ports, and logistics parks, logistics centers, distribution centers. Coordinate the investment and construction of key areas, key programs, and carry out step by step the logistics programs with demonstration effect, strong radiating function, and corresponding level of function. To establish a low-cost, efficient modern logistics system with rational layout, complete function by overall planning and step-by-step implementation.

2. Principle of Being Led by Center City. In theory of regional development, “Growth Pole”, “Point-axis Development” models are still the fairly ideal development models for the construction of Hunan modern logistics system. Therefore in the process of constructing modern logistics system in Hunan, firstly take the construction of logistics as breakthrough points, such as core city group centered by Changsha-Zhuzhou-Xiangtan and important communication cities of Yuanyang, Hengyang, Huaihua, to cultivate “Logistics Pole” which has further impact on the regional economic and the construction of modern logistics system in Hunan, this logistics pole can radiate the surrounding area and promote the modern logistics.
development of surrounding area, and form logistics economic zone, after all establish a fully-functional and quick modern logistics network system of in line with international standard, and of which consists five levels- logistics traffic point city, logistics park, logistics center, distribution center, city express system.

3. **Principle of Sustainable Development.** High frequency of logistics activities will result in increased fuel consumption, more serious air pollution and waste pollution, terrible traffic congestion and so on; all these problems will negatively influence the sustainable development of social economy. Therefore, sustainable development is the base of development of modern logistics; it’s also an important principle of the construction of modern logistics system in Hunan Province. In the development of logistics industry, in order to stick to the principle of sustainable development, we must take into consideration the relationships between immediate and long-term interests, between partial and overall interests, between vested and prospective interests, subordinate immediate interests to long-term interests, partial interests to overall interests, vested interests to prospective interests, abandon simple economic growth theory, under no circumstances should we seek partial, short-term economic benefit at the expense of the environment, in order to build an energy-efficient, environment-friendly society, we shall abide by existing laws and regulations, enforce strictly *Environmental Protection Law of the People's Republic of China*, *the Law of the People's Republic of China on Prevention and Control of solid waste Pollution*, as well as *the Law of the People's Republic of China on the Prevention and Control of Environmental Noise Pollution*, to form green logistics management system and achieve the coordinated development among economy, society and ecology.

4. **Principle of Market Operation.** The market demand is the basis for the development of logistics industry, domestic and international market demand is the strongest and most direct motivation for the development of logistics industry. Demand is the most basic reason for the fairly rapid progress of logistics in the regions of Bohai, Yangtze River Delta, Pearl River Delta; it’s also the reason for the first breakthrough in industries of appliance, pharmaceuticals, auto, and retails. Therefore, in order to speed up the development pace of logistics industry of Hunan Province, we must face domestic and international market, identify and adjust the industrial pattern and product mix of logistics according to demand structure and scale, and make every effort to maintain dynamic adaptable and prospective.

5. **Principle of Overall Consideration.** In the development of modern logistics industry, we cannot solely consider logistics industry by itself, or limit the construction of modern logistics system to the development of transportation, trade and business, storage, but to establish the concept of major industry and large scale economics, with a view to joint development of industry and the inner relations between modern logistics industry and its associated industries, between departments,
we shall obey strictly the economic rules, social rules and ecological rules, form resultant force for development of logistics industry and maintain the virtuous cycle and comprehensive benefit of the combined system.

6. Principle of Combining Integration with Construction. According to regional advantage and resource advantage of center city, we should make full use of existing logistics infrastructure, optimize resource structure, and use modern electronic information network technology together with advanced management method, to upgrade the existing logistics resource from function and the utilization rate. On the basis of integrating logistics resources, aiming at the construction of modern logistics service system, and stick to combining integration with construction, to realize the favorable development of modern logistics. Combine the reality of the needs of the modern logistics industry development in Hunan, development strategy and policy measures should be cleared in Hunan, to integrate existing resources, and investment in new logistics facilities for need in order to build a modern logistics industry development pattern.

(III) Development Objective

We must gradually construct and perfect the modern logistics system from the actual conditions of Hunan Province.

1. Overall Objective. By the year of 2011, we aim to build a modern logistics service system suit for the economic development of Hunan Province, and of in line with international standards by following measures: integrate social logistics resources; build logistics public information platform, key logistics infrastructure and comprehensive logistics park and specialized logistics center, distribution centers, logistics city group centered by Changsha-Zhuzhou-Xiangtan, cultivate modern logistics leading enterprises and so on. All these efforts will lead to the progress in socialization, specialization and modernization of logistics industry. By the year of 2015, the modern logistics system continues to mature, the logistics network will be well-developed; a modern logistics network system will be formed, which consists of five levels-logistics traffic point city, logistics park, logistics center, distribution center, city express system; the fully-functional and quick modern logistics public information platform operate well, which of in line with international standards; the third-party logistics become subject among logistics enterprises; socialization, specialization, information, large-scale, ecologicalization become the basic characteristics of logistics industry. There will be progress in logistics service; the proportion of logistics cost accounts for GDP goes down; the added value of logistics industry increase by 20% to 30% in comparison with growth rate of gross regional product, the logistics industry will be transformed into a pillar industry of the national economy.

2. Specific Objective. Try to improve the difficult situation of logistics enterprises in 2009, maintain the stable development of logistics industry. By the year
of 2011, the total social logistics cost accounts for less than 18% of the gross regional product; the third-party logistics accounts for 30% of total social logistics income; the proportion of logistics enterprises making advantage of network technology to deal with users’ logistics information reaches 50%; the third-party logistics accounts for 30% of total number of logistics enterprises; there are more than 10 logistics enterprises with operation scale over CNY500,000,000; 1-2 advanced key logistics park with yearly income of CNY5,000,000,000.

V Major Tasks for Coordinated Development of Logistics Industry in Hunan Province

(I) Acceleration of the Construction of Modern Logistics Service System

The essence of modern logistics is logistics supply chain. According to the requirements of modern logistics, there should be supply chains between enterprises, between enterprise and user, as well as a network among material supplier, manufacturer, wholesaler, retailer, logistics enterprise and end user; the logistics activities can be carried out either by a single enterprise or several enterprises. The subject involved in modern logistics system includes the above-mentioned enterprises of the supply chain.

Firstly, the large-scale traditional storage and transportation enterprises are encouraged to become subject in logistics system. Through reforming the traditional model of operation, looking for new ways for social public logistics, make good use of current equipment to build logistics base, to become a logistics subject combined storage with transportation, transfer, material supply, parts-purchase and information service and so on.

Secondly, attract large-scale logistics enterprises from home and abroad to invest in Hunan through improving the environment of investment. On the basis of sufficient proof, promote some social public logistics infrastructure to society and market by ways of renting, selling, transferring, such as airport, harbor, therefore to attract the investment of enterprises from home and abroad, which leads to a great-leap-forward development in logistics industry of Hunan Province.

Thirdly, guided by relevant policies and guardians of the government, in order to foster modern logistics enterprises of advanced logistics theory and the third-party logistics of a certain market base, the following action should be taken, upgrade and renovate the technology of enterprises with a certain market base; or take strategic cooperation with traditional logistics enterprises.

(II) Cultivation of Logistics Service Market in Various Channels

Exploiting logistics market as well as building the modern logistics service market is a key link in the construction of modern logistics system in Hunan Province. Without need for logistics service, the logistics centers and logistics park are nothing at all.
Firstly, make further effort to help and encourage Hunan enterprises to change their traditional concept, to fully realize that bettering logistics supply chain is an important means in reducing production cost, increasing added value of product, improving enterprise competitiveness, making new profit. Support enterprises to create conditions for effective separation on material purchase, transportation, storage and product processing, sorting, distribution from logistics service business, according to modern logistics management model, some jobs can be done by one enterprise, or entrust parts/all jobs to specialized enterprises, to promote the transformation of logistics enterprises to social specialized logistics and cultivate and develop logistics market in Hunan Province.

Secondly, improve supply on the logistics service market. Make full use of existing logistics functions, such as transportation, storage and distribution, multimodal transport and so on; take advantage of competitive advantage to satisfy needs of logistics market; according to the requirements of user, provide high-class logistics service to exploit more needs for logistics service from different enterprises and society. Energetic efforts will be made to guide traditional logistics enterprises to develop into modern logistics industry, select and transform large-scale material supply enterprises, transportation enterprises and develop the third party logistics, to combine logistics service with production and marketing, nurture sense of service, perfect function of service and improve capacity of service.

Thirdly, the logistics market of Hunan should be further standardized, strengthen legislation work and policy management, change the situation of separation, inefficiency, cutthroat competition of departments in logistics market, get rid of the boundary between departments, between regions, to the construct a logistics service market network system which provides a just, fair, open market environment for logistics enterprises.

(III) Construction of Logistics Support Carrier

1. Acceleration of Construction of Logistics Infrastructure. The well-built traffic facilities provide premise and base for the development of logistics in Hunan. Firstly make overall planning for the transportation network of Hunan, optimize the allocation of transportation resources, and reduce repeated construction and resource waste. Secondly realize the financing in different channels and ways, then invest on the construction of traffic and traffic network, such as rebuild railway bed and highway, improve facilities like port, harbor, airport, station and so on. Thirdly, speed up construction of logistics nodal. Strengthen reconstruction and upgrade of logistics nodal like cargo terminals, transfer stations and storage stations, especially multifunctional logistics centers and distribution centers, which are the important link in modern logistics, it’s necessary to build new multifunctional logistics centers and distribution centers around important commodity production base and transport hubs.

2. Establishment of the Logistics Resources Information Platform. Through
logistics information platform, the logistics enterprise can strengthen cooperation with its upriver enterprise and downriver enterprises, to form and better the supply chain. Firstly, form and widen the network of logistics communication in Hunan. Rely on the national communication network, Hunan communication network, national defense communication network, and the communication of major logistics enterprises cabling, program-controlled remote organization use satellite, and microwave as channels; secondly, form and widen the information network of logistics resources management in Hunan. Relying on the construction of information port in Hunan, the logistics enterprises have access to the network. As tentative idea, establish LAN into relevant government department, large-scale logistics companies, large-scale warehouse, major transport hub, freight marshalling yard and so on; set up terminal in basic unit such as storage room, harbors in key site; thirdly, establish a real-time source data collection system. According to the requirements for realizing the function of logistics resources information platform, we should equip bar-code label, automatic identification equipment, data acquisition unit for the end nodes of storage room, harbor, platform, vehicle, and container and so on. Meanwhile dealing with the GPS information is also necessary. Thirdly, establish information standard system. Make standards and specification applied for classification of material, index system, all types of code of information; fifthly, establish system and platform of technology. According to the needs for the gradual combination of e-business and logistics, we should develop standards of electronic data interchange, including basic standard, code standard, message standard, document standard, management standard, application standard, communication standard, safety & secrecy standard, and establish an integrated information processing system. Sixthly, develop application software. Focus on the software system of logistics resources information management, design and plan all types of application software need for logistics resources information platform, to make sure that the detailed catalog of development is developed by grades, professions and in year.

3. Establishment and Improvement of All Types of Logistics Operation System. Firstly, guide the enterprises to cultivate comprehensive integrated service system and improve service ability. Encourage the enterprises expend sales network through the construction and operation of logistics center, distribution center. Secondly, reduce the logistics chains; optimize the system of logistics operation. Guide logistics enterprises in marketing create process of logistics operation, increase actual allocation efficiency of product. Solve large stocks of customer goods and over-occupation of capital from root. Fourthly, increase greatly technical content in separate chain of logistics operation. Actively promote techniques that meet needs of logistics, these techniques include transport technique, storage technique, packing technique, information technique and so on. Fifthly, realize the uniform and perfect of system of logistics operation through the promotion of standardization. Standardize
logistics operation, to realize the coordination, uniform and close connection of system of logistics operation.

4. Expansion and Improvement in Organization of Logistics System. Firstly promote the first party logistics transfer to the second logistics and the third logistics. Improve and update the existing organization of logistics, to promote the first party logistics transfer to the second logistics and the third logistics, gradually increase the proportion of the second party logistics and the third party logistics in logistics in Hunan. Secondly, promote the organization transfer distribution from single enterprise to different enterprises. Thirdly transfer from ordinary logistics to electronic logistics. Combined with the construction of information port, to realize internal electronic, fourthly, look for new way to transfer the second party logistics and the third party logistics to the fourth logistics.

(IV) Optimization the Layout of the Logistics Industry

According to the factors, such as market demand, industrial layout, flow of commodity, environment of resource, traffic condition, regional planning and so on, to optimize the layout of the logistics industry, emphasis on the development of “one core, three cycles, three corridors” should be given.

One Core: construct Changsha-Zhuzhou-Xiangtan urban agglomeration as the growth pole for the logistics industry in Hunan. These three cities of great influence are the group leader of economy development in Hunan Province, with the above-mentioned advantage, more effort should be made to build provincial large-scale logistics distribution center, and develop the third-party logistics; centering in Changsha, build Changsha-Zhuzhou-Xiangtan as an important modern regional logistics center integrated storage with transportation, distribution and information service in the PRC. Make great effort to cultivate modern logistics market, and develop comprehensive logistics service enterprises and groups, led by some key logistics enterprises, such as railway, highway, water transport, airway, large-scale warehousing, logistics distribution and so on, through coalition, joint-stock partnership, to set up industrial or regional large-scale logistics group; speed up the process of scale and industrial logistics, to promote the constant development of Changsha-Zhuzhou-Xiangtan urban agglomeration. Meanwhile, speed up the pace of restructuring or transformation traditional warehousing enterprises to transform to the third-party logistics. Support the development of private enterprises; develop rapidly the modern logistics park, to provide a good platform for specialized logistics enterprises and development.

Three Rings: Surround Dongting Lake Logistics Ring centered by Yueyang, Xiangnan Logistics Ring centered by Hengyang, Daxiangxi Logistics Ring centered by Huaihua. During the construction of three logistics ring, the construction of logistics system of node cities- Yueyang, Hengyang, Huaihua, are of the most importance.
The development of the logistics industry of Yueyang must Rely on Beijing-Guangzhou Railway and Beijing-Zhujiang Express, construct Yueyang to be a hinge collecting and distributing logistics park with great influence. The main activities include: the trans-provincial logistics activities between the “3+5” urban agglomerations and Wuhan urban agglomerations, carry bulk goods and distribute it to the next level logistics park. Become a distribution center, collecting goods from other place and distributing local goods, and also a place for vehicle exchange; rely on Chenglingji Port, make full use of the Golden Waterway the Yangtze River, to construct Yueyang to be a large-scale transfer communication, important trading port in Hunan and intermediate center from The Yangtze River Delta to Chongqing, provides service of export shipment, containers’ consolidation & devanning warehousing, booking space, customs declaration, quarantine. Realize multi-transport of highway, railway and waterway by using highway and railway resources surrounding ports; Rely on its advantage of location and transportation, construct Yueyang as a energy supply hub of first-level in Hunan, enlarge the energy storage capacity, to offer service for the storage and transportation of coal, petrol and gas for Hunan Province, to ensure the energy supply for local economic development; rely on the rich agricultural resources of Dongting Lake region, build regional logistics park centered of distribution processing, to provide high-quality agricultural products for retailers and supermarkets of local area, Changsha, Zhuzhou, Xiangtan.

The development of the logistics industry of Hengyang must give full play its advantage of transportation, especially, Beijing-Guangzhou Railway and Hunan-Guangxi Railway and Luoyang-Zhanjiang Railway and so on, strengthen the construction of station yard, rely on station, to build Hengyang to be a hinge collecting and distributing logistics park satisfy the needs storage and carrying bulk cargo for the “3+5” urban agglomerations, the Pearl River Delta urban agglomerations, east Hunan and west Hunan, and become the important logistics center in Pan-Pearl River Delta Region; rely on the advantage of going right through Changsha, Zhuzhou, Xiangtan and Guangdong Province by express network surrounding Hengyang, construct regional logistics park corresponding to communicational logistics park, which mostly rely on highway transportation, and mainly process the industrial and agricultural products, and also provide service of logistics distribution, sales, storage and the third party logistics; play the important role in transporting non-ferrous metal, establish special logistics park, mainly process non-ferrous metal, and also provide service of goods distribution, sell goods from the higher level logistics hub of Hengyang to Changsha, Zhuzhou, Xiangtan or the Pearl River Delta.

Huaihua is an important communication hub in Southwest part of the PRC, which is called as “the city on the train”. Rely on its advantage of location and transportation, construct Huaihua as a city with radiation force and influence on Hunan, Hubei, Chongqing, Guizhou, Guangxi, as the regional modern logistics center.
for trade and business integrated logistics with trade, business, consumption and finance, as the second-level logistics node in the PRC and the first-level logistics node in Hunan Province. Through the development of logistics programs, attract investment, to form a rationally distributed, complete-facilities and complete-functional modern logistics system consists of trade zone, Logistics Park, specialized logistics center, logistics distribution center and processing park and so on.

**Three Corridors:** The north-south logistics corridor includes: Beijing-Guangzhou Railway, Luoyang-Zhanjiang Railway, Beijing-Zhuhai Express, Beijing-Zhuhai Double Track, Erlianhaote-Guangzhou Express, 107 Motorway, Xiangjiang Waterway and so on. The east-south logistics corridor includes: Shanghai-Kunming Railway, Hunan-Guangxi Railway, Heng-cha-ji Railway, Shanghai-Ruili Express and so on. Northern Hunan- Northwest Hunan-Western Hunan logistics corridor includes: Jianzuo-Liuzhou Railway, Hangzhou-Ruili Express, Baotou-Maoming Express and so on.

**VI Policy Suggestions to Accelerate Continued Development of the Logistics**

*(I) Establishment of Sound Organizational Management Structure.* The existing market fragmentation in management system of Hunan, at a certain extent, restrict the development of logistics industry, therefore a provincial leading group for the development of logistics industry is suggested, for this group, provincial officer should play a role of leader, and other departments participate, such as Provincial Economy Commission, Provincial Development and Reform Commission, Provincial Department of Commerce, Department of Communications of Hunan Province, the office locates in Provincial Economy Commission, the main task of this group is to discuss, make and coordinate the relevant policies concerning the development of logistics industry: encourage the integration, reformation, improvement of existing logistics resources; break department separation, regional blockade and encourage the integration of cross-department, trans-region for logistics enterprises; use the opportunity of main-supplement separating reform of the state-owned industrial enterprises, to acquires and reconstruct existing logistics resources, to speed up the pace of integration, transformation and improvement of logistics resources, to put forward policies, such as favorable financial policy concerning logistics socialization and equipment renewal, land-use policy concerning logistics, pricing policy concerning logistics service and transport, and registration policy and so on, discuss and draw up supportive measures favorable to the development of logistics industry.

*(II) The Enforcement of Overall Coordination.* Make scientific development planning of logistics industry. Work for the good coordination and connection of the construction and development of logistics infrastructure between regions, departments,
and proper arrangement for key logistics programs. Construct comprehensive logistics park of high starting point, large scale, and great influence in the mature center city, which has easy access to various transportation facilities, improve organization degree of logistics. Statistical departments should discuss and set up accounts statistics system of logistics as soon as possible, to strengthen the monitoring and analyzing of the development of modern logistics industry of Hunan. Government of cities and towns should establish corresponding coordinated system, discuss and develop concrete measures to promote the development of local modern logistics industry, to ensure policies made by the state and provincial government to be carried out, to promote the rapid and coordinated development of modern logistics of Hunan.

(III) Early Release of Concrete Policy to Support the Development of Logistics

1. Relax of Registration. Unless it is otherwise provided in state laws and administrative regulations, any department or entity shall not set precondition on the registration of logistics enterprise. Relax the scope of operation. Unless it is otherwise restricted business, program in state laws and administrative regulations, the logistics enterprise have right to choose scope and means of operation as required, and the commercial and industrial departments grant approval for these enterprises. The competent department of charter industry shall grant special permission to applicant according to relevant specifications. Relax the area of investment. Unless it is otherwise prohibited area of logistics service in state laws and administrative regulations, the social capital have right to invest; any area open to foreign investment is also open to private investment.

2. Standardization of Charge Management. Focus on an overall clearance of the collection of charges to freight vehicles, such as administrative charge, governmental funds, governmental foundation and fine program, cancel illegal charges. Unauthorized inspections, arbitrary charges, fund-raising quotas and fine, unreasonable valuation are firmly prohibited. Standards of administrative charge and charges of certificates, examination, training involved in modern logistics industry shall be published in public; the price of water, electricity, gas for logistics enterprises shall be same with that of industrial enterprise.

3. Standardization of Market Order. Further effort should be made to set up an orderly market system for fair competition. Break regional blockade, trade monopoly, market segmentation, let enterprises of different regions and ownership to start logistics service business. Normalize the behavior of logistics enterprise, to form a market mechanism for fair competition. Pay more attention to market oversight and law enforcement to build a good environment for the development of logistics market, if there are someone overbearing the market, carrying on business without license, they will be punished seriously.

4. Preferential Tax. Preferential tax policies: logistics enterprises outsource
partly or entirely business as transportation, storage to other enterprises, and make collection by these enterprises, according to the requirements of State Tax Administration, the logistics enterprises may apply to the preferential tax policy in the Instructional Advice on the Promotion of Producer service Industry with Rapid Development (Published by Hunan Government [2007] No.9) issued by Hunan government. Secondly, technology innovation is encouraged. For the logistics enterprises, 150% of its actually incurred expense for technology development in current year may be offset against the amount of tax payable. If the amount of tax payable is in excess of the actually incurred expense for technology development, the excess amount may be carried forward for five years; the equipment and instruments, which consistent with state industrial policy the policies of the state on import tax treatments, imported by the logistics enterprises may apply for VAT and customs duty exemption; this policy as well applies to the enclosing technology (software included), accessories and fittings; if the home equipment, which consistent with state industrial policy, is used in the technology innovation of logistics enterprise, these home equipment may enjoy preferential tax policy for company income tax after approval.

5. Land Use Policy. Any land included in the overall land-use planning, urban comprehensive planning, logistics land-use planning for development of modern logistics industry, logistics land-use planning for urban short-term development, shall be preferential arranged in the annual land use plan, so as to ensure the land allocation for logistics park in the development of modern logistics industry.

(IV) Acceleration of Integration of Existing Social Logistics Resources

There are tremendous idle logistics resources being wasted in the pillar industries in Hunan Province, preferential policies should be adopted for the separation of these resources, to make these resources be used for not only for one enterprise but also for the society. Socialize the logistics resources of pillar industries. Meanwhile, fully integrate existing social logistics resources, combined with the construction and planning of main hub of highway and railway station, choose suitable location for the logistics park, specialized logistics center, distribution center, make full use of existing facilities of station and warehouse of all trades to integrate existing resources in stock. Different types of enterprises are encouraged to operate in unified way to make the best use of comprehensive advantage.

Encourage the separation of logistics resources in industrial and commercial enterprises. Break the extensive mode of operation of "large and all-inclusive" or "small and all-inclusive", adjust and rebuild logistics business, realize gradually the integrated management of supply chain. Industrial and commercial enterprise, especially those large and medium-sized enterprises, should realize the integration of material purchase, warehousing and transportation, distribution processing, packing and distribution, outsource partly or entirely business to specialized logistics
enterprises, to accomplish the specialization of first-party logistics. Resource reforms, such as separate investment, affiliation, lease, are encouraged to develop socialized logistics.

Speed up the transformation of traditional storage and transport industry. Break the boundaries among departments, industries and ownership, to guide the integration of logistics enterprises as per business process. Set up logistics enterprise group, to improve the capacity of trans-regional operation and comprehensive service. Strengthen the union of regions, to form service network covering the whole province, and to develop operation network of logistics service influencing the Pearl River Delta and the central region.

(V) Increased Investment in Logistics Industry

Firstly, play a financial role to guide capital. Funds should be arranged to support the development of modern logistics industry out of the initiation funds of service industry from financial budget of Hunan, this funds are mainly used for loan interest subsidizing for the key logistics enterprises and key logistics program, the construction of public welfare infrastructure of logistics and basic work of logistics, exemplary project of logistics transformation of industrial and commercial enterprise. Funds from corresponding budget of City, town government should be arranged to support the development of local modern logistics industry. Secondly, increase investment in various channels. Further effort should be made to recommend potential key logistics programs as national projects funded by treasury bonds. Initiation funds involved with logistics industry from the relevant departments directly under the provincial Party committee should be arranged to support the development of modern logistics industry every year. Credit guarantee institution of provincial small-and medium-sized enterprise should arrange guarantee fund to support the development of small-and medium-sized logistics enterprises. Strengthen communication and co-operation between the banks and enterprises, to encourage financial institutions in the independent loan to increase loan in the logistics enterprises and logistics of the project. Encourage qualified logistics enterprises to enter the capital market for financing.

(VI) Enhancement of Training for Qualified Personnel

With the rapid development of logistics industry in Hunan, acute shortage of qualified logistics personnel becomes a big problem. Currently, three types of most wanted qualified personnel are logistics planner, extravert logistics personnel, logistics researcher. The reasons for this situation are: firstly, the logistics education started late, still small scale, the number of formal-educated personnel is limited in market, while the students are still not qualified; secondly, the logistics education is not adapted to the changing of market demand, the market of job training is not in good order result in unqualified personnel. The logistics courses and majors offered by universities in Hunan are not close with practice. The aging of personnel become a
general problem. Lack of qualified personnel is one of key factors that result in the weak development of logistics industry.

Therefore, it is necessary to study the subject setting and personnel training plan of logistics industry of Hunan, to establish theory of modern logistics and subject system of logistics as soon as possible. Institute with good conditions can change to professional institute, such as Institute of Circulation Economics, College of Business, and Institute of Logistics Management, to supply the market with qualified personnel. Multi-means shall be adopted to speed up the development and education of human resources, combine academic training with on-the-job training, and long-term cultivation with short-term training, to turn out qualified personnel with interdisciplinary comprehensive abilities. Actively study the advanced foreign logistics concept and technology, strengthen the cooperation and exchange with foreign countries, to develop the logistics industry of Hunan. At the same time, talents will be welcome by freely register for residence, go and come of one’s own will, to attract talents from home and abroad, meanwhile, the brought-in first-class specialized technical, first-class management may enjoy the favorable treatment according to the specifications of talent policy.
Subreport 3 Strategy of Energy Conservation and Environmental Protection in Hunan Province

Summary

Increasingly the basic foundations of economic and social development, energy and environment are turned into national strategies in most countries. During the process of new industrialization in Hunan Province, developing a scientific, sustainable energy conservation and environmental protection strategy is extremely urgent.

Hunan has a relative shortage of energy resources. Having reached only a middle stage of industrialization means that over the coming 5 to 10 years, rapid development of either category or industry size of heavy chemical industry is unavoidable. Rising energy demand and increasing energy consumption will be driven by the heavy chemical industry-centered industrial structure.

The contradiction between energy supply and demand is tough. Energy production and consumption in Hunan mainly relies on coal. Great consumption of fossil energy, such as coal, and extensive economic growth pattern has caused serious environmental pollution to air, water and other media. Hunan is a less developed province and the funds invested in energy conservation and environmental protection is seriously inadequate due to limited local resources.

During the setting of the “Eleventh Five-year” plan, the target for energy conservation and emissions reduction was set, in order to improve the current energy and environmental situation in Hunan Province. Since then, unprecedented efforts have been made, meaning that the target is expected to be met by the end of the “Eleventh Five-year”. However, these are only short-term result. Whilst they help to relieve the pressure on energy conservation and environmental protection to a certain extent, the present situation of energy conservation and environmental protection in Hunan is still very challenging.

Hunan Province can realize the sound and rapid economic development through innovation and strategic thinking, speeding up the pace of a comprehensive transition towards a development mode of Hunan energy conservation and environmental protection as well as the entire economic and social development pattern. In addition by changing the development concept of achieving a fast GDP growth and carrying
out scientific development view, advocating a low carbon economy, circular economy, fostering new economic growth points of low carbon emission, recycling characteristics, constructing industry, building and transportation system of low carbon emission, recycling characteristics, promoting to form resource-saving and environment-friendly production modes, lifestyle and consumption modes, we strive to achieve the general objective of realizing the first construction of low carbon economy, circular economy province in the PRC by 2020.

Therefore, a series of more improved, supporting and powerful policies and measures should be put forward, including improving the laws in the fields of energy conservation and environmental protection, strengthening the enforcement and supervision of energy conservation and environmental protection policies, introducing policies of finance and taxation to encourage the development of a low carbon and circular economy, attempting to establish an emission trading market for carbon, and so on. Special efforts in innovation in financing methods for government and enterprises should be made, in order to solve the problem of the lack of capital in energy conservation and environmental protection in developing regions.

Research Background and Purpose

In the present world, energy security and environmental protection have risen to a high degree in national strategies, giving greater importance to both, energy conservation and environmental protection and improving energy efficiency. At the same time great efforts are being made to protect the environment, which is the main theme of energy development strategies for developed countries.

By contrast, in Hunan Province, which is in central part of the PRC, rapid economic development, in particular to speed up the process of industrialization, has not lead to a fundamental change in the traditional extensive economic development mode, and energy bottlenecks and environmental pollution problems are continuing to grow. Hunan is subject to a relative shortage of energy resources. At the same time, there is a large demand for energy consumption, which has brought a lot of environmental problems. As a consequence, Hunan urgently needed to explore sustainable strategies for energy saving and environmental protection.

This report has a number of significant practical applications, systems analysis and. It properly deals with the environment and energy issues of Hunan Province, which relates to the sustainability of economic growth of Hunan Province, and the ability for residents of Hunan Province to live and work in. The report also has a bearing on the healthy development of the whole society of Hunan Province.

At the same time, the energy saving and environmental protection issues of Hunan Province in the PRC, in particular in the central area, are representative and typical, and the results of the research of this report could promote to center and even the country in the future, energy saving and environmental protection strategy would
constitute important aspect of central of the PRC grow up strategy.

**Research Method**

1. Evaluation of strategies and policies for energy saving and environmental protection in connection with the economic development of Hunan Province, especially problems arising in implementation and their causes.

2. General assessment of past and present energy use with respect to energy efficiency, renewable energy sources, environmental protection in agriculture and cities, including transportation and other areas.

3. Assessment of potential of Hunan province in agriculture, tourism, energy and resources in national development planning.

4. Study of international experience: analysis of polices and plans applicable to Hunan province in previous and ongoing international projects on the one hand, and study and use of experience of polices of other countries on the other hand.

**Key findings of Research Literature and reference**

(I) Foreign documents:

1. *Kyoto Protocol (KP) of United Nations Framework Convention on Climate Change (UNFCCC), UN, 1998*

   Key word: quantified emission limitation and reduction of greenhouse gases, clean development mechanism, the principle of common but differentiated responsibility

   Main content

   (1) Each Party, in achieving its quantified emission limitation and reduction commitments under Article 3, in order to promote sustainable development, shall implement and/or further elaborate policies and measures in accordance with its national circumstances.

   (2) Specific measures include the enhancement of energy efficiency in relevant sectors of the national economy, protection and enhancement of sinks and reservoirs of greenhouse gases the promotion of sustainable forest management practices, afforestation and reforestation; the promotion of sustainable forms of agriculture in light of climate change considerations; research on, and promotion of, development and increased use of new and renewable forms of energy, of carbon dioxide sequestration technologies, and of advanced and innovative environmentally sound technologies, progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all greenhouse gas emitting sectors that run counter to the objective of the Convention and application of market instruments, encouragement of appropriate reforms in relevant sectors aimed at promoting policies and measures which limit or reduce emissions of greenhouse gases not controlled by the Montreal Protocol, measures to limit and/or reduce emissions of
greenhouse gases not controlled by the Montreal Protocol in the transport sector, limitation and/or reduction of methane emissions through recovery and use in waste management, as well as in the production, transport and distribution of energy and limitation or reduction of emissions of greenhouse gases from aviation and marine bunker fuels.

(3) The developed country Parties and other developed Parties shall achieve emission reduction objectives by means of joint implementation (JI), International Emissions Trading (ET) and clean development mechanism (CDM).


Key words: low-carbon economy, market failure, benefits and costs

Main theories and content:

(1) If we ignore environmental degradation caused by global warming, human beings will face a global economic crisis and recession similar to that of the 1930s. By the beginning of the next century, we may have experienced a 5% -20% loss of GDP worldwide due to global warming.

(2) Taking into account the physical impact of climate change on the economy, human life and the environment in decomposition method and make analysis with different techniques and strategies to reduce resource costs for emission of greenhouse gas; take advantage of economic models, including integrated assessment model for prediction of economic impacts of climate change and macroeconomic model indicating costs and benefits the change in of the overall economy to transform to low-carbon energy system; compare current level and the future development of "social cost of carbon " (cost affected per increased unit of emission of greenhouse gas) with a small amount of mitigation cost (cost per tapered off unit of emission).

(3) It is concluded that benefits will significantly outweigh costs when effective measures to mitigate climate change are taken by all countries in the world as early as possible.

(4) Polices of emission reduction shall be based on three essential elements:
   - carbon price,
   - technology policy,
   - elimination of barriers to behavior change.

3. State of the Union, Barrack Obama, Jan. 28, 2010

Key word: clean-energy economy, employment.

Main theories and content:

To address climate change and the global financial crisis, the U.S. will strive to develop clean-energy and a highly energy-efficient economy, enhance employment of
citizens and make the U.S. the world leader in the production of clean energy.

4. Documents of Climate Conference in Copenhagen, Dec., 2009
Key word: post-Kyoto protocol age, emission reduction targets.

Main theories and content: The PRC announced a target of 40-45% for carbon emission reduction by 2010.

(II) Chinese documents:
In recent years, with increasing industrialization and urbanization, Hunan Province has witnessed rapid economic growth and great achievements in various constructions, but has also paid a high price in terms of resources and the environment. As a result, the conflict between economic development and environmental resources has been increasingly intensified. Hunan Province is in relative shortage of energy resources but has a great demand for energy due to its high energy consumption. Therefore, many environmental problems, including energy bottlenecks and environmental pollution problems, are increasingly prominent. This situation is directly related to the irrational economic structure and the extensive mode of economic growth. If the structural adjustment and growth pattern transfer cannot be performed in time, society is destined to suffer from a lack of resources and deteriorating environment, and the economic development therefore would not be sustainable. Hunan Province can realize the sound and rapid economic development only by adhering to thrift, clean and safe development.

I Analysis of the Current Energy Situation in Hunan Province
Hunan Province is an energy input province and there is a big gap between supply and demand.

(I) Characteristics of Energy Resources
1. High-carbon energy resources are scarce, showing “shortage in coal, no oil and little gas” features. Coal resources in Hunan are limited and the quality of the coal is poor. Hunan has an annual output of around 40 million tons of coal in the long term. However, the per capita recoverable coal reserves are only 28.8% of the national average, and the per capita hold reserves are less than 1/6 of the national average. In addition, coal resources have an uneven distribution with the hold reserves in Chenzhou, Loudi, and Shaoyang accounting for more than 59% of the province's total quantity.

Coal resources development is difficult. Compared with the rest of the world and other provinces in the PRC, ecological exploitation conditions of coal resources are
poor in Hunan, and most of the reserves need underground mining. Bituminous and anthracite account for more than 98% of the coal production in Hunan. In addition, coal quality is poor, the calorific value is generally between 2500-5000 kcal, the quantity of ash is large, heat efficiency is low, and pollution is heavy. Moreover, there is no oil and little gas in Hunan Province with no industrial reserves of oil and natural gas available for extraction having been discovered. All the crude oil and the vast majority of natural gas need to be imported or transferred from other provinces, which means that there is a high dependence on imported resources.

2. Renewable energy is relatively prominent; hydropower, nuclear energy, wind energy, solar energy, and biomass energy take up the largest proportion. In Hunan, hydropower has large reserves, but is subject to strong seasonality. The province’s total water reserves are 15.3245 million kilowatts, accounting for 2.27% of the national total water reserves. From this, 10.8384 million kilowatts can be developed and used, accounting for 70.7% of the province’s water reserves and 2.88% of the national total development and utilization quantity. Each year runoff from April to July usually accounts for 50-70% of the annual total runoff, while the other eight months are low water seasons and the contribution of water to generate energy is limited.

Nuclear energy and mineral resources are abundant in Hunan with 26,000 tons of uranium having been proven to be in the province. The grade is high and the reserves are among the largest in the PRC with a certain degree of mining and refining capacity.

Total reserves of solar energy in Hunan equate to about 1.25 trillion kilowatts. This accounts for 1.7% of the country’s total reserves. The total reserves of 10-meter-high wind energy resources are 32.2203 million kilowatts. Wind energy resources are abundant mainly in the area around Dongting Lake, Xuefeng Mountain, southern Hunan and western Hunan Mountain.

(II) Characteristics of Energy Production

Due to constraints in natural resources, Hunan Province is dominated by coal power generation with support from hydropower in energy production. In addition, there is good potential for further development of new energy production, such as solar, biomass, wind, and nuclear energy.

1. Mainly coal production. Hunan produced a total of 51.122 million tons of standard coal from raw coal in 2007, accounting for 82.7% of the total energy production. In 2008, influenced by the financial crisis and natural disasters, such as floods, snow and ice calamity, the output decreased by a certain degree. Recently Datang, Huaneng, Huaian, Huarun and Hunan Investment Group built 12 large thermal power plants in Hunan Province. Datang Huayin Electric Power Co., Ltd. has an important role in Hunan power system. By March 2008, the company’s generating and installed capacity had reached 2289MW. Its installed capacity now accounts for
1/3 of the province’s total installed capacity, of which the installed capacity of thermal power accounts for nearly 70% of the province’s total installed capacity.

2. Hydropower production takes up a large proportion. In 2008 Hunan produced 11.3491 million tons of standard coal from hydropower, accounting for 20.85% of the total primary energy production. It is also significantly higher than national and Western developed countries’ levels.

A number of large hydropower stations, such as Fengtan, Dongjiang, Wuqiangxi, have recently been built. The total installed capacity of Fengtan Hydroelectric Power Plant is 400 thousand kilowatts. The average generating capacity designed for many years is 2.04 billion KWh. The total installed capacity of Dongjiang Power Plant is 609,000 kilowatts. The total installed capacity of Wuqiangxi Power Plant is 1.2 million kilowatts. By the end of 2008, developed water resources took up 93.9% of exploitable deposits of the hydropower economy in the whole province. Thus, the development potential has been very limited.

3. New energy is developing rapidly. Solar water heating is a mature renewable energy technology in Hunan Province. It has a high degree of marketization and a relatively complete industrial chain. It was the first renewable energy project that reached the scale of industrialization in Hunan Province. By the end of 2008, Hunan Province’s solar water heaters have had a hold volume of 1022.6 thousand square meters.

The PRC lists Hunan as one of the inland provinces seeing development of nuclear power as a priority. Recently, preliminary work by Taohuajiang Nuclear Power Project in Hunan was formally launched. No. 1 Unit of Taohuajiang Nuclear Power Project will be put into operation in 2015. Once all four units have been built and put into operation, the annual capacity is predicted to reach 28 billion degrees.

In 2008, a total of 27.2 million KWh of wind power was generated. In 2009, initial investment in the wind power industry exceeded CNY1.2 billion. Yang Tianhu Wind Farm in Chenzhou City is expected to be put to use in December 2009. Annual generation capacity is expected to reach 77.44 million KWh following the completion of the project.

Remarkable results have also been achieved in the development and application of biomass energy. By the end of 2008, the province’s total rural production of high quality biogas had reached 905.4177 million cubic meters, while the production of straw gasification gas totaled 2.2341 million cubic meters. Moreover, relevant industrial clusters of new energy automotives have been formed in Hunan, with the electric automobile power as the drive and AC drive control system and key components as the core. It is expected that by 2012 Hunan CSR Times Electric Vehicle Co., Ltd. (CTEV) will realize an annual sales scale of more than 1000 vehicles, more than 10000 sets of electric drive systems, more than 20000 key components, and more than CNY10 billion of annual sales income to become the
PRC’s largest specialized R & D and manufacturing base of electric vehicles.

4. There is a big gap in energy supply. In 2008, the per capita energy production of Hunan province stood at 0.88 tons of standard coal, far less than that of the whole nation, i.e. less than 50% of national level. Likewise, energy generated per capita was 1,320.96KWh, which is also much below the national level. As a whole, the energy production of Hunan province remains at the lower-middle level in the whole country, and per capita energy production is appropriately equivalent to half of the national mean level.

In 2008, there was a deficiency of up to 50.83 million tons of standard coal in energy supply. This reflects an increase of 18.53 million tons of standard coal since 2005, or a rate increase of 16.31% annually. Moreover:

- 76.57 TWH power was purchased in Hunan province, 48.79 TWH more than in 2005, representing a rate of increase of 40.2% annually.
- 40.1735 million tons of coal was imported, increasing by 21.7524 million tons, or at the rate of 29.7% annually.
- 9.305 million tons oil is imported, increasing by 0.7246 million tons.

Meanwhile, 823 cubic meters gas is transported in Hunan province, increasing by 7.23, at the rate of 101.89%. 40% of the energy needed by Hunan's economic development and residents’ consumption therefore need to be supplied by other provinces.

(III) Characteristics of Energy Consumption

1. Energy consumption's over-reliance on coal. In 2008, the total energy consumption of Hunan Province was 113.554 million tons of standard coal, and energy consumption sort was mainly coal, oil, and electricity. Amongst them, coal products fuel consumption reached 82.4098 million tons of standard coal, accounting for 72.57% of society’s total consumption. At the same time, fuel oil consumption reached 13.3994 million tons of standard coal, accounting for 11.8% of total consumption, hydropower consumption equaled 11.3491 million tons of standard coal, accounting for 9.9%, and natural gas consumption was 10.946 million tons of standard coal, accounting for 0.96% of total consumption (See Figure Subreport 3-1).
2. Energy consumption is concentrated within industry and within a few industry segments. With regards to the energy consumption structure, industry, in particular the secondary industry, is the biggest consumer of energy in Hunan province (See Table Subreport 3-1). In 2008, industry (primary, secondary, tertiary industry and living energy consumption) consumed 5.5587, 81.343, 15.0962 and 11.7648 million tons of standard coal, respectively, which, in turn, accounted for 4.89%, 71.45%, 13.29% and 10.36% of the gross consumption of the whole society. In the secondary industry, industrial energy consumption was 79.7836 million tons of standard coal, accounting for 98.33% of total industrial consumption, and 70.26% of society’s gross consumption.

Since 2005, the proportion of energy consumed by Hunan Province’s primary industry has decreased from 5.23% in 2005 to 4.89% in 2008, whilst the energy consumed by the secondary industry has stayed at 71%, and that of the tertiary industry has risen from 12.71% in 2005 to 13.29% in 2008. In addition, living energy consumption has decreased, mainly due to the reduced coal consumption and a rapid increase of consumption of high quality and high efficiency energy, such as electric power, LPG and other gas fuels, which are enable improvement of utilization efficiency of terminal energy and decreased of increment of demands.

In Hunan province, energy consumption in light and heavy industry is not balanced, with heavy industry taking up a larger proportion of overall consumption. Using the equivalent value, in 2008, industrial energy consumption was 79.7836 million tons of standard coal, 72.309 million tons of which was consumed by heavy industry. This accounted for 90.63% of gross industrial energy consumption and 63.67% of the whole society consumption. Within the gross industrial energy consumption, the eight key energy-intensive industry sectors, including ferrous metal smelting and rolling processing industry, non-metallic mineral production, manufacturing of chemical materials and chemical products, power, heat production
and supply, non-ferrous metal smelting and rolling processing industry, petroleum processing, refining, coking and nuclear fuel processing industry, coal mining, washing and screening, paper-making and paper production industry, accounted for around 84% of the total.

Table Subreport 3-1 Structure of Energy Consumption in Hunan Province (%)

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy consumption formation</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>By industry: the primary industry</td>
<td>5.23</td>
<td>4.97</td>
<td>4.86</td>
<td>4.89</td>
</tr>
<tr>
<td>the secondary industry</td>
<td>71.58</td>
<td>71.75</td>
<td>71.69</td>
<td>71.45</td>
</tr>
<tr>
<td>the tertiary industry</td>
<td>12.71</td>
<td>12.56</td>
<td>12.85</td>
<td>13.29</td>
</tr>
<tr>
<td>Living consumption</td>
<td>10.48</td>
<td>10.72</td>
<td>10.59</td>
<td>10.36</td>
</tr>
<tr>
<td>By department: Agriculture</td>
<td>5.23</td>
<td>4.97</td>
<td>4.86</td>
<td>4.89</td>
</tr>
<tr>
<td>Industry</td>
<td>70.23</td>
<td>70.45</td>
<td>70.44</td>
<td>70.26</td>
</tr>
<tr>
<td>Construction</td>
<td>1.25</td>
<td>1.3</td>
<td>1.26</td>
<td>1.19</td>
</tr>
<tr>
<td>Transportation, warehousing and post industry</td>
<td>7.14</td>
<td>6.96</td>
<td>7.03</td>
<td>6.13</td>
</tr>
<tr>
<td>Wholesale and retail trade, lodging and catering services</td>
<td>4.3</td>
<td>4.26</td>
<td>4.29</td>
<td>4.41</td>
</tr>
<tr>
<td>Others</td>
<td>1.26</td>
<td>1.35</td>
<td>1.53</td>
<td>2.75</td>
</tr>
<tr>
<td>Living consumption</td>
<td>10.48</td>
<td>10.72</td>
<td>10.59</td>
<td>10.36</td>
</tr>
</tbody>
</table>

Source: Hunan Bureau of Statistics.

(IV) Characteristics of Energy Saving and Consumption Reduction

In accordance with national requirements, Hunan Province’s “Eleventh Five-Year” Plan proposes that, by 2010, the province’s CNY 10-thousand GDP energy consumption will fall by 20% based on 2005 levels, and that the CNY 10-thousand added value energy consumption of the scale industry will fall by 25%. The energy consumption base number of Hunan Province in 2005 was as follows: CNY 10-thousand GDP energy consumption was 1.40 million tons of standard coal, and CNY 10-thousand added value energy consumption of the scale industry was 2.88 million tons of standard coal.

In 2008, Hunan made positive progress in saving energy and reducing the consumption of energy. Initially determined by the State Statistics Bureau, the CNY10-thousand GDP energy consumption of Hunan Province in 2008 fell by 6.72% compared with 2007. The CNY ten-thousand added value energy consumption of the scale industry fell by 11.84% compared with 2007, exceeding the annual energy saving target. The reduction rate of the CNY10-thousand GDP energy consumption has in fact met 168% of the annual target, and the CNY10-thousand added value energy consumption of the scale industry has met 236.8% of the annual target.

From 2006 to 2008 Hunan already met 66.9% of the “Eleventh Five-Year” CNY10-thousand GDP energy consumption reduction target(See Table Subreport 3-2).
The following features are important for this:

1. Growth in energy consumption is slower than growth in GDP; the energy utilization level has been continuously increased.

2. From the point of view of industry consumption structure, energy consumption intensity of the main energy consumption sectors continues to drop.

3. From the point of view of consumption structure of energy end products, the proportion of fossil energy consumption, especially coal consumption, has declined.

4. From the point of view of energy processing and conversion, efficiency has been improved.

5. From the point of view of the energy consumption elasticity coefficient, the level of energy utilization has been upgraded.

Table Subreport 3-2  Hunan Energy Conservation and Consumption Reduction in the 11th Five-year

<table>
<thead>
<tr>
<th>Year</th>
<th>CNY10-thousand Energy Consumption (Ton Standard Coal)</th>
<th>Decreasing rate compared with the previous year (%)</th>
<th>CNY10-thousand Increment of Energy Consumption in Scale Industry (Ton Standard Coal)</th>
<th>Decreasing rate compared with the previous Year (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1.40</td>
<td></td>
<td>2.88</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>1.352</td>
<td>3.39</td>
<td>2.74</td>
<td>4.48</td>
</tr>
<tr>
<td>2007</td>
<td>1.29</td>
<td>4.43</td>
<td>2.51</td>
<td>7.99</td>
</tr>
<tr>
<td>2008</td>
<td>1.204</td>
<td>6.72</td>
<td>1.98</td>
<td>11.8</td>
</tr>
</tbody>
</table>

Source: Hunan Energy Conservation Office

II The Analysis of the Current Situation of Environmental Protection in Hunan Province

The contradiction between rapid economic and social development and restrictions on population and resources is becoming increasingly conspicuous. More potential environmental hazards have been caused been by irresponsible (or unsustainable) resource management. In particular, the mining and utilization of large amounts of fossil energy, such as carbon, greatly influenced the environment so that multiple total pollutant emissions have ranked amongst the top in the PRC, and in some regions, environmental capacity has reached saturation point. The task of pollution prevention and cure in the main regions remains arduous. The eco-environment of some regions has been damaged to a varying extent, natural disasters are frequent, and the condition of the whole province remains tough.

1. The ecological environment remains stable in general, but global warming tends to accelerate. By the end of 2008, 60 national ecological demonstration areas had been approved for establishment in Hunan Province. In total, 105 natural reserves
of different grade and different types have been established, covering an area of 1.194 million hectares and accounting for 5.64% of the whole province. Amongst them there are 14 national reserves with a total area of 473,000 hectares, 31 provincial reserves covering an area of 446,000 hectares, and 60 municipal and county reserves covering and area of 275,000 hectares. According to the Climate Center of Hunan Province, the annual average temperature of the province has increased by 0.14℃ per decade since 1961. At the same time, high temperature and heat, heavy rain and snow, as well as freezing and dust tornadoes, which are affecting Hunan province, and other kinds of extreme weather conditions have sounded the alarm on global warming.

2. **The atmospheric environment is stable, but acid rain pollution is serious.**

In 2008, the total emission of industrial waste gas in Hunan Province was 924,860,000,000 cubic meters. The emission of sulfur dioxide was 840,100 tons, a 7.1% drop from the previous year. Smoke dust was 377,700 tons, reflecting a 14.8% drop from the previous year, and industrial smoke dust was 554,700 tons, reflecting a 15.8% drop from the previous year. The ambient air quality has improved for the whole province. The ambient air quality of 10 out of 14 cities in Hunan Province reached the 2nd grade standard of the state. This proportion has increased from 50.0% to 71.4%. Inhalable particles and sulfur dioxide were the main pollutants.

The range for 14 cities shown in the comprehensive pollution index was from 1.342 to 2.737, with an average value of 2.056, a modest decrease compared to the previous year (0.072). These 14 cities in Hunan Province have been polluted by acid rain to a varying degree, but the frequency of heavy acid rain (pH≤4.5) decreased a little. The average annual pH value of rainfall lies between 3.99 and 6.10, and the frequency of acid rain throughout the province amounted to 64.5%, 0.8% higher than the previous year. See Table Subreport 3-3.

### Table Subreport 3-3 Comparison of Emissions of Waste Gas Pollutants in 2007 and 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Sulfur Dioxide (Ten Thousand Tons)</th>
<th>Smoke Dust (Ten Thousand Tons)</th>
<th>Industrial Smoke Dust (Ten Thousand Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Emission</td>
<td>Industrial</td>
<td>Domestic</td>
</tr>
<tr>
<td>2007</td>
<td>90.43</td>
<td>73.94</td>
<td>16.49</td>
</tr>
<tr>
<td>2008</td>
<td>84.01</td>
<td>67.48</td>
<td>16.54</td>
</tr>
<tr>
<td>Increase or Decrease Rate (%)</td>
<td>-7.1</td>
<td>-8.7</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Source: Environment Protection Bureau of Hunan Province.

3. **The water environment is stable, but water pollution remains widespread.**
In 2008, the total amount of wastewater discharged in Hunan Province was 25.03 hundred million tons, 0.7% less than the previous year, of which, industrial wastewater discharge was 9.23 hundred million tons, 7.8% less than the previous year, and domestic sewage was 15.80 hundred million tons, 3.9% higher than the previous year. Overall, domestic sewage accounted for about 63.1% of total discharge amount of wastewater (See Table Subreport 3-4).

The chemical oxygen demand (COD) discharge in wastewater was 884,600 tons, 2.1% less than the previous year. The COD discharge in industrial waste water was 237,200 tons, 7.8% less than the previous year. The COD discharge in domestic wastewater was 647,400 tons, 0.2% higher than the previous year. Pollutants discharge of ammonia nitrogen, petroleum, cyanide and heavy metal pollutant in industrial wastewater were lower than the previous year, in particular the discharge amount of lead and chromium (VI) was significantly reduced (See Table Subreport 3-4).

There is still widespread water pollution in Hunan Province, especially the water quality of some rivers passing through towns and industrial areas are polluted to a varying extent. Near-shore pollution belts are not under efficient control and an immediate threat is posed to urban water sources. In 2008, only 3 out of 96, (or 3.1%) of the water quality monitoring sections in Hunan Province were rated I class. 39 monitoring sections (40.6%) of water quality were rated II class, 41 monitoring sections (42.7%) of water quality were rated III class, 6 monitoring sections (6.3%) of water quality sections were rated IV class, 1 monitoring section (1%) of water quality sections was rated V class, and 6 monitoring sections (6.3%) were rated class IV contamination (See Figure Subreport 3-2).

4. The rate of multipurpose utilization of industrial solid waste has been improved, but the output and emission of hazardous waste is increasing. In 2008, 45.1963 million tons of industrial solid waste was produced in Hunan province, decreasing by 0.9% including 548,600 tons hazardous waste produced, increasing by 21.4% over the previous year.

A total of 36.3279 million tons of industrial solid wastes were put to multipurpose use in the whole province, reaching a utilization rate of 78.87%, 4.61% higher than the previous year. The amount of emissions of industrial solid waste for the whole province was 290,200 tons, decreasing by 8.7% The emission of hazardous waste was 711 tons, 24 tons less than the last year.

In addition, the Xiangjiang River basin suffers heavy metal pollution in Hunan province.
### Table Subreport 3-4  Comparison of Waste Water and Pollutant Release in 2007 and 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Waste Water (One Hundred Million Tons)</th>
<th>Chemical Oxygen Demand (Ten Thousand Tons)</th>
<th>Ammonia Nitrogen (Ten Thousand Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Amount</td>
<td>Industrial</td>
<td>Domestic</td>
</tr>
<tr>
<td>2007</td>
<td>25.21</td>
<td>10.01</td>
<td>15.20</td>
</tr>
<tr>
<td>2008</td>
<td>25.03</td>
<td>9.23</td>
<td>15.80</td>
</tr>
</tbody>
</table>

Increase or Decrease Rate (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Petroleum</th>
<th>Cyanide</th>
<th>Volatile Phenol</th>
<th>Mercury</th>
<th>Cadmium</th>
<th>Chromium (VI)</th>
<th>Lead</th>
<th>Arsenic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007(Ton)</td>
<td>858.30</td>
<td>44.70</td>
<td>74.72</td>
<td>0.67</td>
<td>16.40</td>
<td>7.56</td>
<td>49.86</td>
<td>70.40</td>
</tr>
<tr>
<td>2008(Ton)</td>
<td>747.64</td>
<td>39.47</td>
<td>71.36</td>
<td>0.65</td>
<td>15.38</td>
<td>6.06</td>
<td>40.52</td>
<td>66.34</td>
</tr>
</tbody>
</table>

Increase or Decrease Rate(%) -12.8 -11.7 -4.5 -3.0 -6.2 -19.8 -18.7 -5.8

Source: Environment Protection Bureau of Hunan Province

### Figure Subreport 3-2  Water Quality Class of Control Section in Hunan Province, 2008

Source: Environment Protection Bureau of Hunan Province

### III The Evaluation of Current Energy Conservation and Environmental Protection Policy in Hunan

(I) The Main Content of Current Energy Conservation and Environmental Protection Policy in Hunan
Since implementation of the Environmental Protection Law began in 1979, the Chinese government has been incorporating energy conservation into the national economic plan. In the 1990s, the Chinese government further concretized the policies and formulated the Energy Conservation Law of the People’s Republic of China, as well as some related regulations and policies to make energy conservation a basic national policy and a long-term strategy for national economic development. At the beginning of the 21st century, the central government further strengthened the implementation of energy conservation and emission reduction, assigned the energy consumption reduction targets to the provinces and required them to sign the responsibility documents of energy conservation target. The circular economy law was passed in August 2008.

According to national energy conservation and environmental protection laws and regulations, and taking the situation of Hunan Province into consideration, Hunan Government enacts local laws and regulations and adopts environmental protection policies and measures based on the energy and environmental characteristics and major problems of Hunan Province. Suggestions on Vigorously developing Circular economy, build a resource-saving and environment-friendly society published by Hunan Communist Party Committee and Hunan Provincial Government in 2006. Environmental Protection Act in Hunan Province” Method of Implementation of the Prevention and Cure of Air Pollution in Hunan Province (modified)”, and “Regulations of the use of new-type wall materials in Hunan Province”, were published by Hunan Provincial People's Congress, together with the first local laws and regulations for rural renewable resources: “Rural Renewable Resources Regulations in Hunan Province”.

The “Eleventh Five-Year Plan” Special Plan for Energy Saving, the “Eleventh Five-Year Plan” Special Plan for Environmental Protection, the “Eleventh Five-Year Plan” Special Plan for Comprehensive Utilization of Resources, the Development Outline of “Eleventh Five-Year Plan” in Developing a Circular Economy, the “Eleventh Five-Year Plan” Special Plan for Water-saving Society Construction, and the Three Years Action Plan for Environmental Protection (2005-2007) were formulated by Hunan Provincial Government. The main contents of these policies can be summarized in the following aspects:

1. The construction of key energy conservation projects. A special yearly fund of CNY60 million has been established for energy conservation and emissions reduction (30 million each for energy conservation and emission reduction) to build promotional energy conservation systems in Hunan Province. The projects with annual energy savings of 5,000 to 10,000 tons of standard coal receive incentives according to the energy saving. (Those projects with an annual energy saving up to 10,000 tons of standard coal can also apply for a national award).

Since then, ten important energy conservation projects as well as projects to
improve the energy conservation of main energy consuming enterprises have been carried forward. In 2008, a total of 218 energy saving projects received support from the provincial energy saving fund. It is estimated that after its establishment an annual energy saving of over 1 million tons of standard coal could be achieved. It will also strengthen the analysis and supervision of energy utilization of main energy consuming enterprises.

In addition to cooperation with the central government in the “One Thousand Enterprises Energy Saving Action”, which aims to improve the energy conservation management of 28 main energy enterprises in Hunan, “One Hundred Enterprises Energy Saving Action” was organized and developed in the whole province. “One Thousand Enterprises” and “One Hundred Enterprises” were set up to carry out energy audit, to formulate energy saving plans, and to organize benchmarking activities for efficiency levels, in order to improve energy management levels of the main energy consuming enterprises.

During renovating activities in paper enterprises around the Dongting Lake, 234 paper enterprises were closed down. The phased renovation target was fulfilled with annual energy conservation of 400,000 tons of standard coal. The “Special Action Plan against Pollution of Paper Enterprises” in Hunan was printed and distributed and consequently forced 596 paper enterprises outside the Dongting lake areas to be closed down and to carry out renovation. Comprehensive renovation in the Xiangjiang river basin was also carried out and a set of high energy consuming and high pollutant enterprises were closed down. Based on charging differential electricity prices from high energy consuming enterprises in 2004, since 2007 three lists concerning 666 enterprises, which would be charged differential electricity prices, have been published, effectively restraining the blind development of high energy consuming industry. By the end of 2008, 1,084,000-kw small scale thermal power units had been closed down and 10 million tons of cement capacity had been eliminated for backwardness.

2. Concentrating on main pollutants emission reduction. “Main Pollutants Total Amount Reduction Plan in Hunan Province (2008-2010)”, published by the government, demands that municipal governments and key enterprises carry the responsibility for pollutant reduction during the last three years of “Eleventh Five-year”. The “Methods of Assessment of Main Pollutants Total Amount Reduction during the “Eleventh Five-year” in Hunan Province” was published to support emission reduction policies, strengthen the publicity of emission reduction, and to concentrate on monitoring the emission reduction projects. 433 sulfur dioxide reduction projects, 469 COD reduction projects, 20 arsenic reduction projects, and 21 cadmium reduction projects were completed in 2008.

Focus has been on the prevention and cure of water pollution to solve the problem of “Benefiting from water, also suffering from water”. The “Plan of
Comprehensive Improvement of Pollution of Xiangjiang River” has also been published. In this the provincial government demands to solve Xiangjiang water pollution problems within 3 years by emphasizing on structural emission reduction to reduce pollution at source and focusing on project emission reduction to speed up the pace of prevention and control of pollution at source.

Moreover, a three-year plan to construct sewage treatment equipment in towns has been set up. In this the provincial government requires 113 sewage treatment works to be set up by 2010, making sure all provincial cities and counties built with sewage treatment equipment. At the end of 2008, 26 sewage treatment works had been put into operation, which increased the sewage treatment capability in municipal cities to 600,000 tons/day. This increased sewage treatment rates in municipal cities to 52%. In addition, 17 treatment facilities for non-hazardous urban domestic waste were built, which raised treatment capability to 9,030 tons, and the non-hazardous treatment rate of urban domestic waste reached 59.5%.

3. Active development of a circular economy. The construction of 6 state primary and secondary circular economic experiment units was promoted. Related policies for circular economic development, supporting Poluo’s renewable resource terminal market and Yongxing’s renewable resource industrial park, have been put forward successively. The first circular economic experiment pilot project was established in this province, which decided that the circular economic experiment would be developed in 17 enterprises and 7 parks, supporting the construction of experiment units in the main project. Recycling economic meetings with the petrochemical industry and building material industry have been held separately to guide key industries and key enterprises on how to promote the circular economy in a comprehensive way. Furthermore, the implementation of favorable taxation policies and the promotion of more comprehensive utilization of resources were carried out. Another focus has been on the promotion of clean production methods in the paper making industry and textile industry.

4. Strengthening the environment controls system of construction projects.
“Methods for Administration of Environmental Protection of Construction Projects in Hunan Province”, clarified the enforcement regulations of environmental impact assessment systems. It further stipulated that the regulation of “first approval power” of environmental protection should be carried out strictly, that the environmental impact assessment authority should be further standardized, and that “heavy energy consumption, heavy pollution and resource-related” projects should be strictly restrained.

In 2008, 235 reports on environmental impact assessment were examined. More than 20 projects, listed as disqualified energy production capacity, were rejected, and 9 built projects without approvals were administratively punished. The focus was on monitoring the construction of newly built projects such as paper-making and
smelting industries. In 2008, 64 projects directly under the management of the Provincial authorities were completed for the inspection and approval of their environmental performance. 18 unqualified projects were not accepted or continue as trial production.

The creative “Three Simultaneous” margin system was established. Under this, projects with the greatest environmental impact are required to submit a margin, i.e. 5-20% of investment, in environmental protection facilities, to make sure the implementation of “Three Simultaneous”. In 2008 CNY93.39 million from “Three Simultaneous” margin projects were collected for 91 projects in Hunan Province.

5. Implementation of the pollution discharge levy system and discharge permit system. The pollution discharge levy is a system aimed at collecting funds for pollution control as per the “polluter-pays” principle. Under this system, the polluter discharging pollutants or discharging pollutants above legal discharge standard will be levied according to the types, quantities and density of the discharge. In 2007 the total amount of pollution discharge levy was 524 million, increasing by 2.67 million, or 103.9%, compared with 2004.

The discharge permit system is founded on the theory of “utilizing environmental capacity resources with compensation”. The system is based on controlling the total pollutants, and defining the permitted types, quantities of the discharged and where it can be discharged. In 2007, 5,766 enterprises obtained discharge permits, with 6,682 of permits issued in total.

(II) Major Problems Exist within Current Energy Conservation and Environmental Protection Policy

In recent years, despite Hunan having made active progress in energy conservation and environmental protection, these are only short-term results in terms of relieving the pressure of energy conservation and environmental protection, and the present situation of energy conservation and environmental protection in Hunan remains very challenging. Especially, many problems still exist within the policy framework.

1. Unsound input mechanism. First, no input growth mechanism exists. Many local governments are achieving fast economic growth but are paying no attention to energy conservation and environmental protection. Environmental investment depends on the decision of leaders but energy conservation and environmental protection lacks guarantees from institutions and standardization.

Second, single investment and financing channels cause significant financial gaps. Take environmental protection as an example: investment mainly comes from financial input, for example, from pollution discharge charges returned as subsidies to enterprises and from environmental investment of “three simultaneous” pollution enterprises. According to the requirement of the environmental protection mission in
11FYP, about 1.35% of the GDP of the period shall be invested to protect the environment in order to realize the environmental protection goal of 11FYP. Based on this, the required environmental investment is therefore about CNY1.25 billion annually during 11FYP period. However, in 2007 the total amount of pollution discharge levy was only CNY524 million in Hunan. Simply relying on input from government revenue and polluting enterprises will therefore lead to a large financial gap.

2. Policy relying on administrative measures, neglecting market-based instruments. A number of policies and measures were based on traditional plans and administrative control of the government, but market-based instruments and economic levers were seldom used. The corresponding policies of environmental charges, emissions trading, ecological compensation, green taxation, green credit and green trade policies were not effectively implemented and there was a lack of necessary incentive measures for emission reduction and pollution treatment.

Firstly, the standard charge for pollution discharge does not reflect the scarcity of environmental resources and the pollution discharge fee actually paid by polluters is far below the pollution loss. According to estimates by relevant departments, the PRC’s standard charge for pollution discharge is about 50% of the operational costs of pollution treatment facilities and the pollution discharge fee of some projects is even less than 10% of the operational costs of pollution treatment facilities. Take sewage treatment as an example. As estimated, 3,000 sewage treatment plants in the PRC will be built by the end of the 11th Five Year Plan period. If we take a treatment rate of 50 billion cubic meters couple with treatment costs of CNY1.5 per ton, actual treatment cost should be CNY75 billion. However the scale of sewage treatment charges is only CNY4-5 billion. As a consequence this might result in enterprises exceeding the pollution emission standard rather than applying pollution treatment.

Secondly, the discharge permit system lacks corresponding policies. The discharge permit system is based on the current situation of pollution, exert total control on key pollution source emission by environmental resource capacity, while large quantity of non-key pollution sources remain uncontrolled, which is unfavorable for overall environmental protection. As to the buying and selling of discharge permits, there is a lack of emission trading - related policies. These results in enterprises discharging pollutant according to the discharge capacity set in their initial discharge permit, rather than make efforts to improve technology and reduce emission. In addition, relevant policies must be improved and the method of obtaining discharge permits for newly built, rebuilt and expanded enterprises must be clarified. The conformity of content, expiration and payable use period of environmental resources in permits must be ensured.

Thirdly, incentive measures for renewable energy are limited under the current technology and policy framework. Apart from hydropower and solar water heaters,
which are competitive in the market, most renewable energy lacks competitiveness due to high cost of exploitation, scattered resources, and small-scale, discontinued production and so on. Therefore, further policy support and incentives are required. At present, the policy framework to support renewable energy, such as wind power, biomass energy and solar energy is incomplete and economic incentives are weak. There is also poor coordination between related policies and unsteady policies, which means that an effective system to support the sustainable development of renewable energy has not been established yet.

3. Lack of authority of laws and regulations. Unlike other laws, such as criminal laws, energy conservation and environmental protection-related laws are considered “soft law” by the public. This is because there is an over-emphasis on using legislation but little emphasis on the enforcement of the law. The number of general clauses is big, for example, while the number of definite, mandatory clauses is small, and the number of prohibited, punitive, incentive measures is even smaller. Therefore the operability of Hunan energy conservation and environmental protection laws and regulations, measures and systems is less powerful. In addition, the level of standardization, programming, and institutionalization of the enforcement action is low.

The situation of “the cost of compliance is high, while the cost of non-compliance is low” in the fields of environmental protection and energy conservation has existed for a while. The law-abiding enterprises pay a lot to purchase new equipments, improve techniques and train staff, while only a small sum of money is paid by unlawful enterprises to continue production. Law-abiding enterprises are psychologically unbalanced, and unlawful enterprises are taking a chance. This will impact on the efficiency of laws as well as the realization of the goal of energy conservation and emission reduction. In the end, people cannot enjoy the fresh air and blue sky.

IV Challenges and Opportunities in Hunan Energy Conservation and Environmental Protection

(I) Challenges

Although Hunan Province has met most indices of energy conservation and consumption reduction as reducing main pollutant emissions of the “Eleventh Five-year” Plan, these indices were short-term. In the long-term, great challenges are still ahead for Hunan Energy Conservation and Consumption Reduction.

1. Economic booming leads to more intensive conflicts between energy supply and demand. History in other countries shows that rapid economic and social development of the PRC and Hunan will be linked with, rapid increases in energy consumption. The accelerating process of Hunan industrialization and urbanization
coupled with the escalation of people’s living standard, will lead to more intense conflicts between energy supply and demand.

According to statistics, a 1% growth in GDP in Hunan Province will mean a 0.3% increase in coal demand. The annual growth of coal demand will be more than 1,700,000 tons, which is estimated based on an annual growth in GDP of 9%. Based on developments in recent years, the provincial coal self-sufficiency rate is less than 79%, the coke self-sufficiency rate is less than 52%, and the steam coal self-sufficiency rate is about 40%. Moreover, the hard gap of coal is growing larger and larger, and as a result, energy production fails to meet energy demand. In the future, with continuous growth of the economy, the total energy demand could remain at a high level for the long term, and the gap between energy supply and demand could grow even larger.

2. “Heavy Chemical Industrialization” of industrial structure leads to high energy consumption and high pollution. Hunan is at a middle stage of industrialization and also at the rapid development stage for the heavy chemical industry. During the coming 5 to 10 years, rapid development of either category or industry size of heavy chemical industry is unavoidable. It would be difficult to change the heavy chemical industry-centered industrial structure in the short term, or to upgrade the technical reform. Energy consumed by the secondary industry accounts for over 70% of the provincial energy consumption, of which the high energy consuming industries such as steel, nonferrous, chemical, building material, petrochemical and electricity etc. account for 80% of the whole industrial energy consumption. Since this reflects 56% of the provincial’s energy consumption, it will become the main reason for the increasing energy demand and high energy consumption of the province.

In the first half of 2009, investment for newly started projects in cities and towns for steel, building materials, petrochemical products and nonferrous of high energy consuming industries increased by 176.9%, 116.0%, 88.4% and 84.9%, respectively. In the building projects in cities and towns, the investment in building materials, nonferrous and petrochemical industries increased by 74.9%, 34.3% and 25.7%, respectively. Direct consumption of coal caused less efficient energy use and serious pollution to the environment.

Nonferrous, petrochemical, steel, paper-making and cement, which are classified as high emission industries, made up a fair proportions of the industrial structure of Hunan. People had a weak consciousness of environmental protection during the past years and environmental protection policies were not effectively implemented. Many historic problems still exist, and structural pollution has become more noticeable. As a province of nonferrous metal, many small scale smelting plants and mines are situated in Hunan, whose low technology could result in a waste of resources and serious environmental problems.
3. Relatively poorness, laggard technology, and insufficient investment cause great pressure on energy conservation and environmental protection. Hunan, as a moderately developing region in the developing country- the PRC, is facing much more difficulties than developed countries in energy conservation and environmental protection.

Firstly, the tasks of economic development, elimination of poverty and safeguarding people's livelihood are arduous. For a long time into the future, Hunan revenue will be mainly used to upkeep people's livelihood. However, revenue has been just 100 billion, due to limited financial capacity, the capital bottlenecks of energy conservation and environmental protection will exist for a long time.

Secondly, Hunan energy technology is relatively behind compared with developed countries, therefore, it will be very difficult to realize the technical reform and industrial transition. As a consequence, the province is under great pressure with regards to energy conservation and environmental protection. For instance, the emission intensity of pollutants in one GDP unit is far above the national average level, In addition, the emission reduction rate of the main pollutants, the treatment rate of domestic sewage in towns, the standard pollution fee and environmental investments are all below the national average., The differences are even greater for developed littoral provinces like Jiangsu, Zhejiang, and Guangdong.

(II) Opportunities

1. A green wave themed as a new energy revolution and the low carbon economy is sweeping the whole world. The financial crisis has accelerated technological innovation and application so that every country is seeking for new growth points to activate the economy. Therefore, developed countries represented by the U.S. have started initiating an overstepping multi-industrial new technology revolution and a new industrial revolution driven by energy. Within the context of global warming reducing carbon emissions is the common choice for every country. Promoting the clean development mechanism (CDM) and developing a low-carbon economy is exerting an influence on the development of all economies through the regulation and direction of rules of international trade.

Since the beginning of the Industrial Revolution, modern industrial civilization of the developed countries has caused the increasing concentration of carbon dioxide (CO₂) in the air, which results in a global warming. In December 1997, 149 countries and regions signed the legally binding Kyoto Protocol within the UN framework, in which CO₂ emissions are allocated globally. No detailed emission reduction or emission restriction duties are set out in the document for developing countries, but 3 flexible mechanisms of emission reduction are provided. As a consequence, markets for carbon trading, low carbon products and low carbon services expanded rapidly and have a very bright future. Furthermore, the publication of the Stern Report in 2006 drew the attention of global policy-making bodies and
governments to the impact of climate change on the social economy. Since then it has become a common understanding that the global economy should develop into a low carbon, high efficiency and energy conservation economy.

At present, major nations are making or adjusting their respective energy conservation strategies. US president-elect Barack Obama chose energy as the very core of his administration and the axis of the economic structure. In June 2009, the United States House of Representatives passed The American Clean Energy and Security Act which developed the plan for promoting the green economy and new energy as a national strategy. Within ten years, US$150 billion are planned to be invested to support development of clean energy technology and a low carbon economy, to lift the country out of the economic slump, to seize the commanding height of new energy, and to secure its overlord ship in the world. The EU has also declared that Euro 105 billion will be invested to support the “green economy” by 2013. The money will be used for environmental protection projects as well as relevant employment projects. Euro 54 billion of this will be used to help EU member countries to implement EU environmental protection laws and Euro 28 billion will be used to improve water quality and waste handling and management.

In December, 2009, leaders of over 100 countries and chiefs of the UN and its specific institutions and other international organizations took part in the Climate Conference in Copenhagen, showing how concerned the international community is about global warming and how strong they are willing to strengthen cooperation and meet challenges together in politics. Thanks to concerted efforts of all parties, great achievements have been made during the conference: First, participants stood up for the principle of common but differentiated responsibilities defined in United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol (KP). Second, a new firm step in implementing compulsory emission reduction in developed countries and taking self-mitigation actions in developing countries was taken. Third, extensive agreement was reached on areas, including the global long-term targets, capital and technological support and transparency.

Based on development trends of the global low carbon economy and the studies of experts, the Kyoto Protocol might become the third general principle, which regulates the global development. If the Charter of the United Nations is the rule of the agricultural civilization based on land as the main resource, WTO and GATT are the rule of industrial civilization based on breaking through land as the main resource and using market rules, then Kyoto Protocol might be the rule of the ecological civilization based on a low carbon economy, and it may lead the future development of global economy.

In the development of a new energy driven technological and industrial revolution, the PRC will increase its investment in line with the new wave of technological revolution for developing new energy in the world. Therefore, Hunan
must catch up with the opportunity by making all efforts to develop new energy, looking for alternative energy and taking full advantage of and developing new clean and renewable energy in Hunan province, such as biogas, biomass energy, solar energy and wind energy.

2. **Energy saving and environmental protection is an important measure in responding to the current international financial crisis for the PRC and a long-term strategy for post-financial crisis economic development.** Responding to the international financial crisis, ten expanding domestic demand-related measures were put forward at the end of 2008. CNY4,000 billion will be invested in total, CNY350 billion of which will be used for the construction of the eco-environment. The State Environmental Protection Agency announced that three years from now, CNY1,000 billion would be raised to protect the environment. This will be used for the development of new energy and renewable energy, energy-saving, water-saving, material-saving, pollution control, and, in particular, the development of nuclear power, wind power and solar power to try and cultivate these into new economic growth points for the PRC.

At present, the PRC is the second biggest greenhouse gases emissions country as well as the largest supplier of carbon emission rights, with annual emission-reduction quotas sold from the Chinese market reaching 70% of the global emission-reduction quotas. Even though the developing countries are still not required to carry responsibility for carbon emission reduction, with the rapid increase in emissions from these countries, the international community, especially, developed countries increasingly calls for developing countries to carry carbon emissions reduction responsibilities.

Evidently, the PRC will probably face the test of the carbon emission reduction index, and developing a low carbon economy has become unavoidable for the PRC. In fact, the study and trial of the low carbon economy has started in some places. At the beginning of 2008, WWF offered pilots for “low carbon city” development demonstration projects in Shanghai and Baoding. Afterwards, Jilin was listed as a case study pilot city for low carbon economic zone by the relevant department. Guangdong Province expects to finish its road map towards low carbon economic development in March 2011 to guide various sectors of the economy to formulate an industrial development plan and to improve the core competition of “Made in Guangdong” under international low carbon industrial systems. Shanghai has planned to build a “low carbon economy practice area” in the Nanhui District. The PRC Beijing Environment Exchange put forward the PRC’s first voluntary emission reduction standard. Jiangxi Province is expected to become an ideal place for the national low carbon economy. Henan Province established the first Low Carbon Group Ltd., Co. There are various indications that a bitter battle for the low carbon economy in both domestic and international markets is quietly starting.
3. Development of low carbon economy and circular economy, which embodies Hunan’s characteristics and advantages. Hunan Province, as a large province in terms of agriculture and resources development, possesses good conditions and foundations for developing the low carbon economy. Agriculture, as a carbon sink industry, makes up a fair proportion of the industry structure in Hunan Province: in 2008, the added output value of farming, forestry, animal husbandry, and fishery was CNY200.740 billion, claiming sixth place in the whole country. The primary industry makes up 18% of the industry. Forests are the biggest carbon reservoirs and most economical carbon collectors on land, with provincial forest coverage rate reaching 55.85% in 2008, providing significant potential for carbon sinks. Traditional low carbon energy like hydropower makes up a fair proportion of the energy structure of Hunan Province, and low carbon energy, such as solar energy, wind energy and nuclear energy, has a huge potential for exploitation.

Carbon emissions in Hunan are generally below the national average level. Per capita emissions are 3.9 tons, 0.2 ton lower than the national average level. Carbon emissions per unit area of land are 510 tons, 40 tons lower than the national average. Carbon emissions per CNY10-thousand GDP is 2.3 tons, 0.1 tons lower than the national average. With the pilot areas of Changsha, Zhuzhou and Xiangtan as platforms, allowed to pioneer in energy-saving and environmental protection, the conditions for becoming a low carbon economy and circular economy pilot zone exist, and the foundation and prerequisite for the province to realize the low carbon economy and circular economy are laid.

V International Experience in Energy Conservation and Environmental Protection

Based on research made by international energy experts of the research group and field investigation in Japan and Korea by some experts along with retrieval of documentation, international experience is collected and summarized as follows:

(I) Three stages for development of ideas on energy conservation and environmental protection

Energy and environmental policy cannot be separated. Energy is the most important requirement for economic development. The expansion of economic activity, as well as production, conversion, transport and use of energy, usually runs the risk of stresses and dangers for a quality environment. Therefore, the most effective environmental protection is avoidance of energy, or instead of this, using environment- and resource-saving productions processes. This awareness got firstly noticeable in Europe during the 1960’s and 1970’s. Later the three development stages of green movement, the recycling economy and low-carbon economy followed.

Green Movement (1960-1990). The 1960s were the period of enlightenment for elites to develop green awareness. A key event included U.S. marine biologist Rachel
Carson publishing her famous work “Silent Spring” in 1962, which is considered as having kicked off an ecological age. In 1972, the Roman Club submitted “The Limits of Growth”, giving genius prophecy of human predicament to the western world in the golden age of high growth and high consumption. The slogan of the Roman Club “only one earth” became an important background material for The United Nations Conference on Human Environment in Stockholm and later agreed in consensus by human beings. In response to this, the governments of all developed industrial countries established one environmental management organization after the other.

From the 1980s onwards, green ideology prevailed massively throughout the world. Academia industry and the media were completely involved in green topics, and green eco-environmental issues became common knowledge, like a household word. In 1992, the Global Environment Summit - Rio United Nations Conference on Environment and Development- was hold, symbolizing man’s efforts to step into a global age of defending the common home with concerted efforts. Thus, environment and development issues became an important part of the construction of a new international economic and politic order.

Recycling economy (1990-2005). The term “recycling economy” was brought forward first by U.S. economist K Paulding. In the 1990s the development of a knowledge economy and a recycling economy became two major trends in the international community. Germany and Japan were the pioneers in developing a recycling economy in the world.

Germany started developing a recycling economy with the milestone of issuing and implementing the Recycling Economy and Waste Management Acts in 1994 and 1996, respectively. In Germany, all problems of recycling economy were solved primarily through market pricing mechanism and competition mechanism as well as system innovation, etc. System innovation is mostly featured in construction of a series of laws and rules systems, covering the establishment of well-developed laws and regulations systems, the establishment of charging systems and implementation mechanisms based on enterprise operation, and the test and demonstrative logistic management mode from enterprise to local area.

Within contrast to Germany, Japan mainly focused on creating venous industry such as reuse of wastes and safe disposal and made efforts to link it to the arterial industry in the process of material utilization in production area, in addition to the development and advancement of fundamental laws and other laws and regulations for a recycling society.

In 1998 the PRC introduced the concept of a recycling economy from Germany and established the central strands of the 3R principles. In 1999 integration was made between the development mode of a recycling economy with the principles of sustainable production. In 2002 a real understanding of the significance of the recycling economy was achieved in respect to the emerging industrialization. In
2003 the recycling economy was incorporated into the scientific development outlook and the development strategy of material consumption reduction was determined. In 2004 it was proposed to develop the recycling economy with efforts coming from different geographic levels: urban, regional or national.

**Low-carbon economy (2003-now).** With the rapid development of the economy, people have shifted their concern on environmental problems to global warming gradually. In 2003, in the white paper “Our Energy Future - Creating a Low Carbon Economy”, the U.K. government put forward the concept of a low carbon economy for the first time. Generally speaking, the low carbon economy refers to an economic model based on low energy consumption, low pollution and low emissions, and it illustrates another great progress of human society after the agricultural and industrial civilization. Low carbon economy refers to the issue of high-energy utilization efficiency and clean energy structure and is centred on energy technology innovation, system innovation and essential transformation of concepts for human beings to survive and develop.

(II) **International experience in energy conservation and environmental protection since the 21st century**

1. **Making laws and establishing specific administration institution to cope with climate change**

   International conventions are issued to advance concerted actions of all countries and adapt to and mitigate climate change jointly. The United Nations framework convention on climate changes (UNFC—CC) and its Kyoto Protocol have become cooperation frameworks for the international community to make concerted efforts.

   The EU leads the way in lawmaking on climate change. In order to reduce emission costs of greenhouse gas and define the legality of trading of emission right, the EU Legislative Council passed the Emission Trading Scheme in June 2003. This stipulates that from January 2005 the 12,000 facilities of various industries including electric power, refining, metallurgy, cement, ceramics, glass and papermaking must not emit greenhouse gases like carbon dioxide (where the emission of carbon dioxide accounts for 46% of the total emission of Europe) without permits. Later on many associated regulations were issued. The U.K. was the first country in the world to introduce laws to tackle with climate change. On March 13, 2007, the U.K. published its Draft Climate Change Bill seeking views from the Parliament and the public. On November 15, 2007, the Bill was incorporated into legislative procedures of the Parliament. On November 26, 2008, the Climate Change Act was passed.

   Even though the U.S. federal government still hasn’t approved the Kyoto Protocol, some local governments have determined their own targets for emissions of greenhouse gas. For instance, California passed the law on addressing climate change in 2006. Some other states joined local emission reduction protocols and the U.S.
Congress is trying to pass relevant acts to reduce emissions of greenhouse gases.

Since the United Nations Conference on Environment and Development in 1992, many countries have established administrative organizations or institutions to cope with climate change. For example, the Environment Agency of Japan was upgraded to the Ministry of Environment in Japan in 2001 and a global environment division added, which is responsible for adaptation to and relief from climate change and corresponding international cooperation. In Australia and France, etc., specific institutions were founded in the same department as energy conservation and new energy and renewable energy administration. The U.S. founded an inter-ministry cabinet “the Cabinet Committee on Climate Change and Technology Integration”, co-chaired by the minister of chamber of commerce and energy ministry who takes charge of coordination and alignment of scientific research made by federal agencies with respect to global climate change and advanced energy technology. The U.K. established the Climate Change Committee specifically to monitor compliance with emission reduction targets independently.

2. Issuing state scheme, plan or action program

All developed countries and major greenhouse gas emitting countries have developed and issued their own state scheme or plan.

(1) German/European “Integrated Energy and Climate Program” (IECP). Germany is seen as one of the environmental-policy pioneer countries and considered as a “first mover” for countries of the European Union moving towards a “Green Energy and Environment” policy. In the case of air pollution control, recycling policy and climate policy, Germany sets new European and international impulses. The European Council of the heads of states and governments set the course for an integrated European climate and energy policy under the German presidency during spring 2008. With the publication of corner marks for an integrated energy and climate program, the German government implemented the European policy course decision on the national level on the basis of a concrete program of measures. The directions of the energy and policy program aim to reach the climate targets by 2020 and to implement the required measures in a cost-efficient way. An ambitious strategy for increasing energy efficiency and an expansion of renewable energies are the right decisions for a reduction in greenhouse gas emissions. With the definition of 29 sub-measures, the German government sets aims for the government, industry and end users. The government has also decides to set itself some ambitious targets to be implemented in the form of concrete laws, ordinances and promotional measures within the coming years.

The Commission has adopted an Action Plan aimed at achieving a 20% reduction in energy consumption by 2020. The Action Plan includes measures to improve the energy performance of products, buildings and services, to improve the yield of energy production and distribution, to reduce the impact of transport on energy
consumption, to facilitate financing and investments in the sector, to encourage and consolidate rational energy consumption behaviour and to step up international action on energy efficiency. The purpose of this Action Plan is to mobilise the general public, policy-makers and market actors, and to transform the internal energy market in a way that provides EU citizens with the most energy-efficient infrastructure (including buildings), products (including appliances and cars), and energy systems in the world. The objective of the Action Plan is to control and reduce energy demand and to take targeted action on consumption and supply in order to save 20% of annual consumption of primary energy by 2020 (compared to the energy consumption forecasts for 2020). This objective corresponds to achieving approximately a 1.5% saving per year up to 2020. In order to achieve substantial and sustainable energy savings, energy-efficient techniques, products and services must be developed and consumption habits must be changed so that less energy is used to maintain the same quality of life. The Plan sets out a number of short and medium-term measures to achieve this objective. The Action Plan runs for a six-year period from 1 January 2007 to 31 December 2012. The Commission considers this timeframe to be sufficient to adopt and transpose most of the measures it proposes.

(2) Japan presented low carbon social plan and roadmap. In March 2008 METI issued Cool Earth: Innovative Energy Technology Program, setting out 21 technologies to significantly reduce emissions of CO₂. As a result of research, Japan is expected to achieve the goal of reducing CO₂ emissions by 60% with the use of the 21 technologies. On May 2008 Japan published the report “A Dozen of Actions towards Low-Carbon Societies”, indicating 12 urgent actions for the construction of a low carbon society. Furthermore, it set out potential achievable targets for emissions reduction and actions required to achieve 70% reduction of emission, technological choices, social reform as well as measures and polices to adopt, etc. Japan also attached importance to cooperation with the IEA to boost technological development and information communications and development of technological roadmap, etc.

Japan is the country with the highest energy efficiency in the world. Many practices of such an island country, where there is insufficient natural resources are worthy of reference by us. In terms of energy conservation, Japan proposed to develop the national emission reduction campaign “one kilogram per day for everyone”, covering that everyone:

- takes showers 1 minute less every day, leading to reduced emission of 74 gram,
- goes shopping with self-prepared bags for packaging, resulting in reduction of emission by 62 gram,
- turns the air conditioner up by 1 centigrade degree in summer and down 1 centigrade degree in winter for emission reduction of 25 gram,
- replaces air conditioner, refrigerator and bulbs with energy saving products for emission reduction of 281 gram,
- stops the automobile engine in time to reduce emission of 42 gram,
- makes thorough classification of organic wastes to reduce incineration load and emission by 52 gram,
- cuts off power at home in the case of no intended use to reduce emission by 64 gram;

In total, these measures will achieve reductions in CO₂ emissions by 610 grams, whereas the remaining 390 grams emission reduction will be achieved by citizens.

The history of energy saving policy in Japan can be traced back to The Law on Rational Use of Energy (Energy Conservation Act) made in 1979, followed by revisions for the purpose of addressing global warming. It especially aimed to consolidate countermeasures on energy conservation of livelihood and transport sectors. For example, in 1993 basic guidelines on energy conservation were made, adding the obligation of energy management and regular development of plant report; in 1998, leading systems with respect to energy saving standard for automobile fuel consumption and electrical appliances were developed, incorporating new measures requiring plants with high energy consumption to make and submit middle and long term energy saving plan and middle sized plant to select and employ energy manager; in 2002, requirements that large office buildings shall make energy management pursuant the same standard for large plants and non-residential building larger than 2000 square meters shall submit energy saving initiatives were defined; in 2005, heat and electrical integrated management of plants and working sites was spread and it is determined that large transportation operator and shipper shall make and submit report and plan on a regular basis and more objects were involved in architecture energy conservation; in 2008, the enterprise-based limitation system was introduced so that every department would determine standards to evaluate the common energy conservation undertaking and strengthen energy conservation measures for residences and buildings. In terms of environmental protection, Japanese went through serious water and air pollution resulting serious social problems in the fast growth period after WWII, e.g. minamata disease in 1956, itai-itai disease in 1961, Yokkaichi Asthma in 1961 and rice bran oil event in 1964. In order to resolve impacts of environmental pollution on human life and health, Japan has developed Basic Law for Environmental Pollution, Air Pollution Prevention Law, Noise Regulation Law, Basic Law for Environmental Pollution, Waste Disposal Law one after another and added new idea that citizens should be entitled to environmental rights to enjoy a good environment. The improved sense of environmental protection has played an important role in enhancing technological innovation and industrial reform and influenced the evolution of environmental industry from prevention of environmental
pollution, energy saving to energy recycling. In addition, the improvement of sense of environmental protection is linked and supplementary to popularization of environmental education. In Japanese schools, environmental education is mainly constituted of three stages: education on approaching the nature, understanding the nature and protecting the nature. Apart from stress on environmental protection education in schools, Japan has also attached importance to social and community education, fostering individual ability to take part in social activities freely and balancing the freedom and responsibilities, obligations, spreading the sense of environmental protection and improving the consciousness of involvement in social activities for environmental protection and sense of responsibility to undertake the obligation to make contribution to sustainable development of human being, the society and economy.

(3) Developing countries led by India developed national scheme or plan. In the 11th five-year plan (2007-2012), India put forward objectives to increase the energy efficiency by 20% by 2016/2017 and forest coverage rate by 5%. On June 30, 2006, India released NAPCC determining 8 national programs to be implemented by 2017, i.e. solar energy, improvement of energy efficiency, sustainable life, water resource, maintenance of Himalayas ecosystem, green India, sustainable agriculture, strategic knowledge platform for climate change. Initiatives of other countries with high emission include the white paper Contribute to Combat Climate Change by Brazil in 2007, advising that a series of plans will be made for the purpose of development of 10% renewable energy for energy consumption in 2022 and implementing national ethanol program in terms of which at present, 40% transport fuels are bio-ethanol, long-term emission reduction scenario setting launched by the South Africa government which creates the base for development of comprehensive polices and measures to combat climate change. It is stated in July, 2008 that the emission of greenhouse gas would be controlled in 2020 ~ 2025 to achieve reduced emission after about 10 years’ stable emission period and emission reduction of greenhouse gas would be accelerated through introduction of carbon tax.

(4) Korea and Hong Kong of the PRC came up with their own specifically characterized plans or initiatives. Korea advised to reduce emission of greenhouse gas with great efforts in development of nuclear power. In the national power plan on relief of climate change released by Korea government, it is proposed that nuclear power would account for half of the state power quantity by 2022, namely, from 48% ascending from present 34%. The government of Hong Kong Special Administrative Region initiated a series of measures on emission reduction of greenhouse gas, e.g. advocating use of clean energy and renewable energy to improve energy benefits and save energy, encouraging afforestation and improving the sense of the public. In Hong Kong, power consumption in buildings accounts for 89% of gross power consumption. In this regard, Hong Kong Environmental Protection Department and Electrical and
Mechanical Services Department compiled Hong Kong Guidelines on Auditing and Reporting Emission and Elimination of Greenhouse Gas in Buildings (Commercial, Residential or for Public Use) jointly to help users perform auditing and report emission and elimination of greenhouse gas in buildings and find out improvable points and a set of systematic and scientific measures.

3. Issuing specific supportive polices

Every country has issued a large number of specific supportive measures with respect to energy saving and consumption reduction and development of new energy one after another. Due to the limitation on length, this report will only present specific polices on solar energy we have collected.

(1) Feed-in Tariff Act by Germany. Germany issued the renewable energy act in 2000, mainly featured in the policy of fixed feed-in-tariff. Since 2004, Germany has leapt to the fastest growing country in PV market and PV industry in the world, driving the development of PV industry in other countries. The Feed-in Tariff Act has made Germany to be the largest PV market in the world rapidly with powerful driving force. Coverage of PV power generation in Germany: the grid company purchases PV feed-in at full amount and pays tariff to the developer at the price €0.506/KWh; within fixed time duration, fixed feed-in tariff is entitled to and applied (for 20 years); the feed-in tariff for newly established PV power system will decrease year by year (PV: 5%); cost share: the price above conventional power price will be shared equally by all consumers who will pay €0.20/KWh more for power.

(2) U.S. solar energy policies. Since the implementation of PV investment tax credit policy since 2005 in U.S. PV capacity established has been growing fast ranking no. 4 in the world following Germany, Spain and Japan. The policy states that citizens and business entities will be entitled to investment tax credit equivalent to 30% of installation cost for benefits gained from PV system for power generation installed on the roof of residential and commercial buildings and maximum 2,000 dollars will be entitled for individual citizen residence and credit. The policy was scheduled to expire at the end of 2008, but U.S. Senate passed an one-package credit program on September 16, 2008 with following specific terms: the investment tax credit will be applied for another 8 years for commercial PV program, another 2 years for residential PV program; the maximum 2,000 credit will be cancelled for every household PV program. On January 10, 2009, the California government invested 3.2 billion dollars to promote Million Solar Roofs in all-round manners. With the support of tax credit, it is expected that U.S. PV capacity established will remain increasing at 52% annually in 2008-2012, with 1,840 MW added capacity and 5,182MW aggregated capacity.

(3) Solar energy policies of Japan. Japan applies subsidy policy to user of solar energy. Engineering subsidy given to power generation system is 50% first and will be reduced year by year in 10 years. The Japanese government succeeded in applying
the first round of subsidy in 1994–2003 enabling aggregated PV capacity of 1,100 MW by 2004 so that Japan became the country of the largest PV capacity in the world at that time. In 2006, Japan cancelled the subsidy policy as scheduled. Later, the Japanese government made another plan to promote installation of solar power generation units on the roof of governmental office buildings all over the country as of 2007 to 2012. The Japanese government also launched the Initiative for Popularization of Solar Power in November, 2008, defining the objective of solar power generation at 40 times as much as of 2005 by 2030 and reducing the price of solar cell system to a half of present level in 3~5 years. Since January, 2008, Japan has restored the subsidy system for family purpose at the rate 70,000 Yen per kW, equivalent to 1% of the system price.

(4) Solar energy policies of France. The revised solar PV policies of France are to shift development focus of new energy to the solar power industry in the coming 20 years, including research on solar power technology, construction of solar power station and applications of solar cells in daily life. On the basis of application of previous fixed power price € 0.30/ KWh to residential and commercial rooftop photovoltaic system, € 0.15 / KWh subsidy is added and it is planned to build and complete 300MWp ground PV power station before 2011.

(5) Solar energy policies of Italy. Italian government issued Grid Act with an entry of 1200MW; 14 months grace period is entitled to those above the entry level. As of 2009, the power price will be reduced by 2% and all new buildings shall be equipped with solar roof. Owing to the geographic advantage of long duration of sunlight, based on the increase rate of power price in power market and decrease rate of photovoltaic cost, Italy will be the first country achieving the same photovoltaic power price with commercial power price in 2012 as predicted by E.U. joint research subject and Meiling Investment Group.

(6) Solar energy policies of Spain. Spain is the most fast growing country in these years as with more than 2,500 MW unit added annually in 2008. The Spanish government has been implementing Real Decreto since 2004, which was revised in 2006 and defined compensation for power purchase, thus applying the price €0.44/KWh (5.75 times of the mean power price) for photovoltaic system with power generation less than 100Wp for a term of 25 years and purchasing price 4.6 times as much as the mean power price after 25 years. For photovoltaic system with power generation more than 100Wp, € 0.23/KWh will be applied (3 times of the mean power price). On September 23, 2008, the energy minister Pedro Marin announced that the government would improve subsidy standard to 500 MW from the previous 300 MW in 2009 and the increased 200 MW quota would be entitled to the ground system to relieve hurt to industry operators caused by the significant change of policies; the power policy remains unchanged actually, reducing significantly from the current €0.44/KWh, €0.33/KWh for roofing system and €0.29/KWh for ground system.
4. Utilizing market mechanism to boost emission reduction of greenhouse gas

Generally speaking, the world carbon market is consisted of compulsory market and voluntary market. Compulsory market mainly involved trade developed by developed countries in compliance with Kyoto Protocol, e.g. E.U. trade which is the trading system for emission of greenhouse gas that involves most countries all over the world and multiple industries to the most extensive degree. Trade made in Chicago Climate Exchange is voluntary trade and so is trading of emission right of greenhouse gas in some regions in U.S.

In addition, every country is promoting research and development of energy technology and its innovations aggressively and carbon acquisition and reserve and decarbonisation are two major directions for research and development of energy technology.

VI General Ideas of Promoting Energy Conservation and Environmental Protection

Strategy is the basis to develop and make policies. Strategies are long-term and major measures conceived for and orientation of development while plan and policy are mandatory institutional arrangement for the coming 5 to 10 years. Only with long-term development strategies for energy conservation and environmental protection established and steadfast in implementing strategic objectives and ideas, the economy and society can develop in sustainable and ongoing manners with stable and consistent polices on energy conservation and environmental protection.

(I) Strategic Thinking

Based on the current state of energy conservation and environmental protection in Hunan province, taking the development trend of world economy and society into view, it is essential to speed up and promote complete transformation of energy conservation and environmental protection mode and the development mode of the whole society and economy, i.e. to carry out scientific development outlook, advocate the concept of low carbon economy and recycling economy, nurture new economic growth points featured in low carbon emission and recycling, speed up construction of industry, architecture and transportation system featured in low carbon emission and recycling, promote and develop energy saving and environment friendly production, living and consumption method so as to improve the ecological environment, enhance resource utilization efficiency significantly and improve sustainable development capacity constantly compete with achieve harmony between man and the nature. Besides, Hunan shall have become the great province with low carbon economy and recycling economy first in the country by 2020.

Two basic points:
1. Development of green energy and encourage low carbon economy. Within the framework of sustainable development, low carbon development should be regarded as an important content of building a resource-saving, environment-friendly society and innovative Hunan, “low carbonization” should be seen as one of strategic objectives of economic and social development, new energies like low carbon or carbon-free energies should be developed and the development of clean energies like solar, wind, biomass and nuclear energies should be accelerated to fulfill high efficient and clean utilization of energy. It should also be advocated to promote low carbon economy, reduce carbon sources, increase carbon sinks, strengthen the efforts to achieve technical innovations in carbon neutral, carbon sequestration and carbon capture, and advance the idea of Green Consumption. Based on the market mechanism, through designing and innovating system frame and policies, a clear, stable and long-term guide and stimulating system should be built to push forward the development and utilization of energy-efficiency and energy-saving technologies, renewable energy technologies, and GHG emission reduction technologies. And thus the whole social economy could be successfully transformed into a high efficient, low consuming and low carbon emission one.

2. Advocating of clean production and developing circular economy.

Energy development and conservation should be conducted at the same time, energy conservation and emission reduction being placed at the top, and improve the efficiency of resource. Keep on the path of new industrialization and upgrade the industry level by combining the development of circular economy and adjusting or optimizing industrial structure; Keep balancing the development of urban and rural areas, improving living and production conditions in rural areas and preventing agricultural area pollution; Keep on clean production, combining the development of circular economy with pollution prevention and realizing a sustainable economic and social development in the whole province.

(II) Strategy

1. Coordinated development, mutually beneficial and all winning.

Appropriately handling the relationships among energy conservation, environmental protection and economic development and social progress, combining protection with development, realize sustainable scientific development by adhering to thrift, clean and safe development. Appropriately weigh the relationships between economic development and conservation of climate, between short-term and long-term target, appropriately handle the relationships between realizing stride in the late stage in the heavy chemical industry through strategic opportunities and low carbon transition, and give fully consideration to the synergistic effect among carbon reduction, energy safety, and environmental protection to effectively reduce the cost of reduction.

2. Intensifying the rule by law and carrying out comprehensive environment treatment.

Environmental laws and regulations should be improved, the
environmental laws shall be strictly enforced; environmental protection and development shall be both considered while making policy, put prevention first, prevent and control pollution and ecological damage at the source, solve the environmental problem by laws, economy, technology and science, and necessary administrative means.

3. No new accounts, old accounts be repaid. Strictly control the total pollutant emission; all newly built, expanded, or rebuilt project shall be in accordance with requirements of environmental protection, realize increasing production without adding pollution, or increasing production while reducing pollution; actively solve those problems left over by history.

4. Relying on technology, innovating mechanism. Greatly develop environmental science and technology, solve the environmental problem by innovative technology; a government-enterprises-society multi-input mechanism and the marketization operating mechanism of part of pollution control plants shall be established, environmental protection system shall be improved; unified, coordinated and efficient environmental supervision and control system should be improve.

5. Giving guidelines according to different issues and prioritizing key issues. In accordance with local conditions, solve the environmental problems, which are slowing down the economic development and which are reacted strongly by the mass, by regional planning, to improve the environmental quality of main basins, regions and cities.

(III) Strategic Objectives

1. General Objective: Becoming the First Province of Low Carbon Economy and Circular Economy in the PRC

The realization of low carbon economy, circular economy is not only a tough task for the PRC, is also considered as one of most challenging issues in Euramerican developed countries, none of mature “sample” exists until now. There are only a few northern European nations embarking on the development of low carbon economy, circular economy, even those developed countries, including Canada, Australia, America, Japan and so on, fails to fulfill respective promised emission reduction indexes. In the 2009 Strategic Report: The PRC’s Sustainable Development published by the Chinese Academy of Sciences in April 2009, the strategic target of developing low carbon economy is put forward, national energy consumption per GDP unit shall be reduced by 40% - 60% than 2005, carbon dioxide emission per GDP unit shall be reduced by 50% by 2020.

Seen from present situation in Hunan, one major index and two important indexes are much higher than the national average level, even higher than the western developed countries. One is carbon emission. At present, carbon emission in Hunan is generally below the national average level, per capita emissions is 3.9 tons, 0.2 ton lower than the national average level, carbon emission in unit area of land is 510 tons,
40 tons lower than the national average level, carbon emission per CNY10-thousand GDP is 2.3 tons, lower 0.1 ton than the national average level. One is forest coverage rate. The forest coverage rate of Hunan Province reached 55.86% in 2008, while the target of national forest coverage rate by the end of the 11th Five Year Plan is 20%, this index is also higher than some developed countries. One is renewable energy proportion. In 2007, 10,681,800 tons standard coal of hydropower was produced in 2007, which accounted for 17.3% of total production volume of primary energy; hydropower consumption accounted 9.89% of social total energy consumption. While the target for national increased proportion of renewable energy is 10% by the end of the 11th Five Year Plan. According to The UK Renewable Energy Strategy published in 2009, 15% of energy (power generation, heating, transportation and so on) shall be produced by renewable energy. What’s more, compared with national situation, Hunan is moving in a new direction of low carbon economy with Hunan features by rapid social and economic development and low energy consumption. Therefore, Hunan has the foundation and possibility of being the first province in realizing low carbon economy and circular economy.

Gradual development of high carbon economy - medium carbon economy-low carbon economy should be considered. In the short term (2010-2015), through technical upgrading and transformation, emission reduction for industries of high energy consumption, improvement in infrastructure construction, adjustment in competitive industrial structure, carbon emission reduction, to maintain the increment speed of greenhouse gases emission lower than economic growth rate; meanwhile, to develop green agriculture, such as forest industry, to increase carbon sinks. In the long term (2016-2020), steady economic growth should be maintained, reduction of absolute emission should be achieved, energy-consuming level should be close to leading domestic level, and finally, Hunan Province can be the first province in the PRC to realize low carbon economy and circular economy.

2. Main Indexes of 2010 - 2015

By 2015, the provincial CNY10-thousand GDP energy consumption shall be decreased by 20% compared with 2010, and the CNY10-thousand increment for energy consumption in scale industry shall be decreased by 25%, per capita carbon emission shall maintain the present 3.9 tons, carbon emission in unit area of land is 510 tons, the CNY10-thousand GDP energy consumption shall maintain 2.3 tons, the percentage of renewable energy in whole social energy consumption shall keep at 10%, the forest coverage rate shall stay at 56%, sulfur dioxide emission shall be decreased by 10% compared with 2010.

Although the indexes we have set are modest, it will still be hard to achieve them.

About energy consumption index: our national energy consumption per GDP unit is 2.4 times higher than international level, energy consumption per main product
is much higher than advanced world level, energy efficiency rate is just about 30%, 10% lower than the advanced world level. Energy consumption is much higher than the developed country and average world level. Hunan energy consumption level is twice higher than the developed provinces and cities like Beijing, Guangdong, Zhejiang and so on. With the acceleration of adjusting the industrial structure and improvement of technology. There is a great potential of energy conservation and environmental protection, but considering that Hunan is in initial period at the intermediate stage of heavy chemical industrialization, for a long time in the future, the heavy chemical industry will develop rapidly, the pressure on energy conservation and environmental protection is still grave. Our suggestion: on the basis of fulfilling 11FYP mission of energy conservation and environmental protection, our energy consumption level reaches national energy consumption average level by 5 years’ hard work, and get close to national leading level by another 5 years’ hard work.

**About carbon emission index:** According to The UK Low Carbon Transition Plan published in August 2009 by the British government, the core objective of economic development is to build Britain into cleaner, greener and more prosperous country; by 2020, carbon emission shall be decreased by 34% compared with 1990. This is the most systemic white paper in the developed countries responding to climate change until now. In other words, during three decades, from 1990 to 2020, the annual carbon emission shall be reduced by one percentage point. Hunan has entered a phrase of heavy chemical industry, with the same technology level and rapid expansion of industrial scale, the increment of carbon emission is inevitable. In the near future, maintaining current carbon emission is a huge progress by promotion of new technology and optimization of industrial structure.

**About indexes of sulfur dioxide emission:** According to the implementation plans for energy conservation and environmental protection comprehensive work in Hunan Province, during 11FYP period, the total emissions of main pollutants shall be reduced by 10%, by 2010, sulfur dioxide emission shall be decreased from 919,300 tons of 2005 to 836,000 tons by 83,300 tons. By the end of 2008, Hunan main pollutant index examined by the state the total emission of sulfur dioxide was 840,500 tons, down by 8.56% compared with 2005, and accomplishing 95% of “Eleventh Five-year” mission. As per this trend, fulfilling the emission reduction mission of sulfur dioxide of “Eleventh Five-year” ahead of time is possible. We suggest that, by 2015, sulfur dioxide emission shall be decreased by 10% compared with 2010.

**About forest coverage rate index:** the forest coverage rate in Hunan Province is of high level, large-scale increase of the rate will occupy the space of other economic activities.

**About renewable energy proportion index:** the renewable energy proportion in Hunan has already reached a high level in the following years, total energy output and consumption will greatly increase, but due to limited resources, the same increased
proportion cannot happen to Hunan hydropower, maintaining the 10% of renewable energy must rely on the substantial development of new energy like nuclear energy.

(IV) Strategic Emphasis

1. Optimization of Industrial Structure

Optimize industrial structure and the inner structure of industrial branch, accelerate the development of tertiary industry, develop high-tech industry with high added value as well as low energy consuming industry inside industry; reduce substantially the energy consumption intensity and emission intensity. Develop low carbon industry, to foster new economic growth point. Raise the market entry standard, eliminate the disqualified energy production capacity, and reduce the carbon emission per GPD unit, to realize low carbon development.

(1) Controlling increment. Strictly restraining the construction of new high energy consumption and high pollution projects, and limiting the growing of high energy consumption and high pollution industry. Stick to the two “strobes” of land and credit, and the entry standard related to energy conservation and environmental protection. Execute the entry conditions of 13 industries such as steel, ferroalloy, coking etc., which are controlled by the government. Establish energy conservation evaluation, check mechanism, as well as estimation mechanism of environmental influence for new started projects.

(2) Checking storage. Accelerating the elimination of disqualified production capacity. Carry out plans of eliminating disqualified production capacity in industries such as electricity, steel, cement, coal, paper making etc., establish mechanism of eliminating disqualified energy production capacity, improve and carry out corresponding policy measures on closing up enterprises. For enterprises listed as disqualified energy production capacity to be eliminated but has not been eliminated yet by term, it should be closed up by principal department of local government, and prevent the occurrence of being closed but not rejected, in case of its rise again. Improve local administrative rules and policy system, establishing efficient encouragement and restraint mechanism on rejecting the, work complete mechanism, as well as long efficient management mechanism. Give stimulating rewards and punishment to energy production rejected. Increase the financial support to rejected energy production in less developed areas.

(3) Adjusting and optimizing industrial structure. Accelerate the development and construction of state, provincial new and high technology industrial zones and centers; fasten the development of promising and low energy consumption industrial group such as service, electronic information, new material, biologic medicine and green new energy etc., establish a set of new and high-tech backbone enterprises, focusing on developing modern equipment manufacture; promote the upgrade of industrial structure invested by foreign businessman, focusing on the investment of absorbing optimization and upgrade of global top 500 companies; lift entry conditions
for processing trade and optimize industrial link.

(4) Carrying on pilot work. We will first experiment with high energy consuming and high pollutant industries such as power, transportation, building, metallurgical, chemical, petrochemical industries for exploring the major fields, to exploit a development for low carbon economy. Build actively “low carbon economy development zone”, “low carbon industrial park”, “circular economy park”, make the pilots in Changsha, Zhuzhou, Xiangtan and other cities, to stimulate the rapid development of low carbon economy of surrounding areas and the whole province.

2. Optimization of energy structure and encouragement of development of new energy industry

UNDP classified new energy into three categories: large and middle power, new renewable energy including little hydropower, solar power, wind, modern biomass energy, geothermal energy, ocean energy (tidal energy) and transformable biomass energy. Relative to traditional energy, new energy is generally featured in low pollution and large reserve and has great significance in solving today’s serious pollution and resource exhaustion (especially fossil energy) in the world. New energy highlights clean and renewable energy. Seen from development trend of science and technology, the years from 2020 to 2050 would be a crucial period and nod for transition from traditional fossil energy to new energy, therefore, Hunan shall decide a transition period in its energy development strategy, increase science and technology input, speed up the structure adjustment, increase the proportion of new energy like nuclear energy, wind energy, solar energy etc., establish strategic measure to develop beyond relying on thermal power and petroleum.

(1) The promotion of high efficient and clean energy production and utilization of coal. Mainly relying on coal is a realistic choice for Hunan energy strategy. However, as a result of long-term deficit in coal industry, overweight burden, mine disasters, lack of policy and financial support to developing clean coal technology, the production and consumption of coal has become main pollution source; there is great pressure on environment problem. The active promotion of clean coal technology, the promotion of high efficient and clean energy production and utilization of coal is the strategic direction responding to the great challenge of energy problem. Promote the construction of large thermal units which will not be out of date in the future 10 years, and eliminate small thermal units for backwardness, to improve energy conservation and environmental protection.Enlarge the proportion of high-quality energy application, and promote the use of natural gas, liquefied natural gas, hydropower and other clean energy, so as to promote the upgrade of the new generation of energy products in Hunan Province.

(2) Active development of low carbon new energy. Reducing the proportion of coal in energy consumption structure would be an important direction in developing low carbon economy. Broaden use range of solar water heater, increase application
rate of solar power used in street lamp in cities, laminate in communities and country roads; launch wind power stations, increase the proportion of wind power in Hunan energy structure; strengthen the development of biogas in rural areas. But the low carbon new energy like solar, wind, biomass etc., is in the research and development phase, due to low industrialization and commercialization, economies of scale is difficult to be achieved in the short term. Throughout history, the average replacement cycle for the growth of new type energy taking proportion of total energy supply from 1% to 50% takes 100 years. Currently, solar energy, wind energy, biomass energy in Hunan Province has not taken shape yet, taking a certain proportion in total energy balance cannot be realized before 2020. The situation of Hunan is quite different from European countries. The total energy consumption of some European countries is zero increment or little increment; renewable energy acts as supplement and gradually replaces the increment of fossil energy. However, Hunan is in the period of heavy chemical industry with rapid increase in total energy consumption, industrial energy consuming must be supplied by big thermal electricity and big hydropower, renewable energy can only help and supplement to supply power, it cannot replace fossil energy consumption in recent period.

(3) The highlighted development of nuclear power. Since the future development of coal electricity is restricted by factors of provincial coal resources, rail capacity and environmental capacity, and routine hydropower is of limited potential, developing nuclear power, the clean and safe energy with great potential, is a strategic choice for Hunan energy construction. The scale and the speed of nuclear power development are important in Energy strategy. Nuclear power, as a sophisticated technology around the world, is a basic form of electricity generation with low carbon emission except large-scaled hydropower, speeding up the pace of development of nuclear power is a better way for Hunan to supplement power supply to a great extent. At present, the first nuclear project in the PRC inner provinces—Taohuajiang Nuclear Project, whose preliminary work has been launched, the PRC National Nuclear Corporation has invested more than CNY400 million in Taohuajiang Nuclear Project , the infrastructure has taken shape, the Unit 1 is expected to be put into operation in 2015, after the establishment and put into use of 4 units, an total annual generated electricity could take 1/5 of total annual generated electricity, which would greatly reduce the electricity demand at peak. Currently, for the purpose of optimization of energy structure and the security of energy supply, we shall draw up scientific Hunan medium-and long-term development plan of nuclear power, establish efficient mechanism of risk control, speed up the pace of the construction of defined projects like Yiyang Taohuajiang Nuclear Project, step up communication with NDRC to get approval for Yueyang Huarong Xiaomoshang Project as soon as possible, meanwhile, develop nuclear project and Linkage Effect of related industry so as to promote other industries.
3. Developing Circular Economy

In accordance with the principle of “reduction, re-use, and resource-based”, to build the recycling economic system covering three levels which are enterprises, parks, and society, and to actively promote comprehensive utilization of the mineral resources and solid waste, recycling utilization of renewable resources and water resources, as well as resource-based utilization of trash.

(1) Deepening pilot and demonstration work of circular economy. Focus on the organization of the implementation of circular economy planning in three national circular economy pilot units covering the renewable resource market in Miluo, Zhu Ye, and Dacheng Chemical; determine 20 enterprises, 5 industrial parks, and 2 cities (counties) in the key industries, key areas, key industrial parks, and central cities as the pilot units for circular economy; grant policy support to those national and provincial circular economy demonstration pilot units; clarify 1 circular economy pilot county, city, and district in each city and sub-prefecture to make the pilots stimulate the development of circular economy, probe into the effective mode of circular economy.

(2) Fully implying clean production in the key industries. Fully implement clean production in the chemical industry, metallurgy, brewing, paper making, electroplating and other industries; implement mandatory audit of clean production for those enterprises exceeds the pollute emission standard and those with still high total pollutants emission despite of reaching the standard, and publicize to the society. Provide favorable policies of priority application clean production special funds and special funds for environmental protection for those enterprises passing the audit of clean production, support a group of enterprises with better basic conditions to implement clean production in a continuous manner, and build up a group of “zero emissions” enterprise.

(3) Reducing pollution at the source. Ecological design and transformation should be conducted in industry and industrial parks to realize waste recycling, adopt improved design; use clean energy and raw materials; use advanced technology and equipment, improved management, comprehensive utilization and other measures; reduce pollution at the source, and improve the efficiency of resource. Meanwhile, improve the renewable resources recycling system to realize waste recycling.

4. The Construction of a Sound Energy Conservation and Environmental Protection Technology System

Energy conservation is regarded by energy experts as “the fifth energy”, as valuable as coal, oil, natural gas and electricity, which can greatly save investment on energy development. Therefore, technology innovation ability should be greatly improved.

(1) Building energy conservation and environmental protection technology innovations system. Increase investment in science and technology; strengthen the
independent creative abilities; build energy conservation and environmental protection technology innovations and result transformation system with enterprises as the main body and combination of production, study and research, cultivate and develop energy conservation and environmental protection service system, provide enterprises with energy conservation and environmental protection technology services, accelerate the promotion and application of mature technologies, promote energy conservation and environmental protection service industrial development, focus on the mid-term and long-term preparation for technologies and strategies; integrate existing energy conservation technologies in market; organize and implement of a number of common and key energy conservation and environmental protection technologies, and major technical equipment industrialization demonstration projects, encourage and support energy resource exploration and development technologies, energy processing conversion and transmission technology, energy cleaning and comprehensive utilization technology, energy conservation and emission reduction technology, safe production technology of energy, and other innovative research and development application. Like utilization technology of solar, wind, biomass and nuclear energies and collection and storage technology of carbon dioxide and so on. Improve the carbon sinks function of ecosystem. Coordinate and promote the technical upgrading and pollutant emission reduction of traditional industry. Relying on current new energy technology innovation and industrial development platform, strengthen international communication and cooperation, encourage technology transfer from developed country to the PRC as well as Hunan.

(2) Building energy conservation and environmental protection standard system in Hunan Province. Study and formulate the mandatory standards of energy consumption limit for crude steel, cement, thermal power, and other high energy-consuming products, pay close attention to the study and formulation of the mandatory standards of energy consumption limit for the local main energy-consuming products and large-scale public buildings. Formulate (revise) the water and materials saving, waste products recovering and recycling standards. Organize the formulation and (amendment) of the energy efficiency standards for the power transformer, electrostatic copiers, inverter air conditioner, commercial freezers, household refrigerators and other terminal energy-consuming products (equipment). Formulate the general energy conservation standards preparing system for key energy-consuming enterprises; guide and regulate the energy conservation work of enterprises. Promote the implementation of the energy conservation product certification and energy efficiency labeling management system, guide the Government’s energy conservation procurement, and guide the consumers to purchase energy conservation products.

5. Enhancement in Supervision and Management of Energy Conservation and Environmental Protection
(1) Strengthening and improvement of energy conservation monitoring system. Establish and improve energy statistics agencies; strengthen statistical monitoring; establish and improve energy conservation monitoring system; strengthen the building of energy conservation monitoring (measuring) teams; improve energy conservation monitoring system; carry out special law enforcement and inspection for energy conservation; focus on the examination of the energy consumptions of high-energy-consuming enterprises and public facilities as well as the energy conservation evaluation and investigation of fixed assets investment projects. Strengthen the day-to-day supervision and inspection over key energy-consuming enterprises; establish the 100-enterprise and 1000-enterprise dynamic tracking mechanism; fully implement the energy conservation monitoring, and simultaneously provide technical support for the government in promoting energy conservation works. Expose the units in violations of the energy conservation laws and regulations, investigate and punish them in accordance with the laws, further intensify the punishment, and publicize the violations.

(2) Strengthening and improvement of environmental protection supervision and management system. Strengthen environment control over the limited controlling projects of key industries and key enterprises. Implement limited production and emission during the limited controlling period. Supervise and manage the limited controlling projects through hanging signboards; check the controlling progress on a regular basis or from time to time. Strengthen the supervision and management of key industries and enterprises to ensure their pollution control facilities under normal operation and their stable discharge of pollutants reach the standards. Install on-line monitoring apparatus for state-controlled key polluters, provide technical support for supervision and management works, and effectively eliminate surreptitious emissions. Strengthen supervising inspection frequencies for key polluters, to grasp their pollute emissions and to provide basis for supervision and management. Increase efforts to sewage charging and penalties imposed, and promote enterprises pollution emission reduction in economic manners. Force enterprises repeatedly violate the laws in pollution emissions upon repeated investigations to cease production and conduct rectification, impose the highest fines thereon, and claim full emission fees in accordance with the laws. Establish pollution source accounts, to grasp the dynamic changes of decline in regular pollutes and new pollutes in a timely manner, and to lay a foundation through adopting appropriate measures.

6. Intensifying Publicity, and the Establishment and Improvement of Mechanisms for Universal participation in Energy Conservation and Environmental Protection

(1) Establishing new concept of energy conservation and environmental protection. The realization of Energy conversation and environmental pollution reduction relies on the conscious behavior of each organization and every citizen.
Compared with energy conservation and environmental protection consciousness of Japanese, Americans and Germans, Chinese citizens, including Hunan citizens, are still weak in this aspect, for us, energy conservation and environmental protection concept is a new concept, there is a long way to go to foster green awareness of citizens, to strengthen the consciousness of emission reduction. Therefore, attention should be paid to the education, propaganda and improving public awareness in fields of environment and climate change, strengthen education and avocation of climate change; conduct mass ecological civilization creating activities; widely publicize energy situation, energy conservation and emission reduction laws and regulations, guidelines and policies, energy conservation and emission reduction knowledge, and typical case thereof, to guide everyone to set up new concept of green production, green product, green consumption, green house, green transportation; to create a good social atmosphere in which everyone cherishes energy and protects environment.

(2) **Advocating green consumption pattern.** As IPCC pointed out, livestock industry produced 18% of global greenhouse gases emissions, which is higher than the 18% of traffic, close to the 19.5% of industrial emissions. A report has been published on the date of International Environment Day by UNEP in 2008, put forward seven suggestions on the “low carbon life style” for individual, guided people to start from those matters within their capacities, making contribution to emission reduction. It’s necessary to guide the public to reduce, correct high energy consuming and wasted consumption pattern.

(3) **Sticking to the basic state policy family planning.** For the emission of CO$_2$, there’s a famous Kaya formula: the population by per capita GDP by the energy consumption per unity GDP by consumption per unit energy consumption. Through analysis of the formula, it is known that to reduce emission, the population shall be controlled for growth. Since Hunan is a most populated province, to control rapid growth of the population will realize control of emission of CO$_2$ from a different angle.

(4) **Increasing forest carbon sinks.** To answer for global warming and relieve greenhouse effect, increasing forest carbon sinks is an effective approach. Forest is the main source of terrestrial biological carbon sequestration. As studied by experts, woods can absorb 1.83 tons CO$_2$ per cubic meter growth. For this purpose, the general secretary Hu Jintao make serious commitment to the world in UN Summit on Climate Change that the PRC will have expanded forests by 40 million hectares by 2020 compared with 2005 and increased forest reserve by 1.3 billion cubic meters. Prime Minister Wen Jiabao highlighted in the Government Work Report that it is essential to speed up greening process of the whole country and increase forest carbon sinks by expanding the area of forests and boosting the growth of woods to increase reserves. However, there’s limit for increase of forests since the limited land suitable for forest growth in the country determines limited area of forestation; on contrary, to boost the
growth of woods to improve forest reserves through forest operation and development creates great potential of carbon sequestration and will be the main way to increase ecological carbon sinks in the future. According to the latest research results of international forestry, trees are most capable of carbon sequestration in middle and early age and the carbon sequestration capacity will decrease gradually by maturity stage. As a result, to strengthen development of young forest and accelerate construction of fast-growing and high-yield forest will always keep high carbon sequestration of the forest and put carbon sinks in play to the largest extent.

VII Policy Proposals for the Implementation of Strategy of Energy Conservation and Environmental Protection in Hunan Province

In order to achieve the goal of energy conservation and environmental protection in Hunan Province, a series of more improved, supporting and powerful policies and measures should be put forward, including improving the laws in the fields of energy conservation and environmental protection, strengthening the enforcement and supervision of energy conservation and environmental protection, making policies of finance and taxation of encouraging the development of low carbon and circular economy, attempting to establish an emission trading market of carbon and so on. Special efforts of innovation on financing mode of government and enterprises should be made, in order to solve the inadequate investment on energy conservation and environmental protection in developing regions.

(I) Recent Policy

Those policies will be put forward in the future 3 to 5 years, considering the economic and social development and market maturity in Hunan, recent policies will focus on government administrative control, strengthening publicity and government support intensity, and improving mechanism.

1. Strengthening legislation. Legislation is at national level, Hunan, as a province of the PRC, should promote state legislation as well as carries on local legislation. Since 1980’s, the western developed countries have formulated a series of sound circular economy laws and regulations, in recent years, they put forward all kinds of low carbon economy acts, to provide the guarantee of law for the development of circular economy and low carbon economy. The PRC should form a perfect related law and regulation system. The Circular economy Law passed on August 29, 2008 has arranged for systems to promote the development of circular economy. This law plays an active role in promoting the development of circular economy. However, according to Circular economy Law, Energy Conservation law shall be amended as the sub-law for all aspects. Hunan shall exert local legislation, and enhance the operability of energy conservation and environmental protection. Such as publish wastes recycling-related local regulations, speed up the establishment of resources recycling system. Through the establishment of local regulations,
promote further development of solar power, wind power, hydropower, bioenergy and geothermal power, implement mandatory minimum standard of energy consumption and energy-saving certification, and promote mandatory energy efficiency labeling system.

2. Strengthening law enforcement. Enforcing the law is one of the main responsibilities of local government. Recently, an important development characteristic of national environmental protection laws is strengthening law. Combining with Hunan characteristics, the law enforcement emphasis of Hunan energy conservation and environmental protection should be: Flattening of an energy conservation and environmental protection management system and rigidization of accountability should be promoted. A vertical energy conservation and environmental protection management system with provincial cities and some counties directly subordinate to the province shall be established by taking the opportunity of the present drive of strengthening the counties and expanding their power and following the principle of “adopting the most favorable possible policies in compliance with law and regulations, and regulating the management by matching power with accountability”, so as to reduce local intervention, reinforce departmental authority, and resolve the situation of slack supervision; an energy conservation and environmental protection law-enforcement system shall be accordingly adjusted to facilitate lowering the law-enforcement focus, reduce gradation administration and promote the law-enforcement efficiency. A sound energy conservation and environmental protection work responsibility and accountability system shall be established to break down the work responsibilities, and truly assign the targets and tasks to each enterprise, each project and specific responsible persons. The supervision and assessment shall be enhanced to set up a comprehensive energy conservation and environmental protection work supervision system and include the energy conservation and environmental protection work as an important content in assessing the economic and social development and the performance of leaders of all levels, where one-vote-down system shall be applied. Actively encourage the public to participate in environmental protection, form hearing and argumentation meeting systems of public environmental interest-related plan and project, put environment public litigation system into trial use, broaden the subject range of environment litigation.

3. Guiding and Stimulating for Energy Conservation and Emission Reduction in the Whole Society by Using Finance and Taxation Policy. As the economic lever of government's macro-control, financial and taxation plays an important role in promoting low carbon economy, circular economy. The promotion of low carbon economy, circular economy mainly relies on participation of enterprises. At present, developing circular economy, especially low carbon economy would cost a lot. Therefore, the central and provincial government shall push self-transformation
for enterprises by means of financial subsidies, tax preference etc.

(1) The construction of a sound and supportive energy conservation and environmental protection – related taxation incentive and restrictive policy. The influence of tax is shown through product price acting on energy demand and consumption structure; meanwhile positive impact is acting on the investment of energy conservation and emission reduction projects through taxation incentive policy. National resource and environment tax shall be levied to respond to the opportunity of “carbon tariff”. According to The American Clean Energy and Security Act passed on June 22, 2009, the US is entitled to levy border tax adjustment, so-called “carbon tariff”, on the energy-intensive products imported from those countries without carbon emission reduction limit. For a long term, on one hand, large quantity of cheap products have been exported to other countries, on the other hand, heavy pollution was left over in the PRC. Resource and environment tax shall be levied on “Heavy energy consumption, heavy pollution and resource-related” and high carbon emission products so as to change the above situation, these tax shall be collected by Chinese government rather than by other countries, and used in protecting national resource and environment and emission reduction. For Hunan government, implement national taxation policy, push forward the resource tax reform in pilot low carbon, circular economy pilot zone, properly broaden taxable resource range properly, raise resource tax rate. Fee-for tax reform shall be carried in pilot zone, environment tax shall be levied on solid, liquid pollutants. Favorable taxation policies shall be offered to enterprises of resource-saving and environmental protection industry. These policies include: gas waste recycling products, cogeneration, waste residue comprehensive recycling and reuse and so on shall be brought into favorable taxation policies of resources recycling and reuse Value-added Tax, implement the Drawback Policy of the Value-added Tax; new energy equipment such as electrical vehicles, hybrids vehicles, wind power unit belong to enterprises in pilot zone shall be implemented the Drawback Policy of the Value-added Tax of increased tax burden, imported products belong to energy-saving, water-saving, environmental protection shall be exempted from Import Duty and VAT; government resource saving, for enterprises’ income obtained from government resource saving, environmental protection incentive, exemption of enterprise income taxes shall be implemented subject to financial allocation; taking the advantage of the opportunity that VAT for waste and used materials recycling unit would be restored, three year of transition period after policy adjustment will be given to recycling units in pilot zone, during the transition period, the drawback of storage Value-added Tax will be returned immediately or afterwards by 70%, 50% and 30%; favorable tax policies shall be implemented to enterprises undertaking research on comprehensive utilization of productive resource, environmental-friendly products, pollution treatment products; favorable policies of resource comprehensive utilization after tax shall be cancelled for small cement plant.
of 30,000 tons, to restrict the development of small cement plant for backward technology, waste of resource and heavy pollution.

(2) **Investment of more financial funds in energy conservation and environmental protection field.** The governments of all levels in Hunan Province shall optimize the expense structure from public financial expense, increase the capital input in the fields of energy conservation and environmental protection, set up corresponding financial fund guarantee mechanism. List environmental input as a independent branch, make is the priority of public financial expenses, increase input and input proportion year by year, set up mandatory and restrictive index, require that the increasing degree of financial environmental expense shall not be less than economic growth rate of the same period. Management system of special fund of clean production, renewable energy and energy saving and emission reduction etc. shall be set up, cheap loan, financial guarantee or direct subsidies shall be provided for energy conservation and emission reduction projects. The PRC is a unitary country, solving the difference between regional financial ability mainly relies on transfer payment from higher authority to lower authority. But for longitudinal transfer payment, the determination of transfer amount lacks scientific basis, due to failure to fully consider the regional earning power and expenditure level, the regional financial capacity difference and public service level difference become larger and larger. For this reason, Hunan Province can learn from Germany lateral transfer experience, to supplement longitudinal transfer payment by lateral transfer payment, on the basis of dividing regional affair right from control over wealthy, design standardized capital allocation method, to ensure provincial citizens obtain same living condition and enjoy balanced public service, guarantee that pollutant upstream area shall make proper compensation to the pollution treatment of lower river area, coordinate interest-related relationship during the process of new industrialization. Our suggestion: In the process of pollution prevention and cure in Xiangjiang river basin, withdrawing system of eco-environmental compensation shall be put into trial use, the required compensation shall be withdrew from multiple financial bureaus, according to the water quality improvement of multi-city cross section. The withdrawing funds can be used as eco-environmental compensation for sewage treatment in Xiangjiang river basin, used specially for comprehensive renovation of water pollution.

4. **Strengthen Governmental Financing**

(1) **Striving for national debt to promote energy conservation and environmental protection.** National debt is an important means of increasing financial input. With the stable development of the national economy, the confidence of investors on national debt increase stronger and stronger, as a result, issuing national debt becomes a new financing channel for energy conservation and environmental protection, during 1998-2002 after Asian Financial Crisis, central finance issued CNY660 billion of long- term treasury bonds for construction, of
which, 65 billion was used in the construction of 967 urban energy conservation and environmental protection infrastructure project like fuel gas, heating, waste and diversion treatment and so on, fueling CNY210 billion of project investment. Currently, when the government is implementing stimulus package, Hunan shall strive for more national debt fund for energy conservation and environmental protection, to fuel investment from local, enterprises, banks and other capital source, to provide powerful financial support for energy saving, environmental quality improvement and treatment of main pollution during the new industrialization in Hunan Province.

(2) Improvement of pollution discharge levy and user charge. Pollution charge is a stable capital source for the PRC’s environmental protection, which plays an active role in pollution emission reduction and control. For the past 30 years since the establishment of the PRC’s pollution charge system, regulations system of pollution charge has been relative perfected, more than 100 pollution charge standards of sewage, waste gas, waste residue, noise and radioactive substance etc., have been set up. In recent years, the investment on pollution prevention and cure amounted to about CNY5 billion. According to Pollution Charges Ordinances put into effect on July 1, 2003, pollution fee shall be listed in budget, be included into and managed by special funds for environmental protection, be used in prevention and cure of main pollution source; regional pollution control; development, demonstration and application of new technology and new process of pollution control, as well as grants-in-aid and discount loan for other environment projects specified by government. There are many types of fee for environmental protection users, but sewage treatment fee and garbage treatment fee are the main fees. Afterwards, combining with the implementation of development strategy of new industrialization, Hunan shall strengthen the collection of pollution charge, broaden the scale of special environmental fund; adjust the relation between charge and price to change current price distortion of pollution charge, raise levy standard so as to reflect actual treatment cost from price, establish virtuous operative mechanism of sewage discharge and concentrated treatment; strengthen the collection of waste treatment fee, implement payable service system garbage decontamination so as to promote the industrialized development of waste treatment.

(3) Attempting energy conservation and environmental protection lotteries. Lotteries are a complementary means of satisfying specific public demand. Due to its characteristics of public welfare, according to our existing lottery management system, the lottery distribution authority is concentrated in the State Council. Without approve of the State Council, no regions, departments, authorities, or individuals may issue lottery. Externalities and wide social effect of energy conservation and environmental protection make issuing energy conservation and environmental protection lottery possible. For the reasons that energy conservation and environmental protection lottery is a new lottery, the development of lottery industry likely complements the
improvement of resource and environment, our suggestion: During the reformation test of resources saving and environmental protection, Hunan shall strive for national support to issue energy conservation and environmental protection lottery so as to develop a new financing channel of energy conservation and environmental protection.

(4) Striving for international financing for energy conservation and environmental protection. Widely bring in international credit funds, utilize preferential loans provided by World Bank, Asian Development Bank and countries in the world, and develop energy conservation and environmental protection industry. In recent years, international organizations and bodies pay more and more attention to energy conservation and environmental protection problems. By 2020, the number of banks offering loan for “Green Project” is increasing, these capital will make energy conservation and environmental protection projects the priority of direct investment of loan. Due to limited national funds for energy conservation and environmental protection projects, multi-level governments in Hunan Province shall grasp opportunity to bring in international credit. In the process of bringing in international credit, Investment Company of energy conservation and environmental protection may be acts as legal person to attract foreign capital; it can also act as mediator, guarantor to assist enterprises in attracting foreign capital.

(II) Medium-and Long-Term Policy

Policies will be put forward in the future 10 years in Hunan; these policies will be guided by government, fully plays the role of market’s resource distribution in the fields of energy conservation and environmental protection.

1. Creation of Investment and Financing Models of Government

(1) Exploring of new investment and financing model of energy conservation and environmental protection like BOT and TOT. Obtaining investment by transferring management and administrative rights is a popular financing model around the world, which can effectively attract private capital from home and abroad to invest on the construction of energy conservation and environmental protection infrastructure, main models include BOT, TOT and so on. The major methods of adopting BOT for energy conservation and environmental protection financing include: the government or subordinate organizations provide concession agreement to investor, allow investor to develop and build a certain energy conservation and environmental protection project, the investor will make profit independently in a certain period after establishment of the project, after the expiration of agreement, the project shall be transferred to government or subordinate organizations free. Two problems must be solved when adopting BOT method for energy conservation and environmental protection financing include: one is compensation for loss of investor. The government shall guarantee bottom return rate, otherwise, compensation shall be offered. The other one is that we shall break with the restriction of “BOT model for
foreign investors only”. As a matter of fact, domestic enterprises, even local enterprises shall offered BOT model too. BOT model is widely applied in aspects like water production, sewage treatment, environmental protection, energy. For example, Sewage Treatment Plant Project in Pingjiang County, Hunan, adopted BOT franchise tender. Beijing Capital Co., Ltd. has signed Strategic Agreement with Hunan provincial government on December 21, 2007, set up project company in Hunan to be responsible for investment, construction and operation of sewage treatment facilities projects, by being authorized with franchising, Beijing Capital Co., Ltd. would invest CNY5 billion to build urban sewage treatment plants in the whole province using BOT model, after establishment, Beijing Capital Co., Ltd. would make corresponding return in terms of charged sewage treatment fee, after 30 years operation, the built sewage treatment plants will be transferred to Hunan government. The major methods of adopting TOT model for energy conservation and environmental protection financing include: on the basis of asset evaluation of built energy conservation and environmental protection infrastructure, the government transfers asset and franchising to social investor by open tendering, after purchase of facilities and franchising, the investor will establish a project company, possess, operate and maintain the purchased facilities in the duration of lease contract, the investor recoup its capital and make reasonable profit in terms of service fee, after the expiration of contract, the facilities in good conditions shall be transferred to government free. TOT model is method that government leases the energy conservation and environmental protection facilities to private enterprises, the lease enterprise pays one-time rent to the government. By TOT model, government can recover construction capital and solve the problem of operation.

(2) Adoption of PPP method. PPP is abbreviation of Private and Public Partnership, it refers to the cooperative investment and construction of infrastructure between public sector of government and private enterprise to satisfy urban infrastructure demand. Most public welfare infrastructures cannot be constructed by using private capital for lack of investment value without integration. PPP method commercializes these projects without investment value; private organization may recoup capital and make profits during project operation process, while government can pay the minimum price. In developed countries, PPP is applied in many aspects, such as investment and construction of infrastructures (e.g. hydropower plant, thermal plant), the construction of non-profit-making facilities (e.g. prisons, schools). The advantage of PPP method is that it introduces market mechanism in the investment and financing of infrastructure. But not all urban infrastructure projects can be commercialized, when applying PPP method, the government shall take project operation cost and profit into consideration according to social and economic development demand, private capital’s over-occupancy of public interest shall be avoided.
2. Encouraging Adoption of Multi-financing Model by Enterprises to Promote Energy Conservation and Environmental Protection

(1) Attracting venture investment fund into energy conservation and environmental protection field. The entry of venture investment fund into energy conservation and environmental protection field, can realize the combination of energy conservation and environmental protection industry with capital market, therefore the capital injection for the energy conservation and environmental protection enterprises can solve the problem of insufficient funds for energy conservation and environmental protection construction; the entry can also assist unlisted energy conservation and environmental protection enterprises to lay foundation for future financing in securities market. As a creative financial instrument, venture investment fund greatly enriches the financing means in capital market. In the PRC, the projects like Xinjiang Light Energy Convert Project, Shougang Group Junk-automobile Treatment, Industrial Waste Decontamination, have brought in venture investment funds. From now on, all kinds of venture investment funds shall be encouraged to set up, financing model of venture investment combined with energy conservation and environmental protection shall be explored and improved, to guide the flow of funds in energy conservation and environmental protection industry. To attract financial institutes like Securities Company, insurance company to carry out venture investment business by creation of attractive conditions on the premise that the financial institutes subject to laws and regulations. Support venture investment enterprises to improve energy conservation and environmental protection ability in terms of credit financing model within the laws.

(2) Striving for issuing stock for financing. Stock market is an important means of absorbing idle capital to raise funds for energy conservation and environmental protection, broadening the channel for energy conservation and environmental protection financing, puts energy conservation and environmental protection into market. In future, Hunan shall cultivate listed back-up resource of energy conservation and environmental protection enterprises, support energy conservation and environmental protection enterprises with comparative and competitive advantages to carry on joint-stock transformation by means of utilizing stock market, recommend profitable enterprises to be listed, to realize the raising and expansion of enterprises capital by social financing, speed up financing from stock market, to improve energy conservation and environmental protection investment ability of enterprises. Currently, tens of energy conservation and environmental protection related enterprises have been listed in the PRC, forming an environment plate in securities market by good performance and high development.

(3) Broadening enterprise bond financing. Compared with issuing stock, the cost of issuing enterprise bond is lower for enterprises, the stock ownership and management structure of enterprise will not be changed after the issuing, financial
leverage can be utilized by using external capital to expand company size so as to increase stockholder’s profits. Therefore, enterprises shall attach importance to raising funds for energy conservation and environmental protection projects by using enterprise bond. In future, Hunan shall create better conditions to obtain support from relevant departments to issue more bonds of energy conservation and environmental protection project.

(4) Developing asset backed securitization financing. Short for ABS, Asset Backed Securitization refers to the securities financing model for raising funds by issuing high-profit bonds in international market, it is based on asset of project, guaranteed in terms of future project profits. Since 1980s, ABS financing model appeared rapidly in America, the PRC’s first ABS financing package aiming at obtaining international financing was imposed in Chongqing in 1998. The advantages of adopting ABS are as follows: first, financing risk is low. The issuance basis of ABS is not all legal property of the project company, but limited to the securitized asset, the reimbursement funds of the securities come from cash flow created by secured asset, the discharge of asset securities is also limited to the securitized itself, reducing operational risk of the project company. Second, financing cost is low. Permission, authorization and foreign exchange guarantee from government are not required for ABS operation, reward, price difference can be reduced to the maximum extent, reduce financing cost. Third, the “Limited Recourse” decides that ABS financing shall be adopted on the premise that there must be reliable and expected cash flow income. In future, Hunan shall attempt raising funds for energy conservation and environmental protection by means of ABS model. Meanwhile, the issuance of ABS bonds in domestic market can be considered, whose low investment risk can attract investors, providing a good channel for those growing investor groups like Social Security Funds, Pension Fund so as to broaden financing channel for energy conservation and environmental protection.

(5) Developing trust fund financing. Trust fund is an attempt financing in the field of urban infrastructure since 2002. Acting as a Trustee, Trust company raise funds from investors (organization and individual) by means of establishing a specific trust and investment plan. The advantages of trust fund are as follows: the return on investment is far higher than bank deposit, having strong attraction to investors; trust fund is of better stability, the investment plan will not be terminated even trust company is changed. Afterwards, Hunan shall explore and develop financing of energy conservation and environmental protection trust fund in two aspects: one is trust investment on energy conservation and environmental protection. Specific fund of energy conservation and environmental protection can be set up by the energy conservation and environmental protection department, for the purpose of guiding duly, accurate, high-efficient, concentrated investment on energy conservation and environmental protection industry, to push forward the development, manufacture,
application and extension of energy conservation and environmental protection products. The funds will be concentrated in forms of bonds and stocks, and the energy conservation and environmental protection trust department will issue beneficial certificate to investor, and the certificate holder can withdraw the benefit by proportion. The other one is trust and lease of energy conservation and environmental protection, manufacturer lease energy conservation and environmental protection equipment and facilities, or lease the equipment after purchase of trust department so as to solve the problem of lack of capital.

(6) Extending the energy performance contract (EPC). The energy performance contract (EPC) refers to the cooperation between professional energy management companies (EMCs) and energy users. The EMCs organize experts to perform energy conservation diagnoses for the energy users, and help them identify various problems in their uses of energy. The EMCs implement energy conservation projects with independent financing, thus saving the energy users extra investment. The EMCs profit from the energy conservation benefits in the terms of the contracts through the energy conservation projects, and when the profiting terms as specified in the contracts terminate, the fixed assets invested by the EMCs in the energy conservation projects will be transferred to the energy users. The EMCs engaged in the EPC services are non-governmental commercial economic entities, and are distinct from the current energy conservation (technical) service centers subordinate to the local government, so they are free from the institutional defects of the mismatches between the investors and the operators. The energy performance contract is greatly hailed in developed countries and developed cities and provinces of the PRC for having successfully broken through the technical and capital bottlenecks of energy users. In the Decision of the State Council on Strengthening Energy conservation Work issued in August 2008, the EPC has been designated as a key energy conservation mechanism to extend in the PRC. At present, the EPC is still in the budding stage in Hunan Province. In order to integrate the civil energy conservation resources, it is quite imperative for us to introduce, facilitate, cultivate and support the EPC. With the EPC model applied, we will help and urge the high energy consumption enterprises in Hunan to implement energy conservation renovation projects, so as to achieve the energy conservation and consumption-reducing goal, while securing the enterprises considerable energy conservation benefits, thus affecting a win-win of economic and social benefits.

3. Attempting to establish an emission trading market of carbon

Hunan Province shall facilitate the formation of a price-discovered emission trading market and mechanism, and develop the relevant derivative environmental finance instruments. The concept of emission trading of carbon derives from concept of “Pollution-Discharge Right Trade” put forward by economists in the 1970s, “Pollution-Discharge Right Trade” is an important environmental economy policy for
market economy country, and the USEPA is the very first used this policy in the management of air pollution and river pollution. Afterwards, Germany, Australia, Britain and some other countries implemented “Pollution-Discharge Right Trade” policy. Large emission trading centers of carbon have been formed in some advanced countries and regions like Europe, America, such as the EU Emissions Trading Scheme (EUETS), EU Climate Exchange (ECX), and Chicago Climate Exchange (CCX), what’s more, the derivative finance instruments from securitization of pollution-discharge right were developed, such as European Union Allowances (EUAs) under the EU Emissions Trading Scheme. The PRC’s carbon trading is at its primary stage, after the promotion of energy conservation and emission reduction policy, an emission trading market is expected to be established. As an important supplier of emission trading of carbon, the PRC has not formed a complete trading platform, the trading information transparency in international trading is not enough, and domestic enterprises are in an inferior status. On August 5th, 2008, two organizations-Beijing Environment Exchange and Shanghai Environment Energy Exchange were respectively established in Beijing and Shanghai. Both of them now are only performing technology trading of energy conservation and environmental protection.

The international carbon trading is classified into two types: one is the quota-based trading, where the buyers purchase the emission-reduction quotas stipulated, assigned or auctioned by supervisors under the system of “cap-and-trade”, such the Assigned Amount Units (AAUs) under the Kyoto Protocol or the European Union Allowances (EUAs) under the EU Emissions Trading Scheme (EUETS); the other is project-based trading, where the buyers purchase the emission-reduction quotas from provable greenhouse gas emission reduction projects, with the Certified Emission Reductions (CERs) under the Clean Development Mechanism (CDM) and the Emission Reduction Units (ERUs) under the joint implement mechanism as typical examples. Hunan Province can attempt to set up the first type of emission trading market by defining the pollutant emission quotas as goods and forcing the major polluters to purchase the emission quotas from enterprises that produce less pollution, so as to establish a market trading mechanism and a legal basis for payable emission and emission trading, facilitate implementing the payable emission system in the primary emission market in the pilot areas, build a platform for payable emission and total pollutant emission control, research the technical means of emission trading, and construct an emission tracking platform as well as an emission trading platform.
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