

**TRANSFORMING
TOWARD A HIGH-INCOME
PEOPLE'S REPUBLIC OF CHINA
CHALLENGES AND RECOMMENDATIONS**

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Foreword

Challenges in Transforming to a High-Income People's Republic of China

A Speech by

Takehiko Nakao

President, Asian Development Bank

At the High-level Workshop on Joint Research on the 13th Five-Year Plan (2016-2020)

23 October 2014, Beijing, People's Republic of China

Your Excellencies, distinguished participants, ladies and gentlemen. I am honored to be here with you today.

A. Introduction

More than three decades of successful reforms have transformed the People's Republic of China (PRC) into the second-largest economy in the world. Rapid growth and structural reforms resulted in the PRC's swift transition from a low-income to a middle-income country. They also raised the PRC's influence globally.

Despite impressive achievements, the PRC's pursuit of high-income status requires further in-depth structural reforms. Technological and productivity gaps between the PRC and advanced economies remain large. This is compounded by vanishing low-cost advantages and the end of the demographic dividend, implying that future growth must be driven by productivity increases. It is thus vital to accelerate the process of industrial transformation through innovation and technological upgrading.

In addition, growing environmental concerns after years of rapid resource-intensive economic growth have led the Chinese society to question the soundness of the growth model. Further, the benefits of rapid growth have not been evenly distributed among individuals and regions.

Central and western regions lag behind in terms of social and economic development, and poverty is more widespread in those regions.

The Decisions on Major Issues Concerning Comprehensively Deepening Reforms, released after the Third Plenum on 15 November 2013, acknowledge these challenges. The *Decisions* also call for an *ecological civilization*, one that balances economic development and environmental sustainability. I was impressed with the comprehensiveness and depth of the reform vision presented in the *Decisions*.

The PRC can maintain gross domestic product growth of 7% or higher in the next few years, provided structural reforms are actively pursued. Yet, the task ahead is challenging. It is essential for the PRC's 13th Five-Year Plan (13th plan) to effectively translate the *Decisions'* reform vision into actual policies and programs. The Government of the PRC then needs to forcefully implement them.

Against this background, the Asian Development Bank (ADB) is deeply honored to be invited by the National Development and Reform Commission to support the preparation of the 13th plan. ADB has mobilized ADB-wide resources to contribute to this important assignment under the concept of "One ADB." Close cooperation between ADB and the PRC's National Economic Reform Institute has already resulted in comprehensive preliminary research recommending ways to address major challenges under the new 5-year plan. I am glad that today's high-level workshop provides an important opportunity to discuss the main findings of this research.

B. Challenges in Moving to Higher-Income Status

ADB's discussions with the National Development and Reform Commission during the genesis of this knowledge work identified the following eight key topics:

- (i) developing policies to bring about market-led industrial transformation, and technological upgrading to foster innovation-driven growth;
- (ii) addressing the needs of the rural population and modernizing the agriculture sector to balance rural-urban development;
- (iii) catalyzing human resource transformation to develop the human capital needed to underpin innovation-driven growth;
- (iv) mitigating environmental degradation to ensure a sustainable development path;
- (v) addressing the impact of climate change alongside the process of industrial transformation;
- (vi) enhancing water security as part of the challenge to sustain inclusive growth;
- (vii) modernizing public finance, particularly at the local government level, including the development of a sustainable subnational debt management system; and

- (viii) facilitating the PRC's further integration into the global and regional economy through trade, investment, and greater involvement in the international financial system.

While, originally, environmental protection and climate change were identified as one combined challenge, they are discussed separately as different approaches are needed to address them. In addition, given the importance of water security for the PRC's sustainable development, findings from ADB's ongoing Country Water Assessment on the PRC are incorporated in this policy research for the 13th plan.

Drawing on ADB's knowledge gained from its work with member countries, relevant international experiences, and the PRC's own experiences in structural reforms, the preliminary research makes a wide range of policy suggestions to support the preparation and implementation of the 13th plan. While the findings will be discussed at length during today's workshop, let me present a few key recommendations.

C. Preliminary Key Recommendations

As to the first challenge, industrial transformation, the government needs to shift its industrial policy from the current approach in which the government picks up the winners, to a market-driven approach in which the government lets the market select the winners. In addition to channeling resources to research and development by the public sector, the government can draw on advanced technology already available in the market. One example of this kind of technology is "green buildings" or environmentally desirable buildings.

In order to promote market-driven industrial transformation, it is also essential to reform state-owned enterprises, focusing on transparency and accountability. Policies should encourage private sector investment in innovation through venture capital and public-private partnerships. It is also important to strengthen competition policies and protection of intellectual property rights.

As to the second challenge, balanced rural-urban development, a greater role of the private sector in agribusiness, including opening up agribusiness to foreign direct investment linked to global value chains, will help modernize the agriculture sector and boost rural income.

Land use rights of rural residents should be recognized, so that rural residents can receive fair compensation by selling or leasing their land, or use their land as collateral to obtain loans. This will increase rural incomes and gradually close the rural-urban divide.

In the context of rapid urbanization, balanced rural-urban development requires "hukou relaxation," which would improve education, training, and employment opportunities for migrant workers. Social security reforms are also necessary to provide health insurance and pensions for migrant workers and the rural population.

Better logistics and infrastructure are another important ingredient to balance development by linking rural areas to urban growth centers. Reducing the high cost of logistics in the PRC is also a key to improve the competitiveness of its products in international markets. ADB is supporting the development of model multimodal logistics parks in Chongqing (重庆) combining railways, roads, and waterways.

The third challenge is human resource transformation. Innovation and development of a knowledge economy is fundamental for the PRC to transform its industry and sustain growth. This requires efforts to upgrade human resources with high-quality education and training systems that are responsive to the changing needs of the economy.

Expanded school–enterprise cooperation is a good approach to make education more demand-driven and relevant to the needs of the knowledge economy. Greater involvement of the private sector in education should be pursued, particularly in technical and vocational education and training (TVET). At all levels of education, including TVET, the government has an important role in setting quality standards and providing scholarships to ensure the poor have access to education.

ADB is supporting reforms in TVET systems in Hunan (湖南), Guangxi (广西), and Guizhou (贵州) by strengthening the linkage between TVET and industries. At the tertiary level, ADB is providing policy advice on graduate unemployment to improve the employability of graduates.

The fourth challenge is environmental protection. I note that the revision of the Environmental Protection Law will make industries recognize the expenses for pollution mitigation as part of production costs. Only by improving the quality and public disclosure of environmental data can the new Environmental Protection Law’s environmental monitoring and enforcement reforms be realized. Nongovernment organizations, citizens, and the media need to be empowered to help oversee and enforce environmental standards against polluters.

As stated in the Memorandum of Understanding signed in January 2014 between ADB and the Ministry of Environmental Protection, ADB is strongly committed to supporting the PRC’s efforts to achieve ecological civilization through green development. ADB is ready to support the government in the introduction of an environmental tax.

The fifth challenge is climate change. The 13th plan presents a great opportunity for the PRC to balance economic growth with actions to address the challenge of climate change. We recommend the removal of fossil fuel subsidies to improve energy efficiency, the promotion of greater use of renewable energy, and the introduction of incentives for low carbon technology. These actions can help the PRC peak out carbon dioxide emissions in the next 10–15 years or even sooner, and support the development of innovative climate technologies.

ADB is actively supporting the PRC in this challenge. We have helped finance the Tianjin (天津) integrated gasification combined cycle power plant, and the concentrated solar power project in Qinghai (青海). We will help pilot carbon capture and storage in Tianjin, possibly combining innovative financing, such as emissions trading.

As to the sixth challenge, water security, I would like to point out that water is the single most pressing resource bottleneck for the PRC today. It is estimated that water scarcity and pollution is costing the country about 2.3% of gross domestic product every year. It is urgent to reform water management, in particular to allow a greater role of the market in areas such as water supply, waste water treatment, and water resource protection.

ADB's loan resources are already being used to introduce new approaches, such as eco-compensation scheme under the Guiyang (贵阳) Integrated Water Resources Management Project in which upstream residents are being paid by the downstream community for activities to keep water resources clean. During the 13th plan, ADB will support the enhancement of national eco-compensation regulation and market-based approaches to water management.

With regard to the seventh challenge, managing local government debt, there is a need to reform intergovernmental fiscal relations to better assign responsibilities for public services provision and allocate revenues between the central and various levels of local governments. Revenue-sharing to balance rich and poor local governments also needs to be improved.

In addition to the efforts to raise sufficient tax revenues, local government bond issues will play a key role in financing the planned structural reforms, including the government's new urbanization strategy. Adopting a sound regulatory framework will ensure that local governments manage their debt in a fiscally sustainable manner.

ADB is actively supporting the government in the preparation of a public finance reform strategy, and the establishment of a debt management system.

As to the last challenge, further integration with the global economy, the PRC needs a clear and consistent national policy to pursue open trade and investment regimes. Improved connectivity and trade facilitation projects through the Central Asia Regional Economic Cooperation and the Greater Mekong Subregion programs are important to foster trade with neighboring countries.

ADB is supporting the PRC's adoption of international standards for goods in its domestic market. This will help remove nontariff barriers for the entry of foreign products to the PRC and allow Chinese products, such as meat produced in Henan (湖南) province, to be internationally marketable.

Efforts to open up the PRC's financial market and capital account, and to develop the domestic legal framework to protect investors, are also essential to promote the PRC's further integration in the international financial market.

In addition to these recommendations, I would like to highlight the importance of enhancing the monitoring system in implementing the 13th plan. As a large open economy, the PRC's influence on other countries will continue to increase, while developments in the global economy will also increasingly influence the PRC. Such a changing international context adds new challenges for policy makers. Flexibility is the key to successfully adjust to new environments. This may imply a need for a new monitoring and adjustments mechanism for the implementation of the 13th plan, different from the arrangements made for the earlier five-year plans.

D. Conclusion

In its transition to high-income status, the PRC enjoys an important comparative advantage, which is the opportunity to benefit from both successful and failed international experiences. ADB can help the PRC learn important lessons from reforms in other countries. The preliminary research we are going to discuss today is part of our effort to provide such knowledge support to the PRC, which, in turn, will also guide ADB's lending and knowledge operations in the country.

ADB will continue to use its loan and grant resources to support the PRC's reform process. We are currently discussing with the authorities new lending modalities, such as results-based loans, that may be more effective in addressing the PRC's new challenges.

To conclude, I would like to note that the Chinese people should all own and benefit from the PRC's outstanding development experience. In this regard, let me quote a phrase from the "Strategies of Warring States (战国策)," written during the Han Dynasty (BC206-AD8): "Benefiting people should be the constant principle to govern a country, and a good government needs to follow the rule of law (制国有常,利民为本; 从政有经, 令行为上)."

Thank you.

Preface

In 2013, the Asian Development Bank (ADB) was privileged to be invited by the National Development and Reform Commission (NDRC) of the People's Republic of China (PRC) to contribute to the preparation of the 13th Five-Year Plan (13th plan) covering 2016–2020. ADB responded to this request through a “One ADB” approach by pulling together the intellectual resources available in all parts of ADB, supported by the technical assistance (TA) project for the PRC: Support for the Thirteenth Five-Year Plan (TA 8641-PRC).

The 13th plan covers a critical period for the PRC as it aims to transform itself from an upper middle-income to a high-income country. To achieve this goal, the PRC needs to address the following eight key challenges jointly identified by ADB and the NDRC: (i) industrial transformation, (ii) balanced development of rural and urban areas, (iii) human resource transformation, (iv) environmental protection, (v) mitigation and adaptation of climate change, (vi) water security, (vii) subnational debt management, and (viii) further integration of the PRC with the international economic system.

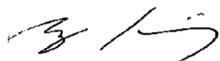
The objective of this knowledge support was to analyze the key issues under each of these eight challenges and recommend practical policy options. ADB submitted a set of reports comprising one main report and eight subreports (one each on the eight challenges) to the NDRC on 30 November 2014. This is the main report that summarizes the major findings and policy recommendations from the eight subreports. The findings and policy recommendations were discussed at the High-Level Workshop on Joint Research on 13th plan attended by the President Takehiko Nakao of ADB and the former NDRC Vice Chairman Xu Xianping, who was in charge of development plans. The NDRC appreciated ADB's contributions and acknowledged that the findings and recommendations were useful inputs to the 13th plan.

As the 13th plan is currently under implementation, it was considered useful to look back at the research work we carried out in 2014 to appreciate better how the challenges were perceived in the formulation of the plan.

I would like to thank Director General Xu Lin of the Development Planning Department of NDRC for his guidance and his team's (Deputy Director General Yue Xiuhu, and Deputy Directors Han Yun and Wang Li) support during this process. I would also like to thank Professor Fan Gang and his team from the National Economic Research Institute for their valuable inputs.

I would like to acknowledge the contributions from the ADB team—ADB Institute (Dean Naoyuki Yoshino); East Asia Department; and Economic Research and Regional Cooperation Department (former Chief Economist Shang Jin Wei and Senior Advisor Noritaka Akamatsu). I also particularly appreciate the efforts of the focal staff: Philip Chang (task manager and industrial transformation); Longyun Peng (co-task manager and industrial transformation); Sharad Saxena (balanced development of rural and urban areas); Sofia Shakil and Wendy Walker (human resource transformation); Qingfeng Zhang (environmental protection and water security); Ashok Bhargava and Xuedu Lu (climate change); Yolanda Fernandez (subnational debt management); and Ying Qian and Yuebin Zhang (further integration of the PRC with the international economic system).

I would also like to acknowledge the support for this TA from the Department of International Economic and Financial Cooperation of the Ministry of Finance.



Ayumi Konishi
Director General
East Asia Department
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Abbreviations

| | |
|----------------------|--|
| ADB | Asian Development Bank |
| CO ₂ -EOR | carbon dioxide-enhanced oil recovery |
| ETS | emissions trading scheme |
| GDP | gross domestic product |
| MLSG | Minimum Living Standards Guarantee System |
| NDRC | National Development and Reform Commission |
| OECD | Organisation for Economic Co-operation and Development |
| PPP | public-private partnership |
| PRC | People's Republic of China |
| R&D | research and development |
| SMEs | small and medium-sized enterprises |
| SOE | state-owned enterprise |
| TA | technical assistance |
| TVET | technical and vocational education and training |
| UREMP | urban-rural environmental master planning |
| WTO | World Trade Organization |

Introduction

1. The economic performance of the People's Republic of China (PRC) has been spectacular over the last three decades. Gross domestic product (GDP) growth has averaged about 10% per year and per capita income has increased by a factor of 13. Rapid growth has led to significant improvement in the well-being and quality of life of the population. From the early 1980s to the late 2000s, the incidence of \$1.25-a-day poverty declined from 85% to about 13%; life expectancy at birth increased from 67 to 73 years; and child mortality under the age of 5 years declined from 65 to 18 deaths per 1,000. Economic expansion has also led to a sharp rise in the country's influence upon the global economy. The PRC is now the world's largest exporter, second-largest importer, and second-largest economy.¹ The PRC is also a leading global destination for foreign investment and its outbound financial flows have been growing substantially.
2. Rapid growth, however, has posed several challenges for the PRC, namely:
 - (i) **Economic imbalances.** Substantial progress has been made to rebalance the economy both in terms of reducing reliance on trade, and in increasing consumption. Nonetheless, on the demand side, growth still relies heavily on investment, with private consumption relatively weak despite efforts to increase private spending. Over-investment could lead to inefficient resource allocation, poor asset quality, and worrisome level of debt. On the supply side, a key source of imbalance is the continued promotion of industry over the services sector.
 - (ii) **Increased income inequality and regional disparity.** The Gini coefficient of per capita consumption expenditure increased from about 0.30 in the early 1980s to 0.47 in 2013, indicating significant increase in income disparity between the rich and the poor. Moreover, the disparities between rural and urban areas are still wide. Despite significant expenditure and various policy programs, inequality among provinces is still large. High-income inequality would not only constrain growth, but could also generate social tensions and instability.
 - (iii) **Rising wages and widening human resource gap.** Many believe the PRC is approaching the "Lewis turning point," in which a decline in rural surplus labor leads to tighter labor markets and rising wages. Real wage growth in the industry sector now exceeds labor productivity gains. Labor supply will also be affected by an aging population and an end to the demographic dividend. With rising labor costs, the PRC's growth needs to be driven increasingly by productivity improvements

¹ Asian Development Bank (ADB). 2012. Growing beyond the Low-Cost Advantage – How the People's Republic of China can Avoid the Middle-Income Trap. Mandaluyong City.

through innovation and upgrading, which requires significant improvements in human capital.

- (iv) **Environmental degradation, climate change, and water scarcity.** There are growing concerns on the appropriateness of the current development model. Issues on natural resources; air, soil, and water pollution, and food safety are becoming more prominent. Rising demand, inefficient use, and pollution are contributing to water shortages; this is exacerbated by increasing variability in the distribution and amount of precipitation in some areas. High fossil fuel energy consumption and increasing dependence on oil imports make the PRC vulnerable to external shocks as well as damaging the environment and contributing to climate change.
 - (v) **Vulnerability in local government finance.** Increased demand for infrastructure and public services requires substantial financing. Together with the mismatch in revenues and expenditures of local governments, this has contributed to the large accumulation of subnational government liabilities. While the absolute amount of local government debt appears manageable at present, its rapid expansion, coupled with mounting off-budget liabilities, is a concern.
 - (vi) **Challenging external economic environment.** Since the global financial crisis, external demand from advanced economies has weakened as consumers and businesses are deleveraging. Moreover, developed economies are at risk of becoming trapped in a low-growth, low-inflation cycle in which mounting public, household, and company debt will be hard to pay down. With the current slow pace of global recovery, external demand may not be able to contribute to the PRC's growth as much as in the past. Moreover, the PRC's trade balance with its major trading partners is likely to continue to generate tension.
3. These challenges were also highlighted at the Third Plenary Session of the 18th Central Committee of the Communist Party of China (Third Plenum) held on 9–12 November 2013, and in The Decisions on Some Major Issues Concerning Comprehensively Deepening the Reform (Decisions) issued on 15 November 2013. If not addressed, these problems could hinder the PRC's efforts in moving toward a high-value economy.
 4. The PRC's economic growth has begun to moderate as the country moves to the “new normal,” and this trend is expected to be maintained over the medium to long term as the PRC emphasizes the quality instead of the quantity of growth. This trend underscores the need to adopt a coherent, coordinated set of structural reforms to address the new challenges confronting the country.
 5. The PRC has a long tradition of formulating 5-year plans to address development challenges, and promote social and economic development. These plans lay out the strategic objectives of the country, determine work priorities of the government, and provide guidance for market activities. Since the founding of the PRC, the country has formulated a total of 12 plans; each of these plans has had a significant impact on the PRC's development during their respective plan periods. Currently, the implementation of the Twelfth Five-Year Plan (12th plan), 2010–2015, is more than halfway. The preparation of the Thirteenth Five-Year Plan (13th plan), 2016–2020, has started. The 13th plan period is a critical period for the PRC as the country aims to establish what

the government calls a “comparatively well-off and prosperous society,” and make the transition from an upper middle-income to a high-income country.

6. As understood from the Third Plenum, the PRC intends to move away from the previous growth model to a new model that promotes innovation, inclusiveness and sustainability. To achieve this, the PRC needs to address the following eight key challenges in the 13th Plan: (i) industrial transformation, (ii) balanced development of rural and urban areas, (iii) human resource transformation, (iv) environmental protection, (v) mitigation and adaptation of climate change, (vi) water security, (vii) subnational debt management, and (viii) further integration of the PRC with the international economic system. In other words, these eight pillars will be critical to supporting the new growth model.
7. In this context, the National Development and Reform Commission invited the Asian Development Bank (ADB) to contribute to the preparation of the 13th plan covering the above eight challenges. ADB responded to this request through a “One ADB” approach by pulling together the intellectual resources available in all parts of ADB, supported by ADB’s technical assistance (TA) project for Support for the Thirteenth Five-Year Plan, which was approved on 22 April 2014.²
8. The objective of this research is to analyze the key issues under each of these eight challenges jointly identified with the National Development and Reform Commission and provide practical policy recommendations. Eight subreports (one on each of the eight challenges) were prepared within a tight time schedule. Workshops,³ domestic field visits, and regular discussions between members of the consulting and ADB teams were conducted as a part of this research. Detailed recommendations for consideration in the 13th plan are contained in the respective subreports, specifically:
 - (i) **Industrial transformation.** This subreport examines how industrial transformation will contribute to the new growth model, in particular, through technological progress and innovation, industrial upgrading, strengthening of the services sector, and promoting small and medium-sized enterprises (SMEs). It analyzes the binding constraints and examines the roles of the government and the market in facilitating this process.
 - (ii) **Balanced development of rural and urban areas.** This subreport examines how balanced development of rural and urban areas will contribute to reducing regional inequality and improving livelihoods for those who have been made vulnerable by rapid socioeconomic change. It analyzes and recommends improvements in rural financial services, integrated supply chains and access to markets for farmers, welfare and pension systems, integrated social assistance, and supporting migrants through more inclusive public services and social assistance.
 - (iii) **Human resource transformation.** This subreport examines how best to strengthen human capital, which is essential to increase labor productivity and a priority for the PRC as it transitions to a high-income economy. It focuses on three critical pillars that must be tackled to ensure this transition: (a) expansion of human

² ADB. 2014. *Technical Assistance to the People’s Republic of China for Support for the Thirteenth Five-Year Plan*. Manila (TA 8641-PRC).

³ Workshops include: workshop to discuss proposals of the eight challenges on 3 June, progress review workshop on 21 July, midterm review workshop on 10 September, and high-level final workshop on 23 October.

capital stock, (b) improvement of the quality and relevance of education to make it flexible and responsive, and (c) promotion of innovation for development of a knowledge economy. It analyzes key challenges and opportunities for improving labor productivity and moving up the value chain, in the context of the PRC's new growth model and demographic transformation.

- (iv) **Environmental protection.** This subreport examines the key current environmental challenges for the PRC, such as air pollution, solid waste management, soil pollution, natural disasters, and degraded ecosystem. It analyzes the barriers to environmental protection, including institutional, regulatory, and legal aspects. It also examines the roles of the government and the market to help resolve environmental problems and promote environmental protection.
- (v) **Climate change.** This subreport analyzes the urgent need to step up efforts on climate change, and how such efforts could have significant co-benefits. It highlights the role of the market in selecting mitigation and adaptation solutions, and the role of the government in guiding the market by setting appropriate targets and performance standards; and creating the right enabling environment to deal with climate change and promote climate technology innovations.
- (vi) **Water scarcity.** This subreport examines how current water shortages and imminent scarcity require aggressive investments in water efficiency and productive technologies across all sectors, a shift to water demand management, and deeper reforms to enable the private sector and market forces to contribute to closing the water supply–demand gap. Recommendations on practical actions for improved integrated river basin planning and management, optimal infrastructure, the introduction of new economic and financial instruments, and the augmentation of existing disaster response capacities are proposed. Given the importance of water security for the PRC's sustainable development, findings from ADB's ongoing Country Water Assessment for the PRC formed the basis of these recommendations.
- (vii) **Subnational debt management.** This subreport focuses on the importance of introducing a sound regulatory framework to manage subnational government debt in the PRC in light of the financial challenges posed by government plans for economic transformation and rapid urbanization. It reviews best international practices in the establishment of subnational debt management systems to formulate policy recommendations for the PRC to adopt a debt management framework. As part of the overall regulatory framework, it identifies suitable policy actions to develop subnational government bond markets in the PRC. The introduction of credit rating and early warning systems, which are critical elements to mitigate risk in subnational government bond markets, is also analyzed.
- (viii) **Further integration of the PRC with the international economic system.** This subreport analyzes the strategies for advancing the PRC's integration with the global economy. It analyzes how the PRC can promote further integration through trade and investment, and further integration into the global financial system. It assesses the roles of the government and the market in facilitating this process.

9. This main report summarizes the major findings and policy recommendations for the 13th plan from the eight subreports. Following the Introduction, each chapter of the main report corresponds to each of the eight subreports. Moreover, each chapter contains a strategic context which provides a self-contained storyline, followed by key recommendations. The last chapter discusses ADB's possible support for the implementation of the 13th plan.



Industrial Transformation

A. Strategic Context

10. The 13th plan period is critical for the PRC as the country makes the transition to a high-income economy. To achieve this goal, the PRC needs to increase its competitiveness and move up the global value chain. This requires shifting resources from less productive to more productive areas within and across sectors. Moreover, further opening up of the PRC markets will expose the PRC firms to greater international competition and force them to innovate and upgrade. The expansion of both the services sector and SMEs should also be core components of the PRC's industrial transformation agenda. This chapter summarizes the discussions and key policy recommendations to promote innovation, accelerate industrial upgrading, and expand the services sector and SMEs from the subreport on industrial transformation.
11. Innovation is key to improving productivity. Innovation not only includes scientific and technological innovation but also business models, marketing, organizational structures, production chains, human capital, and environmental issues. The midterm review of the 12th plan highlighted three main problems in innovation: (i) firms' weak capacities to innovate, (ii) ill-defined role for the government in promoting innovation, and (iii) a weak innovation environment. These issues need to be fully addressed in the 13th plan.
12. Industrial upgrading is closely linked to technological progress and innovation. The PRC's industrial transformation in the last three decades has been marked by the rapid transfer of resources from the less productive primary sector to the more productive secondary sector. The goal of industrial upgrading is to facilitate a similar shift from less productive to more productive areas. In previous 5-year plans, the PRC implemented selective industrial policies characterized by direct government interventions and "picking winners" in the market. The results have led to low efficiency in resource allocation, disincentives to entrepreneurship, a segmented market, and overcapacity. During the 13th plan, the government should shift its industrial policy to a market-driven approach where the market selects the winners.
13. The services sector in the PRC has become an important engine for economic growth and is also an important factor in the development of other sectors in the country. Nonetheless, the development of the services sector has not kept pace with the PRC's overall economic development. In 2013, the share of services in GDP was 46.1%, which is about 15 percentage points lower than an economy would generally reach at this level of GDP per capita. The share of employment in services (at 38.5%) also lags behind that of GDP, and is below international norms. Complicated institutional restrictions, a lack of effective institutional support and regulatory enforcement, and inadequate administrative and regulatory reforms have hindered the services sector to realize its full potential.

14. International experience shows that SMEs have been the main driver of entrepreneurship and the main engine for innovation. They have also played a positive role in promoting economic development and job creation. Therefore, nurturing entrepreneurship and expanding SMEs are essential to promoting innovation and increasing efficiency. Over the past 30 years, the main entrepreneurial players in the PRC have been primarily local governments, at the expense of SMEs. As a result, this has reduced incentives for SMEs to innovate and commercialize their inventions. Further, state-owned enterprises (SOEs) have used administrative advantages to suppress the development of SMEs. Limited access to finance has also hindered the expansion of SMEs.

B. Key Recommendations for the 13th Five-Year Plan

Recommendation 1-1: Develop a market-driven industrial policy.

15. The government should shift its industrial policy from the current supply-driven approach where the government picks successful enterprises, to a market-driven approach where the government allows the market to determine the successful enterprises. Specific actions include:
 - (i) Create and improve institutions to allow the market to play a decisive role in resource allocation. This includes providing market supervision and consumer protection, strengthening property rights protection, strengthening competition policy, and breaking up monopolies.
 - (ii) Provide efficient public goods and services, such as reducing administrative approvals and direct intervention, improving information dissemination, and providing hard and soft infrastructure.
 - (iii) Create an environment to encourage private sector investments (e.g., through venture capital, and public-private partnerships [PPPs]).
 - (iv) Support demand-driven initiatives to achieve national strategic goals, such as those relating environmental protection and mitigation of climate change. For example, incentives (e.g., tax incentives) could be created to encourage consumers to buy certain environment-friendly goods and services (e.g., electricity generated from renewable energy, energy-efficient products, and “eco-cars”). This will help build the market for these goods and services.

Recommendation 1-2: Develop policies to enhance industrial competitiveness.

16. Both traditional and emerging industries in the PRC have ample room for further development. The government should develop policies to enhance industrial competitiveness. Specific actions include:

- (i) Adopt competitiveness-enhancing policies to actively promote the development of all industries rather than a few emerging industries, accelerate the application of sophisticated technologies, and achieve the integration of industrialization and information technologies.
- (ii) Strengthen competitive market mechanism by reducing excessive administrative control and restrictions.
- (iii) Develop policies to encourage technological upgrading of all industries, especially low-end industries, and encourage firms to improve productivity and reduce labor costs per unit of output through innovation and/or application of advanced technologies.

Recommendation 1-3: Develop criteria to evaluate the environment for innovation and incorporate the assessment results into the performance indicators of local governments.

17. The weak environment for innovation is the biggest hindrance to the implementation of an innovation-driven development strategy. Substantial improvements are urgently needed. Specific actions include:
- (i) Improve existing indicators measuring innovation, and increase the number of indicators measuring quality and activities of innovation in the 13th plan, such as the number of registered patent licensing contracts, the patent infringement damages execution rate, the number and amount of technical trading contracts, and the proportion of basic research in total research and development (R&D) expenditure.
 - (ii) Develop criteria for assessing the innovation environment and engage professional agencies to carry out regular assessments at the national and local levels.
 - (iii) Incorporate the assessment results into the economic and social development performance indicators of local governments.
 - (iv) Include measures of R&D investment, patent licensing, and other indicators into the performance assessment of SOEs, and support the role of SOEs in accelerating innovation in strategic industries and common technology fields.

Recommendation 1-4: Strengthen intellectual property rights protection.

18. A sound intellectual property rights protection framework is fundamental to promote technological progress and innovation. Specific actions include:
- (i) Develop and/or revise relevant laws and regulations, including patent law, trademark law, and copyright law; and strengthen law enforcement tools to protect intellectual property.

- (ii) Accelerate the establishment of specialized courts for intellectual property protection and train judges to better handle these cases.
- (iii) Introduce and increase fines and punishments for intellectual property infringement.
- (iv) Reform laws, regulations, and financial systems related to intellectual property transfer, licensing, and mortgage to increase a firm's intangible assets.
- (v) Enhance the protection of trade secrets and the enforcement of "non-compete" clauses to effectively protect the legitimate rights and interests of intellectual property rights holders.⁴
- (vi) Promote the reform of the rights of disposal and earnings for the development and commercialization of in-service scientific and technological achievements.
- (vii) Eliminate institutional barriers to encourage free flow of capital, talent, and technology for innovation (e.g., restrictions on market access, inefficient financial regulations, and the administrative examination/approval system).

Recommendation 1-5: Support demand-side and supply-side policies to encourage innovation.

19. The government should shift its focus toward improving market regulation, maintaining fair competition, and resolving market failures and innovation gaps. Specific actions include:
- (i) Raise the proportion of funding for R&D dedicated to basic research by setting a target of 10%–15% during the 13th plan.
 - (ii) Reform the funding model for basic research and introduce a noncompetitive approach, which will provide stable funding to researchers and institutes, with greater reliance on peer review and field experts.
 - (iii) For applied research, address bottleneck problems in resources and environment, public health and safety, urban management, and livelihood improvement in addition to technology essential to industrial development.
 - (iv) Encourage the use of PPPs to fund innovation.
 - (v) Support demand-side policies, such as application demonstration and government procurement of innovation available in the market to encourage innovation and application rather than direct development of R&D projects.
 - (vi) Eliminate local preferential policies for selective firms.

⁴ Preventing employees from quitting, taking physical and/or intellectual products, and starting a new firm engaged in a more or less identical business in the future.

- (vii) Develop policies to encourage technological innovation, such as expanding the range of deductions for R&D expenditure, canceling or relaxing limitations on R&D, and developing clear and consistent implementation measures and rules.
- (viii) Implement specific measures to accelerate depreciation of R&D equipment to encourage more firms to develop and apply new technologies.

Recommendation 1-6: Improve openness and market access for all service providers.

20. Barriers to market entry are one of the main obstacles impeding the expansion of the services sector. The government should build on the successes of previous pilot reform programs to facilitate market access and continue to open up the services sector. Specific actions include:
- (i) Extend the reform and opening policy pilot to other service industries and cities. The Shanghai Free Trade Zone and Qianhai District in Shenzhen have been successful. However, the negative list to limit market entry remains long and complex, and these pilot programs are still limited in scope. The next steps are to reduce the length of the negative list and promote greater openness in the services sector.
 - (ii) Provide equal opportunities to all service providers. Based on the pilot in the Shanghai Free Trade Zone, update relevant regulations on market entry regulations with fair, equal and standard entry regulations for all service industries to encourage private capital to invest in the services sector.
 - (iii) Further open up the services sector to the outside world. To move up global value chains, the PRC needs to attract more foreign investment into the services sector. At the same time, domestic firms should be encouraged to enter the global services market.

Recommendation 1-7: Promote deregulation and administrative reform of the services sector.

21. To expand the services sector, it is important to remove regulatory and administrative barriers. Specific actions include:
- (i) Deregulate prices for factors and services, particularly in transport, telecommunication, banking, medical care, and education. For competitive industries, such as aviation transport, banking and telecommunication, the government should promote price deregulation, particularly in those industries dominated by SOEs.
 - (ii) Further reduce the number of required administrative approvals for certification, qualification, and grading, and expand the role of intermediate organizations, such as industry associations.

- (iii) Improve coordination among government supervisory agencies. To reduce confusion and costs and build a unified regulatory system, the government should facilitate the integration of supervision standards, information-sharing and accreditation between different departments. This is particularly important regarding the standards for market entry, licensing, professional certification, and reporting of sanctions.
- (iv) Strengthen capacity in relevant government agencies. The government and related intermediaries should improve the use of data collection and updated statistical systems, credit reporting systems, knowledge-sharing, and staff training.

Recommendation 1-8: Boosting SME finance.

22. Access to financing is a primary challenge for SMEs. To support the expansion of SMEs, the government should:

- (i) Develop a multilevel capital market system by encouraging qualified SMEs to issue collective notes in the interbank bond market, revising the standards and requirements for initial public listing, and promoting the development of venture capital and the leasing industry.
- (ii) Provide diversified SME services by setting up provincial and municipal integrated SME financing intermediary service organizations, and establish specialized SME financing intermediary service organizations to help SMEs obtain financing from financial institutions.
- (iii) Improve SME credit record database, support credit institutions, and provide credit counseling and agent services through open competition.

Recommendation 1-9: Support entrepreneurship.

23. Entrepreneurship needs to be further developed to allow SMEs to play a key role in the PRC economy. The government should:

- (i) Promote the emergence of SME entrepreneurial service systems, including venture capital financing, credit guarantees, business consulting, technical support, management consulting, information services, and marketing and personnel training.
- (ii) Support reforms in tertiary and secondary education to include courses on entrepreneurship.
- (iii) Reform the bankruptcy law and strengthen the capacity of the judiciary to handle bankruptcy cases to reduce the disincentive for entrepreneurship.
- (iv) Provide a legal framework for the development of independent small business associations at various levels of administration.



Balanced Development of Rural and Urban Areas

A. Strategic Context

24. While the PRC has achieved upper middle-income country status, not all population groups and regions have benefited equally. Rural and urban areas are each confronting unique sets of challenges concerning imbalanced development: (i) the Gini coefficient was 0.47 in 2013; (ii) coastal cities in the eastern PRC have benefited disproportionately from their access to export markets and their capacity to attract surplus labor from the central and western provinces; (iii) urbanization has occurred at an unprecedented rate, with the urban population reaching 700 million, doubling over the past 15 years;⁵ (iv) one-third of urban dwellers consist of a “floating population” that migrated from rural areas but do not have urban *hukou*⁶ (this segment of the urban population is more likely to be poor); and (v) currently, average incomes in the rural areas are only one-third of those in urban areas, and a critical issue is how to improve the prospects and living standards of those who are likely to remain in rural areas and will face limitations in access to services and opportunities.
25. By 2030, the urban population is expected to exceed 1 billion, accounting for more than two-thirds of the total population. Without reforms, it is estimated that, by 2030, half of the urban population, or 500 million people, will be “floating.”⁷ As the PRC transitions to a high-income economy, a key challenge is how to improve the quality of life and livelihoods for all population segments in both rural and urban areas, in ways that ensure “balanced development.”
26. The Third Plenum recognized that the PRC’s dual rural–urban social structure remains a major area of concern in the PRC’s development, and called for better integrated and balanced development to narrow the rural–urban gap and develop more economically vibrant, healthy, resource conserving, inclusive, and integrated urban and rural areas. This strategy should include reforms in the following areas:
- (i) **Transforming agriculture.** Productivity growth in agriculture has benefited from advances in plant and animal breeding, but there is still considerable scope to improve yields through better research. Increasing the role of agribusiness, and attracting higher levels of foreign direct investment together with improved linkages to global supply chains, will help increase opportunities for value addition by the rural population. In addition, policy actions in areas such as extension of tenure in

⁵ From 2006 to 2010, the urban population grew at an average annual rate of 5.5%. At this rate, the urban population would double every 13 years. ADB. 2013. *Strategic Options for Urbanization in the People's Republic of China*. Mandaluyong City.

⁶ A household registration system in the PRC.

⁷ McKinsey Global Institute. 2009. *Preparing for China's Urban Billion*.

land use contracts, the introduction of modern agricultural practices, and access to credit will have positive benefits for rural income levels.

- (ii) **Improving connectivity and the peri-urban interface.** Poor connectivity, infrastructure constraints, and the high cost of logistics are constraining the PRC's ability to achieve higher economic growth and spread the benefits more widely among the population. It is, thus, essential to accelerate the development of better logistics systems and infrastructure to connect rural areas to urban growth centers and markets. Future urbanization strategies need to emphasize coordinated, staged, and people-based approaches to urbanization, underpinned by integrated urban planning, improved access to social services by urban villages, social and environmental safeguards and improved institutional arrangements.
- (iii) **Ensuring mobility and rural–urban equity.** Segmentation of the PRC social security framework reflects past incremental approaches and the differences in levels of local economic development. However, this complex system of uncoordinated programs results in inadequate and unequal coverage, both in terms of benefits and beneficiaries. Further, its dual nature, perpetuated by the household registration system (*hukou*), is no longer suitable to address the needs stemming from the increased mobility of migrants and the challenges of accelerated urbanization and agricultural transformation. Better standardization, integration, and oversight of the Minimum Living Standards Guarantee System (MLSG or *dibao*) is necessary for increased effectiveness and accountability. Improving pension portability will be a fundamental step toward establishing a unified pension system. Although recent initiatives made substantial improvements to pension portability, significant challenges remain in fully protecting the acquired pension rights of migrant workers.

B. Key Recommendations for the 13th Five-Year Plan

Recommendation 2-1: Catalyze private investment in agribusiness through increasing and integrating public spending on agriculture by various levels of governments.

27. The Agricultural Law in the PRC requires an increase in the share of public spending on agriculture by various levels of governments, thus increasing the overall fiscal expenditure to support agriculture. The various sources of agricultural expenditure at the county and provincial levels need to be effectively integrated. Moreover, it is critical to reform the fiscal system to clarify the responsibilities of different levels of government and different agencies involved in agricultural development so that accountability and efficiency of budget use can be improved. Measures to increase the attractiveness of the sector for private capital and promote agribusiness development could be an important use for the increased public expenditure in agriculture, e.g., (i) increased public funding for extension (i.e., agricultural advisory services on the ground for farmers) can

accelerate the transfer of new technologies to farmers; (ii) improved access to inputs and high-value supply chains and markets such as fruits, vegetables, and dairy products is another way of encouraging agribusiness investment; and (iii) government spending in improving access to technical and financial services in rural areas can make agriculture more profitable to attract the private investors. Focusing public financing and support on small and medium-sized agro-enterprises would also help to link individual farmers to the market and generate employment in rural areas.

Recommendation 2-2: Improve financial services for farmers by enhancing credit supply in rural areas and promoting innovative financial products.

28. To increase the supply of institutional credit in rural areas, the People's Bank of China has provided onlending to rural financial institutions. These funds are earmarked for agriculture, and provided at low interest rates. In light of the remaining gap between credit supply and demand in agriculture, the People's Bank of China should consider increasing its supply of agricultural onlending by 10%–20% annually during the 13th plan period. It should also expand the eligible recipients to include well-performing nondeposit-taking rural financial institutions, such as micro-credit companies and nongovernment organization microfinance institutions. Weather and price indexed crop insurance pilot programs have been conducted in the PRC and other countries. Building on this experience, the government can provide more support for commercial financial institutions and donors to replicate and to scale up these projects, and to expand coverage to a wider variety of crops and agricultural products. The government and insurance regulators should also support research and international exchange to promote catastrophe insurance, a key measure to protect the agriculture sector and farmers against increasing climate risks. Further rural finance innovations with proven potential include value chain finance, risk contingent credit, and cash flow-based lending.⁸

Recommendation 2-3: Extend the tenure of land use contracts.

29. Following the decision at the Third Plenum on retaining the collective ownership of farmland, it is recommended that the tenure of land use rights for cultivated land be extended from the current 30 years⁹ to at least 70 years to encourage land conservation and long-term investments in land productivity. A permanent or longer term land use contract would serve to lower transaction costs for leasing of land operation rights, decrease perceived risks, and incentivize rural investment in new technologies.

Recommendation 2-4: Consolidate the agricultural value chains.

30. The PRC has long and highly fragmented agricultural value chains. The agricultural value chain consists of many small farms at dispersed locations, traders, wholesalers, and

⁸ Cash flow-based lending refers to a form of financing in which the loan is backed by the borrower's expected cash flows instead of assets.

⁹ The current land use contract in many areas of the PRC started in the early 1990s and will terminate in 2023–2024.

retailers, creating challenges for reliable delivery of agricultural produce at a competitive cost and leading to a long and complex delivery process. The road transport industry is highly fragmented, hallmarked by many small operators, each operating a single truck.¹⁰ This severe fragmentation creates costly and unnecessary challenges for shippers in carrier selection and transport management.

31. Consolidation of agricultural value chains can be achieved by simplifying and streamlining of operations. Since each link in an agricultural value chain is a potential trap for inventory and a cause of delays, fewer links will reduce inventory cost, storage cost, and transit time. In addition, simpler chains are easier to manage; leading to lower logistics management costs as well as higher supply chain reliability and flexibility.
32. The development of integrated rural logistics nodes and outsourcing services to third party logistics providers will greatly reduce the large number of shipping combinations, and lower overall transaction costs for all actors in the rural economy. Fewer, more efficient shipping combinations will improve the transport of agricultural produce to urban markets, while also improving service delivery and lowering the cost for transporting consumer goods into village centers by consolidating many small shipments into larger lots. Logistics service providers can also facilitate the flow of logistics information by linking diverse parties in the agricultural product value chain and thereby reduce lead time, enhance responsiveness, and increase value chain transparency for all stakeholders.

Recommendation 2-5: Invest in all-weather access at the “last mile.”

33. At the end of 2010, 1,200 townships and 120,000 villages had no paved roads. In the 12th plan, a stated objective was that, by 2015, all townships and 90% of the villages would be made accessible by vehicles. Some 86.5% of administrative villages are now accessible by asphalt/cement road. However, the majority of these roads are substandard and/or do not provide all-weather access. Connectivity commonly follows a hub-and-spoke model, providing access only to the administrative village center. Natural villages that surround the administrative center quite often lack “last mile” access. As a result, access is restricted during the rainy season and access by larger vehicles (trucks and buses) is usually not possible. This inhibits the movement of products and goods to and from rural areas, and limits the rural population’s access to services. Investment in these roads is essential for improving livelihoods in rural areas. By 2020, 100% of administrative village roads and 75% of natural village roads should have all-weather access.

Recommendation 2-6: Modify the Minimum Living Standards Guarantee System to address the needs of migrants.

34. The MLSG program is currently the main poverty assistance program in the PRC. It includes urban MLSG and rural MLSG programs. According to the regulations on both MLSG programs, rural and urban residents who meet the eligibility criteria are entitled to apply for MLSG in their *hukou* registration place. Based on the complicated procedure for applying for MLSG, it is very difficult for migrants to apply for rural MLSG when living in urban areas because their place of *hukou* registration and place of residence

¹⁰ The PRC’s trucking industry has over 700,000 operators. The average fleet size per operator is 1.7 trucks.

are separate. Moreover, migrants are not eligible to apply for urban MLSG. This means that migrants are effectively excluded from the MLSG program. Ensuring equitable coverage for the MLSG system is an important issue for the government during the 13th plan period. It is recommended that the MLSG programs should be based on place of residence rather than place of *hukou* registration. As such, migrants who have lived in urban areas for some years would be entitled to apply for the urban MLSG program even if they have rural *hukou*.

Recommendation 2-7: Elevate and coordinate rural–urban social protection and poverty reduction.

35. The PRC social protection system is currently fragmented, and the MLSG continues to experience institutional weaknesses in its ability to target benefits. Currently, there is some overlap in targeting after the raising of the rural poverty line and a lack of coordination and standardization across the PRC.¹¹ Centrally coordinated integration, oversight, tracking, and performance of MLSG targeting would improve program effectiveness, efficiency, control, and accountability. It is recommended that a central leading group or interministerial committee covering rural, urban, and migrant populations be established to facilitate information-sharing on beneficiary targeting practices, household data, agency program, budget and other aspects. It is also recommended that a nationwide MLSG performance evaluation system and management information system be created to provide data on activities, outputs, and outcomes.¹² This will require a computerized municipal government administration system, annual assessments of government officials, and the provision of sufficient human and financial resources. To reduce overlap in targeting, it is recommended to create PPP or government operated data centers, with an interagency data-sharing platform.

Recommendation 2-8: Support compulsory education for children of migrants.

36. Compulsory education was universalized in 2000 and includes 9 years of schooling from primary to junior school. However, since migrants are currently not entitled to the same public services as urban residents in cities, some children of migrants do not complete compulsory education. At the same time, the “left-behind” children in rural areas lack their parents’ care and attention to their education and health, resulting in negative impacts on their schooling and educational attainment which will further increase long-term rural–urban inequalities. To guarantee that each school-age child of migrants can access and complete compulsory education, it is recommended to implement a compulsory education voucher system. The core of such a system entails central government provision of a portable compulsory education voucher for each school-age child which could be applied regardless of geographic location or *hukou* status. In addition, the central and provincial governments should increase expenditure on education to ensure that local governments have sufficient resources for the children of migrants, i.e., education budgets should be distributed based on the children’s place of residence rather than *hukou* registration. Care should be taken to ensure that rural

¹¹ In November 2011, the poverty line was almost doubled to the national poverty line of CNY2,300, resulting in a one-time increase in the number of people living below the poverty line.

¹² Such as employment, income and consumption increase, need for additional services, satisfaction, grievance resolution, and social organization involvement.

schools would receive appropriate support as the costs of providing education include fixed costs that do not correspond to the number of students in attendance.

Recommendation 2-9: Support portability of pensions by raising the fund pooling levels of pension funds and creating a consolidated national database.

37. Lack of pension portability between rural and urban areas is currently resulting in inadequate pension benefits upon retirement. To improve pension portability, pooling of pension funds needs to be established, at a minimum, at the provincial level, with a view to the future development of a national pooling system. At the same time, pooling of data sources and official databases needs to be developed to facilitate planning, reporting, and monitoring. A consolidated database will facilitate automatic transfers of records and assets between localities, which will improve pension portability. This will also serve to support the creation of a stable and functional vertical reporting structure among social insurance agencies.
38. It is recommended that a central agency be created and equipped to perform a wide range of functions including oversight of accounting records, audits of financial flows, efficient data transfer protocols, standardization of administrative processes, and effective monitoring of all lower level administrative actions to maintain national consistency in pension portability. Along with establishing a central agency, it is necessary to have a robust actuarial pension projection to determine the aggregate costs to establish a unified pension system. Without reliable financial assessment using appropriate assumptions, it will not be possible to identify whether proposed reforms are off-target and by how much, which would lead to higher financial risk. Clarifying financial requirements is an important precondition for the establishment of a unified and sustainable pension system in the PRC.

Human Resource Transformation

A. Strategic Context

39. Human resource development and education are central to economic growth. Education makes people productive, and increases entrepreneurial ability which can lead to improvements in technical and allocative efficiency. Education increases the ability to adjust to new technology and organizational practices. Economic prosperity depends on human capital in the form of ideas and technological discoveries. Investment in human capital creates a spillover effect on the economy and reduces the diminishing return to capital accumulation. Increasing the supply and quality of human capital is important to ensure more rapid and more equitable growth.
40. Research has shown that human capital plays a key role in the PRC's economic growth. During 1978–2008, it accounted for 38.1% of economic growth and even more during 1999–2008.¹³ Yet, with slowing growth rates of GDP and the decreasing efficiency of other inputs, the efficient use of human capital and expansion of the volume of human capital–creation becomes even more important. Looking forward, the PRC's human resource strategy has to aim at increasing the quality and amount of human stock, improving efficiency, and creating incentives to support the widespread generation of innovative ideas that will increase return on capital in the coming decade.
41. The PRC's rapid growth over the last three decades has been accompanied by social, economic, and demographic transformations. These impressive achievements have created new challenges—such as a declining workforce which must increase its labor productivity to remain competitive, the need to develop new paradigms for elderly care and human resources for rapidly expanding social services. The declining labor force and a rapidly aging population require improved productivity to move toward a high-income economy. The PRC will need more and higher-skilled expertise to move up the value chains for critical areas, such as equipment manufacturing, information technology, biotechnology, new materials, aeronautics and astronautics, oceanography, finance and accounting, international business, environmental protection, energy resources, agricultural technology, and modern transportation.
42. Globally, patterns of employment are changing and are expected to continue to shift rapidly over the next 5 years. In the PRC, the share of employment in agriculture (approximately 40% from the 1990s to 2010) has declined to 30% during the current 5-year plan period, and is projected to decline to 23% by 2020, while the share of employment in services has expanded to 38.5% at present and is projected to reach 48% by 2020. Manufacturing will continue to play an important role, but will require upgraded

¹³ J. Whalley and X. Zhao. 2010. The Contribution of Human Capital to China's Economic Growth. *NBER Working Paper No. 16592*. Washington, DC.

and more environment-friendly technologies to help drive industrial transformation. There has been a major expansion of the education sector since 2000, particularly in the tertiary and vocational education sectors. Each year, nine million people are entering the labor force. This year, seven million students graduated with a tertiary education qualification, and only about half of these were able to enter the labor force immediately upon graduation. Meanwhile, employers report a shortage of necessary skills, particularly among university graduates, signaling a mismatch between education and jobs as the labor market shifts. The changing patterns of employment supporting a mechanizing agriculture sector, modernizing industry sector and expanding services sector will have significant implications for human resource requirements and the future development of the education sector. While there is a concern that the education system does not encourage innovation and creativity, there is also a demand for highly trained technical personnel with higher education who can support the expansion of production.

43. To address these social, economic, and demographic shifts, the PRC has emphasized, in the last decade, rebalancing as a major strategy to ensure broader-based and sustained growth. The rebalancing strategy includes transitioning from labor-intensive manufacturing to high value added industries. This will occur by reforming SOEs and promoting private sector growth. The growth strategy is to be accompanied by a strong emphasis on environmental sustainability and equity of growth fueled by domestic consumption. At the core of this rebalancing effort sits the human development agenda, where human capital is not just a driver of growth, but where a wider human resource base is also a necessity to ensure equitable and rebalanced growth, increase productivity and, ultimately promote a "comparatively well off and prosperous society." To support the rebalancing, the PRC has aligned its National Talent Development Plan, and National Medium- and Long-Term Program for Science and Technology Development, with the National Plan for Medium and Long-term Education Reform and Development.
44. The PRC has made major achievements in meeting the Millennium Development Goals relating to education, particularly in meeting the goal of 9-year basic educational attainment for all.¹⁴ As enrollments in senior secondary school have expanded with increasing demand from rural migrant families, the PRC has strengthened both academic and vocational-professional tracks. The new reform of the national college and university entrance examination (*gaokao*) will give students a choice to pursue the traditional academic path, or a new mode for those who want to become engineering technicians, senior mechanics, and so called "high-quality" laborers. The successful implementation of 600 institutions of higher education identified by the Ministry of Education, accounting for half of the total of public universities, for restructuring their teaching programs from academic education to applied technology and professional education will be an important component of the PRC's plan to transform its industry, sustain growth, and promote innovation and development of a knowledge economy.
45. The Decisions of the Third Plenum provide important guiding principles for the future priorities in human development and education, and identify a series of key thrusts for comprehensively deepening education sector reforms.¹⁵ It stipulates that the PRC

¹⁴ The PRC has achieved the two education-related Millennium Development Goals targets—related to (i) primary education enrollment, and (ii) gender equity in enrollment at primary through tertiary levels—ahead of the 2015 deadline. Using the Human Development Index as a yardstick, the PRC witnessed a rapid improvement in human resources, with its Human Development Index score rising from 0.495 in 1990 to 0.699 in 2012, leapfrogging past the global average (0.694 in 2012).

¹⁵ Section 42 of the Decision of the Third Plenary Session of the 18th Central Committee of the Communist Party of China can be found with the full text online at <http://english.cntv.cn/special/18thccpsession/homepage/index.shtml>

will (i) vigorously promote equity in education by allocating educational resources in a balanced manner, aiming to minimize educational disparities among regions, urban and rural areas, and schools; (ii) accelerate the establishment of a modern technical and vocational education and training (TVET) system to produce competent and skilled workers; (iii) continue to develop preprimary education, special education, and continuing education as well as pilot lifelong learning pathways across academic strand, TVET, and continuing education; (iv) improve mechanisms for selecting applicants to education institutions at different levels (including university entrance), involving the promotion of comprehensive assessment as a basis for selection; and (v) enhance systems for education management.

B. Key Recommendations for the 13th Five-Year Plan

46. Strengthening the education system to meet the demands of the economy and labor market will be one of the most important human resource transformation strategies for the PRC in the next 5 years. Recent research has demonstrated that the role of educational attainment has increased significantly in the past decade in the PRC in explaining household per capita income, and is now the third most important determinant of income inequality.¹⁶ On average, fiscal expenditure on education in the PRC is still below that of the Organisation for Economic Co-operation and Development (OECD) countries and disparity in investment is evident with tertiary education receiving the bulk of funds and at a higher percentage in comparison to other countries. The 12th plan emphasis on investment in TVET and preschool has increased access significantly, but improving relevance and quality for all levels must be priorities to ensure sustainability and to reap the long-term impacts of educational attainment and improved human resources. Ensuring equitable access will address an important remaining challenge in the system, and help to address improvements to human stock, and aspirations of youth particularly in rural areas.
47. There are three critical pillars that the PRC must tackle to ensure its transition toward a high-income economy: (i) improvement of the quality and relevance of education (recommendation 3-1), (ii) expansion of human capital stock (recommendations 3-2 and 3-3), and (iii) promotion of innovation for the development of a knowledge economy (recommendation 3-4).

Recommendation 3-1: Improve the quality and relevance of education across all levels of schooling, particularly to ensure the development of skills not just for the immediate labor market needs longer-term requirements of the economy.

48. The PRC's scores on international benchmarks of education quality, such as classroom size, student-teacher ratio, and compulsory instruction time remain weak. To enhance

¹⁶ R.Kanbur, C.Rhee, and J. Zhuang. 2014. *Inequality in Asia*. New York: ADB and Routledge.

the quality and relevance of education, the PRC should improve the quality of pedagogy, especially in rural areas. Global evidence consistently indicates this issue to be the single most important factor affecting student learning outcomes.

49. Specific actions the PRC should consider to improve the quality of education include:

- (i) Raise the entry requirements for preservice teacher education programs from the completion of junior secondary education to that of senior secondary education for preprimary and primary teachers.
- (ii) Extend the duration of preservice teacher education programs, in a phased manner, to an international benchmark of 4 years, especially for preprimary, primary, and junior secondary teachers.
- (iii) Institutionalize continuous professional development opportunities for teachers by creating higher levels of teacher qualifications, increasing school-based professional development activities, including teacher engagement in curriculum development, instead of one-time workshops which have proven to be ineffective.
- (iv) Provide financial and other incentives to attract and to retain qualified teachers, especially in poor urban and rural areas.
- (v) Continue to reform the curriculum and teacher quality at secondary TVET schools, with emphasis on teaching of science, technology, engineering, and mathematics (STEM) subjects and training of teachers in competency-based curriculum.
- (vi) Strengthen and expand participation of private sector and employers in imparting education, especially TVET, and strengthen the government's role in assuring quality and supporting access by the poor.

Recommendation 3-2: Ensure universal coverage of secondary education, and increase public investment and financing for upper secondary education.

50. Despite recent progress, total human capital stock in the PRC is still far below the levels found in upper middle-income countries. The huge urban-rural gap in educational attainment in the country, which is exacerbated by historically unequal distribution of public resources, the growing "floating population" of migrants moving to urban areas but lacking access to equitable education services, and increasing income inequality, continue to undermine long-term human capital development. Given that the majority of Chinese children still live in rural areas or come from poor households, measures that address these inequalities are likely to be effective in increasing human capital in the country. The PRC has already achieved a solid foundation for universal junior secondary school education, and by the end of the 13th plan, the gross enrollment ratio for upper secondary should also be expanded from the current level of 86%.

Recommendation 3-3: Expand coverage of preschool education, and introduce a targeted school feeding program.

51. Evidence from developed and developing countries illustrates that investing in early childhood education produces high returns and is the most efficient way to improve productivity. The prevalence of early childhood education in the PRC is below those of high-income as well as several middle-income countries (rural preschool enrollment rates in the PRC are lower than the national average of 40% in India), and it varies significantly between urban and rural areas (80% in urban, and 30% in rural). While the PRC has initiated expansion of early childhood education during the 12th Plan with a target of an 85% gross enrollment rate in 1-year preschool by 2015, lack of universal preschool education and the continued poor nutrition of children in rural areas and among disadvantaged groups, e.g., migrants by the time they begin school, are still a problem. Reversing nutritional deficiencies from early childhood also has substantial, positive impacts on cognitive development and subsequent educational performance, as has been demonstrated by several countries which have introduced midday meal or other school-based nutrition programs. To reverse and overcome the inequitable start in life and enhance productivity and future competitiveness, the PRC should increase investment in making early childhood education compulsory and universal to improve the cognitive abilities and potential of the workforce. The government must also consider providing targeted meal programs to students in poor rural counties where survey data shows that stunting and nutritional deficiencies affect more than 20% of children.

Recommendation 3-4: Reform tertiary education to drive innovation and development.

52. Tertiary education reforms are essential to support the PRC's industrial transformation and move up the global value chain. According to the Academic Ranking of World Universities, in 2013, the PRC had about 10 universities in the top-ranked 200 universities of the world. This ranking is based on the number of published scientific papers and patents, and attests to the rising quantity of scientific outputs, with challenges to continue to improve research quality and integrity. The professoriate of PRC universities is less influential in policy matters of teaching, research, and assessment than counterparts in high-income economies.¹⁷ It is necessary to build closer links between university research and industrial interests, and improve the commercialization process of research outcomes while at the same time improving the quality and relevance of research and governance across the entire higher education system.

53. To break into the ranks of a high-income society, the PRC must continuously invest in the capacity of its universities to drive innovation. The following strategies are recommended to improve the performance and governance of the tertiary education sector:

- (i) Increase professional and institutional autonomy in universities following OECD standards of autonomy for the professoriate and tertiary education institutions to stimulate research and performance.

¹⁷ The International Survey of the Changing Academic Profession.

- (ii) Implement the program to transform 600 colleges and/or universities to be polytechnics (to respond to industry requirements and to stimulate), and reform the national college and university entrance exam by adding a new option to include access to polytechnics.
- (iii) Strengthen provincial second and third tier tertiary institutions. These institutions can play a key role in future innovation and urbanization by producing practical research linked to their course programs while also diminishing regional economic inequalities. The central government should consider special subsidies and research grants for tertiary colleges, which support national urbanization and economic development strategic goals.
- (iv) Improve faculty recruitment (less than 20% of all academic staff in tertiary education currently hold a doctorate) and institute performance-based reviews of academic staff, and implement performance-based salary increases.
- (v) Reform curriculum design and structure in tertiary education to give more emphasis to entrepreneurship skills, such as creativity, interpersonal understanding, cross-cultural communication, problem-solving, and other soft skills that will improve the nation's long-term capacity for innovation.
- (vi) Expand representation of enterprises and/or employers on the career boards of tertiary institutions; make mentoring and internships mandatory; institutionalize opportunities for enterprises to engage with academic staff about curriculum development through a biannual forum or special conferences on economic globalization and innovation.
- (vii) Increase internationalization by deepening cooperation with foreign universities, increasing brain gain with better conditions to attract both returnees and more outstanding foreign national to serve as full members of PRC universities. Make it easier for more top tier international universities to establish independent campuses that propose way to directly address one or more of the challenges of transforming the PRC toward a high-income economy in ways unlike the existing public universities.

Environmental Protection

A. Strategic Context

54. Since the start of its reform process, the PRC has prioritized economic growth in its strategic planning and policy making. The unprecedented speed of economic development has beneficially transformed the lives of all Chinese people and propelled the PRC to become the second-largest economy in the world. These achievements, however, have not been without adverse consequences including those on environment. According to the most recent estimate by Ministry of Environmental Protection, the national cost of pollution damage is equivalent to 6% of GDP.
55. With the increasing severity of environmental problems, the government started to prioritize a balanced emphasis on economic growth and environmental protection in its 11th (2006–2010) and 12th (2011–2015) plans. An important and tangible manifestation of these shifts occurred in 2007, at the 17th National Congress of the Chinese Communist Party where, for the first time, “building an ecological civilization” was identified as a key element for “building a well-off society in an all-around way,” thus providing an important basis for exploring new approaches to environmental protection and striking a better balance between economic growth and environmental protection. Some positive results have been achieved in industrial restructuring, energy conservation, and emission intensity reductions.
56. Despite these efforts, major problems persist. The prolonged and recurring smog pollution, frequent water pollution incidents, and soil pollutions have impacted on food safety and human health. These have become challenges for government at both the national and local levels because they have the potential to destabilize development plans and their outcomes, undermine confidence and trust on the part of citizens, affect the quality of life at a time of rising expectations, and degrade ecological services needed for society to thrive.¹⁸
57. It is expected that environmental pressures will continue to grow in the near future due to (i) continuing population growth combined with higher levels of per capita consumption; (ii) the likelihood that the industry sector, in particular the heavy industry sector, will continue to play a prominent role as a driver of growth, and thus industrial air and water pollutant emissions may continue to rise; (iii) the continued dominant role of the coal-fired thermal power subsector, which will further add to regional air pollution problems; and (iv) urbanization, which will continue as a necessary driver of economic growth, with the urbanization rate expected to reach

¹⁸ China Council for International Cooperation on Environment and Development. 2013. *Policy Research Report on Environment and Development*. Canada: International Institute for Sustainable Development.

60% by 2020 and with much of the growth occurring in small cities and larger towns, few of which have adequate urban environmental infrastructure.

58. The government recognizes the massive environmental and ecological challenges that the country is facing, and has placed “Building Ecological Civilization” as one of the most important policy areas for the country as recognized by the Third Plenum. The “China Dream” under the vision of “Beautiful China” is inspiring Chinese green prosperity actions. Renewed emphasis has been placed on minimizing air, water, and soil pollution. The unprecedented level of new investments on action plans provides the opportunity to accelerate the transition to the new path of addressing environmental and ecological challenges in the process of economic growth.
59. For the medium to long term that extends beyond the 13th plan, there are five large-scale, strategic objectives that need to be taken into account by the PRC’s environmental agenda.
 - (i) Shift the environmental governance system away from the current approach, in which the government is the sole determinant of the environmental agenda, toward a broader and more inclusive approach that involves participation by the government, enterprises, and civil society.
 - (ii) Expand the approach to environmental protection by making far greater use of market-based instruments to govern the pattern of economic development and the environmental impacts thereof.
 - (iii) Deepen the reforms of the public finance system relating to environmental issues both in expenditure and revenue sides by correcting the fiscal imbalance between central and local governments.
 - (iv) Place more emphasis on the role of government as an “enabler” of environmental protection by creating financial conditions and providing TA to allow nongovernment economic actors to increase their contributions to the environmental agenda.
 - (v) Focus on human health-related areas and promote environmental risk management in order to support overall human capital development.
60. This framework of long-term objectives provides the basis for the following recommendations on priority actions that should be taken under the 13th plan.

B. Key Recommendations for the 13th Five-Year Plan

Recommendation 4-1: Strengthen bottom-up strategies to complement top-down policies.

61. The basic means of ensuring consistency in the administration of environmental laws and regulations is close supervision of lower levels of government by higher levels of

government and the avoidance of principal-agent problems. However, there needs to be a broadening of the approach to involve local communities and nongovernment sectors, including the general public.

62. Key areas for development include:

- (i) Strengthen institutional development at the local level, especially at the levels of township and community, building on the principles of self-governance and public participation to monitor and motivate environmental sustainability.
- (ii) Strengthen independent monitoring of the state of the environment.
- (iii) Strengthen local environmental services by both the public and private sectors.
- (iv) Motivate local government officials to follow an environmentally sustainable development path by adjusting performance goals and career incentives.

Recommendation 4-2: Promote public participation in the environmental governance system.

63. The revised Environmental Protection Law includes a number of requirements relating to environmental information disclosure and public participation which, if acted upon, will contribute to reform of the governance system to raise awareness by promoting greater participation of the civil society. To further enhance the objective of multi-stakeholder participation in environmental governance, further reform is needed to allow enterprises and social organizations not only to undertake their duties and perform their functions as effectively and as efficiently as possible, but also to initiate their own actions. Specific actions include the following:

- (i) Establish functional departments within the government system specifically responsible for the social and public aspects of environmental governance.
- (ii) Expand the role of nongovernment institutions and local communities in environmental supervision.
- (iii) Strengthen environmental information disclosure and support greater transparency across all aspects of environmental protection.
- (iv) Conduct social dialogue on environment and development with relevant stakeholders.
- (v) Strengthen the staff and resources made available to the Ministry for Environmental Protection to administer additional responsibilities assigned to it under the revised Environmental Protection Law.

Recommendation 4-3: Improve local environmental performance: better use of public disclosure strategies.

64. The criteria used in the cadre evaluation system should be revised to reinforce environmentally sustainable development goals. Key changes needed include:
- (i) Systematically incorporate the effectiveness of environmental law enforcement into the performance evaluation system, based on a set of indicators that will need to be developed.
 - (ii) Publicly disclose performance evaluation results such that local populations will have the opportunity to know how the claimed performance of local leaders relates to real conditions on the ground.
 - (iii) Develop measures for “green GDP,” and utilize it as the preferred measure for gauging local economic performance.

Recommendation 4-4: Strengthen environmental enforcement.

65. The revised Environmental Protection Law gives more authority to environmental protection agencies, and provides stronger penalties for violators of the law. Subsequent to the passage of the law, the National People’s Congress has authorized the establishment by the Supreme People’s Court of a tribunal for environmental cases to strengthen the capacity of the judicial system to deal with environmental disputes. The following recommendations are made to support the work of the judiciary:
- (i) Increase the number of environmental courts to improve public access to the legal system on environmental issues.
 - (ii) Provide the bench with TA and training on environmental law to strengthen their ability to adjudicate environmental cases; and support and strengthen the development and delivery of environmental law courses at public universities.
 - (iii) Institute a national education campaign to increase public awareness of how the courts system can be used to pursue environmental grievances.
 - (iv) Clarify the legal standing of the public and nongovernment organizations in terms of initiating administrative actions against local environmental protection bureaus or other government agencies in case of failures to implement environmental law requirements.
 - (v) Strengthen enforcement of court judgments on environment-related cases.

Recommendation 4-5: Better use of economic instruments.

66. Revision of the Environmental Protection Law, together with related measures recommended above, offer the potential to significantly improve the effectiveness of the command-and-control system of environmental governance in the PRC. These measures need to be combined with the application of economic- or market-based instruments which will affect the way that the country as a whole engages in environmentally sustainable growth and development. This will not only make the pattern of growth more sustainable, but will also resolve weaknesses in the command-and-control system. Priorities include:

- (i) “Greening” of the tax system by introducing environmental taxes on major air and water polluters, extending value-based natural resource tax to coal and other resources, and setting the tax rates at economically efficient levels to curb pollution. Revenues from such environmental taxes may be used to offset income tax or increase social security payments.
- (ii) Increase water tariffs, sewage charge, and garbage disposal fee in urban and qualified rural areas. Gradually increase transport fuel tax rates and introduce congestion fees in cities with serious congestion.
- (iii) Clarify property rights as a first step toward the introduction of market-based mechanisms, such as emission trading for sulfur dioxide (SO₂), nitrogen dioxide (NO₂), water quality, ecological compensation, and PPP for environmental investments.
- (iv) Significantly improve national efficiency standards, including but not limited to higher standards for fuel consumption in the automobile industry, higher standards for energy efficiency in the appliance and lighting sectors, application of national standards for energy-efficient green buildings, and strengthened waste recycling standards for local governments.

Recommendation 4-6: Draw and enforce environmental bottom lines incorporating social principles.

67. The concept of “environmental red lines” was first mentioned publicly in March 2007, when Premier Wen Jiabao informed the National People’s Congress that “the ‘red line’ of retaining 1.8 billion *mu*¹⁹ of farmland would be adhered to and the strictest of land management systems implemented.” To achieve this, the following actions will be required:

- (i) Promote the environmental red lines concept in conjunction with effective laws and regulations.
- (ii) Strike an acceptable balance between the use of command-and-control methods and economic- and social- (and market-based) approaches to achieve the

¹⁹ A *mu* is a Chinese unit of measurement (1 *mu* = 666.67 m²).

objectives, with economic and social incentives²⁰ being particularly important in resource-deprived or resource-constrained regions.

- (iii) Make the program a cross-sectoral initiative rather than restricted to the Ministry of Environmental Protection.
- (iv) Maximize public participation in both the design and implementation of environmental protection programs, with particular emphasis on consulting affected communities.

Recommendation 4-7: Institutionalize and mainstream urban–rural environmental master planning (greening urban development).

68. Rapid urbanization continues to be a critical factor in the PRC’s economic and social development. In the past, environmental degradation and pollution caused by urban development has been severe. Currently, the benefits of sufficient, well-planned green space networks within urban areas are not valued appropriately. These would provide a broad range of very valuable ecosystems services, including (i) producing oxygen and absorbing air and water pollutants and noise; (ii) cooling down temperatures in summer, reducing the need for air-conditioning; and (iii) retaining and absorbing storm-water, thus reducing flood risk and flood severity. These environmental services are in addition to the socioeconomic benefits of public green spaces that contribute to improved public health, provide recreational and community value, and lead to increased land value in their vicinity.
69. It is recommended to develop a legal framework for urban–rural environmental master planning (UREMP) to become a legally binding instrument providing upstream input for the development of regional land-use plans and urban–rural master plans downstream. Cities and their surroundings in the PRC will be required to prepare an UREMP with environmental zoning categories, plotting urban–rural environmental red-lines (no-build zones, growth boundaries) guiding land-use and urban master plans.
70. Key reforms that will effectively promote a more environmentally sustainable urbanization in the PRC include:
- (i) Institutionalize and mainstream UREMP as a new, mandatory planning instrument to protect environment and ecosystems through “urban–rural environmental red lines” guiding urban growth and limiting encroachment onto rural land.
 - (ii) Institutionalize interdepartmental and cross-jurisdictional coordination and partnerships.
 - (iii) Provide technical guidelines; capacity development for planning, implementation, monitoring, evaluation, and enforcement of UREMP; and develop and fund an institution and research that provide technical support.

²⁰ Social incentives refer to public relations, social or community images and reputation.

- (iv) Develop environmental management, monitoring, governance and enforcement systems, and incentives and eco-compensation mechanisms promoting urban-rural environmental protection partnerships.
- (v) Integrate UREMP with regional planning and downstream urban-rural good practices planning for green, inclusive, and competitive development.
- (vi) Engage in public outreach, conduct awareness campaigns, and stakeholder consultations and participation during planning, operation, and monitoring.

Recommendation 4-8: Focus on areas where environmental degradation has the most severe impact on human health.

71. Finalize and implement the environmental-health action plan. A draft environment-human health action plan has been prepared by the Ministry of Environmental Protection. This plan should take into consideration the mortality and morbidity impacts from water, air, and soil pollution. The plan should focus on the geographical areas where the impact of pollution on human health is most severe, including the northern, northeast, and northwestern parts of the country that are experiencing multiple pollution problems. Key activities include:
 - (i) Pilot PM 2.5 emission reduction in Beijing-Tianjin-Hebei, Yangtze Delta, and Pearl Delta areas.
 - (ii) Demonstrate a water pollution risk management system along the Yangtze and Songhua river basins.
 - (iii) Pilot soil pollution remediation in targeted priority areas that have been identified in past assessments (i.e., Yangtze River Delta, Pearl River Delta, and Bohai Industrial Belt).
72. Review and realign the priorities and resource allocation of the PRC's environmental protection based on health impacts. Policies should be made on the basis of concrete knowledge of the impacts and costs of pollution, which requires clarifying the correlation between air, water, and soil pollution and the impacts on human health. Exposure factors such as population density and activities should be incorporated in designing monitoring systems and setting pollution-reduction targets to ensure that priority is given to controlling pollutants that are most damaging to human health. In addition, capacity building of the health sector will help monitor and address the health effects of pollution.
73. Promote information disclosure and public participation. Public disclosure of environmental information, such as emissions by polluting enterprises as well as ambient environmental quality data by local authorities, will help the public minimize exposure and health damages by adopting averting behaviors. In addition, public awareness-raising will promote behavior to reduce pollution, such as greater use of public transport.

Mitigation and Adaptation of Climate Change

VI

A. Strategic Context

74. Climate change is a serious threat to achieving the goals of Xiaokang and enabling the PRC to become a high-income country. The impacts of climate change and the associated extreme weather events may undermine the substantial economic progress made in the past few decades; and in particular threaten food and water security. The PRC has been active in global negotiations on addressing climate change and, in September 2014, announced “China’s National Plan on Climate Change (2014–2020).”
75. The PRC has made impressive progress toward its goal of reducing carbon intensity by 40%–45% from the 2005 levels by 2020. It is now the world leader in renewable energy development and invests more in renewable energy than coal-based energy. However, the PRC continues to rely on carbon-intensive coal, which supplies more than two-thirds of its energy. Carbon dioxide (CO₂) emissions from energy are over 8 billion tons (t). Other greenhouse gas emissions contribute an estimated 2.5 billion tCO₂e (tons of CO₂ equivalent) resulting in total greenhouse gas emissions close to 11 billion tCO₂e.²¹
76. The possible impacts of climate change in the PRC include large increases in average temperatures, and significant regional changes in precipitation and precipitation patterns. Major climate hazards include flooding, sea-level rise, storm surges, glacial and permafrost melt, droughts, reduced agricultural yields, and heat waves. A recent ADB study estimated that the costs of only adapting infrastructure to climate change will be \$11 billion per year, up to 2050.²²
77. Climate change mitigation and economic growth are not necessarily mutually exclusive; instead, they can be mutually reinforcing.²³ In the PRC, the larger share (about 50%) of mitigation efforts will directly improve the overall efficiency of the economy by retiring surplus and inefficient industrial capacity. A more diversified energy mix with a larger share of noncarbon or low carbon fuels will also reduce air pollution. The climate change mitigation efforts, which will intensify further globally, can present significant new business opportunities to unleash innovation and generate economic growth and green jobs.

²¹ The most recent version of the World Development Indicators give the following numbers for 2010: CO₂ 8.29 billion tCO₂; CH₄ 1.64 billion tCO₂e; N₂O 0.55 billion tCO₂e; other greenhouse gases 0.25 billion tCO₂e; total 10.73 billion tCO₂e.

²² Westphal et al. 2013. *Economics of Climate Change in East Asia*. Mandaluyong City: ADB.

²³ ADB. 2014. *Technical Assistance to the People’s Republic of China for the Roadmap for Carbon Capture and Storage Demonstration and Deployment*. Mandaluyong City.

78. Against this backdrop, the proposed recommendations are based on a three-pronged approach: (i) accelerating efforts in climate change mitigation, (ii) complementing current administrative measures with more market-based approach to better allocate resources, and (iii) mainstreaming adaptation efforts more rigorously. These recommendations could result in a cost of about 0.5%–0.7% of the GDP; yet these figures should be compared against the negative impact of climate change which is more than 2% of the GDP, if these issues are not addressed adequately.

B. Key Recommendations for the 13th Five-Year Plan

Recommendation 5-1: Set more ambitious mitigation targets.

79. The PRC has already achieved a 29% reduction in carbon intensity by 2013 compared with 2005. However, multiple challenges such as coal dependency and strong coupling between GDP growth and energy growth remain to be overcome. These issues will continue to build up and exert tremendous pressure beyond 2020 when a more stringent carbon-constrained development will be required. To address these challenges and reverse the trend of rapid growth of greenhouse gas emissions, a set of more ambitious targets are recommended to help the PRC reach a greenhouse gas emission trajectory, which will peak by 2025 followed by a gradual decline beyond 2030.

- (i) Target a reduction of 19% in carbon intensity over the 13th plan period. This requires moderate acceleration of ongoing efforts without compromising targeted 6.5%–7.0% GDP growth.²⁴
- (ii) Restrain energy related CO₂ emissions by capping total energy consumption at 4.6 billion–4.8 billion tons of coal equivalent (btce) by 2020, which will stimulate more aggressive energy-conservation measures.
- (iii) Target a more diversified mix of energy production by 2020 with a lower share of coal (targeted at a maximum of 60% of energy production). The share of natural gas and oil should increase to at least 25%, while nuclear and renewable sources should be accelerated to reach at least 15%.

Recommendation 5-2: Accelerate energy efficiency and renewable energy through targeted incentives.

80. Although the PRC has initiated a comprehensive energy conservation program from the 11th plan onwards, there are still large gaps in average efficiency levels compared with the global best practice. Hence, bolder and more targeted policy actions are required to accelerate ongoing efforts. Similarly, the PRC's success in installing renewable

²⁴ See the studies cited above which indicate a significant potential for mitigation at negative costs. This also echoes the 'Porter Hypothesis'.

energy-based generation capacity is not matched by the utilization of this capacity for electricity generation due to prevailing physical constraints and institutional obstacles, such as the predominance of inflexible coal fired power generation capacity, weak energy storage capacity, and the absence of a real time electricity market. Specific actions include:

- (i) Leverage additional commercial financing through market-based guarantees and other risk-sharing mechanisms by prioritizing fiscal incentives and subsidies to attract such capital.
- (ii) Demonstrate a full suite of potent renewable energy technologies by bringing forward less-advanced technologies, such as offshore wind and concentrated solar power, with targeted policy support and incentives.
- (iii) Incentivize grid operators to increase grid flexibility and change the dispatch regime to ensure priority dispatching of renewable energy by establishing a real time market for electricity generators, expanding the balancing area, establishing a market for ancillary services, and providing targeted incentives and subsidies for investments in energy storage technologies.

Recommendation 5-3: Establish a nationwide emissions trading scheme.

81. International experience has demonstrated that economic instruments, such as emissions trading scheme (ETS) and carbon tax, can be efficient and effective for the least-cost achievement of climate change mitigation targets, if designed appropriately. Taking into account the practical experience of other countries and pilot ETSs in the PRC, the following concrete steps to gradually establish a nationwide ETS are recommended:
- (i) Develop national ETS legislation to define the permanence of emission allowances and credits for meeting the obligations of greenhouse gas reductions imposed by the government, which will provide a solid legal basis for ETS operation.
 - (ii) Develop unified guidelines and methodologies on ETS design and operation to provide a solid basis for building a sound national ETS.
 - (iii) Gradually establish a nationwide ETS by linking qualified existing pilot ETSs and integrating new ETSs into the linked system. The approach of establishing a national ETS by linking qualified ETS pilots is likely to be less costly than any other alternative, and would receive more support from local governments.

Recommendation 5-4: Introduce a tax on fossil fuel consumption.

82. The externalities associated with fossil fuel consumption, such as air pollution, has not been factored into prevailing market prices (for example, Tsinghua University estimates this external cost at CNY175/t of coal). To provide price signals to initiate a structural

change from a fossil fuel-intensive heavy industry-dominated economic structure toward a low carbon and services sector-based economy, there is an urgent need to adjust fossil fuel prices to reflect their full costs. Specific actions include:

- (i) Remove fossil fuel subsidies and introduce a differentiated fossil fuel consumption tax for sectors. The tax rates for the different types of fossil fuel reflect the nonmarket costs associated with the use of a particular type of a fossil fuel.²⁵ The removal of fossil fuel subsidies, combined with the introduction of a fossil fuel tax and greenhouse gas ETS, is expected to further reinforce ongoing efforts to promote energy efficiency.
- (ii) Use the revenues from this tax to further scale up energy efficiency through credit guarantees and accelerate more rapid renewable energy installation, especially through adequate feed-in tariffs for new renewable technologies that have not yet reached the deployment stage.

Recommendation 5-5: Establish a comprehensive climate technology investment promotion framework.

83. Progress on both mitigation and adaptation technologies will be a highly significant source of competitive advantage in a global economy dealing with climate change. A framework to support climate technology investment will be necessary. Specific actions include:

- (i) Establish a pilot climate technology investment promotion framework, which includes a market-based technology selection mechanism, a financial support instrument specific to technologies and firms at different levels of maturity, and an instrument guaranteeing access to markets.
- (ii) Update government procurement and SOE bidding policies to explicitly acknowledge the 'green credentials' of potential suppliers, such as mandatory performance standards for greenhouse gas emission intensity and energy efficiency. This will send a powerful signal that investing in lower emission technology will translate in access to markets.
- (iii) Pilot instruments that have been used successfully in other countries to directly promote innovation and low carbon development: public procurement of innovation (PPI) and pre-commercial procurement (PCP).
- (iv) Mainstream climate technology investment into the PRC's cooperation with other developing countries.

²⁵ See also Recommendation 5-5, specifically the text on extending the value-based natural resource tax.

Recommendation 5-6: Demonstrate carbon capture, utilization, and storage technology and prioritize carbon dioxide-enhanced oil recovery.

84. Carbon capture, utilization, and storage (CCUS) is an essential technology for cost-effective climate change mitigation. Currently, CCUS is the only near-commercial technology available to cut up to 90% of CO₂ emissions from coal-based industrial and power plants and is expected to play a prominent role post-2020 in nearly all mitigation scenarios and strategies. By injecting large volumes of CO₂ captured from power and industrial plants into aging oilfields in the PRC, large quantity (up to about 10 billion barrels) of additional oil can be produced, which otherwise is not feasible. This process, commonly known as carbon dioxide-enhanced oil recovery (CO₂-EOR), is a common practice in the US, where 14% of its oil is produced through CO₂-EOR. There exists a high level of readiness for quickly moving into large-scale demonstration during the 13th plan. Specific measures include:

- (i) Roll out CCUS demonstration targeting 5–10 coal-chemical plants and 2–3 coal-fired power plants and combine them with CO₂-EOR to produce 50 million barrels of incremental oil and, at the same time, reduce cumulative emissions of 20 million t of CO₂ by 2020. Facilitate public financing of early-mover coal-fired power plant with CCUS. Extend tax relief such as reduced value added tax and income tax currently available to renewable energy projects to those coal-fired power plants that install CCUS.
- (ii) All new coal-fired power plants in the large coal bases planned in Inner Mongolia, Ningxia, Shanxi, and Xinjiang should be at least CO₂ capture-ready and preferably CCUS-ready.
- (iii) Recognize incremental oil produced from CO₂-EOR operations as unconventional oil and provide tax relief or tax credits similar to what is currently provided to other forms of unconventional hydrocarbons, such as shale gas or coal-bed methane.
- (iv) Incentivize CO₂-EOR collaborations between industrial plants and oil fields for any effective CO₂ off-take and injection.

Recommendation 5-7: Strategize utilization of gas (natural and shale gas) to avoid mitigation risks.

85. Shifting gradually away from coal will require a significantly higher share of natural gas in the mix. But unless a comprehensive gas utilization strategy is put in place to avoid ongoing gas shortages and gas shedding in regions of the PRC, there could be a rebound in coal usage risking the CO₂ mitigation efforts. Currently, the rapid growth of gas demand is outstripping domestic gas production. Shale gas²⁶ and other unconventional gas resources are unlikely to play a significant role at least up to 2020. Thus, the importation of gas will increase, which is not only an energy security issue, but also a cost issue as the

²⁶ The large-scale exploration of shale gas can be a very potent threat to an already fragile water security, especially in water-stressed areas. See also Chapter 7 on water security.

import price of gas is about four times the domestic gas prices. Therefore, it is imperative that gas use be prioritized in regions and industries where its maximum low-emission benefits can be achieved. Specific actions include:

- (i) Develop a comprehensive gas supply and utilization strategy defining priority sectors and priority regions.
- (ii) Rationalize gas pricing to gradually achieve parity with the international traded price.
- (iii) Tightly monitor coal to synthetic natural gas plants, and discourage further establishment of such plants due to their high CO₂ emission intensity.

Recommendation 5-8: Integrate adaptation in all planning and approval of investment projects.

86. Unanticipated impacts of climate change may pose significant future costs due to losses, repairs, and retrofits. These are costs that could be effectively mitigated against in the elaboration of development plans and the design of investment plans. To this end, three concrete measures include:

- (i) Integrate climate change considerations into the planning and investment approval process by requiring each investment proposal to demonstrate consideration of climate proofing in its planning and approval process. This could be based on a five-step approach similar to that used inside ADB.
- (ii) Invest wisely in climate change response measures using market-based finance mechanisms including insurance products addressing climate change related disaster risks, such as catastrophe bonds, flood insurance, and crop insurance (Recommendation 2-2, page 14).

A. Strategic Context

87. Water is the most pressing resource bottleneck to the PRC's economic growth over the next 10–15 years. The PRC's water crisis already costs the country at least 2.3% of GDP (of which 1.3% is attributable to water scarcity and 1% is from the direct impacts of water pollution).²⁷ Growth in the PRC's population, cities, and economy will increase demand for water.
88. Independent international studies have concluded that, by 2030, the country will face as much as a 25% gap between available renewable water supplies and the projected total water demand. Demand will come mostly from agriculture, followed by industry, and municipal and residential needs. Aside from the issue of unsustainable rates of water withdrawal, the country is chronically unproductive with water. For each cubic meter of water used, the PRC produces only \$7.40 in economic output (2005 constant US dollars). The average for European countries is \$58 per cubic meter. The PRC's average water productivity of grain is only 0.7–0.8 kilogram per cubic meter while other countries can reach 2.0–2.5 kilograms per cubic meter.
89. Decree No. 1 on Water, approved by the State Council in 2011, aims to contain total water consumption at or below 670 billion cubic meters by 2020 and below 700 billion cubic meters by 2030. International analysis of the government's plan indicates that these 2030 target is difficult, if not impossible, to achieve given the current economic growth rates across the economy and the lack of demand management and water markets.
90. **Agricultural water demand.** Agriculture is the biggest water user, accounting for 63% of total water withdrawal in the PRC and is now also a major, if not the biggest, polluter of the environment. Water productivity from agriculture was \$1.18 per cubic meter in 2012, which is low compared with other countries. As a core part of PRC's New Urbanization Strategy, Premier Li Keqiang emphasized the significance of agricultural modernization across the PRC, calling for improvements in agricultural production efficiency, restructuring, and enhancing the quality of life for farmers. The PRC continues to invest in irrigation. The “three red lines” policy includes the compulsory targets to increase irrigation efficiency to 0.55 by 2020, and to 0.6 or above by 2030.
91. **Industrial water demand.** The power sector in the PRC is the largest industrial water user, and 94.3% of total power-generation capacity is heavily reliant on water. Nine out of 13 provinces identified as the country's key energy bases are experiencing high or extremely high water stress. An estimated 70% of operating coalmines are located in water-scarce regions and 40% are located in regions with serious water shortage,

²⁷ ADB. 2011. *Eco-compensation for Watershed Services in the People's Republic of China*. Mandaluyong City.

especially in the north. As of July 2012, over 50% of the proposed power-generation capacity was located in areas with high or extremely high baseline water stress. Alternative energy sources face the same issue. Synthetic natural gas (a coal-to-gas process) is one of the countermeasures in the National Air Pollution Prevention Plans of August 2013, yet 70% of 17 approved synthetic natural gas projects are located in extremely high water-stressed regions and will have to compete for water resources that are already in very high demand. All of these coal-related industries—mining production, coal-to-chemical, and power generation—are extremely water-intensive. If all of the proposed plants are built, they could withdraw as much as 10 billion cubic meters of water annually by 2015.²⁸

92. **Urban demand.** In 2012, the PRC's 18th National People's Congress prioritized urbanization as a core development strategy, with plans to increase the urban population to 60% by 2020. At the same time, the PRC set a target to cap water use to 670 billion cubic meters by 2020 and 700 billion cubic meters by 2030. This will require a sharp slowdown in the growth of water demand from 2020–2030. The newly released national urbanization strategy indicated that an additional 300 million people will be moving to urban area by 2030. This ambitious plan will definitely aggravate water shortage and water use disputes due to unmatched water demand and intensified urbanization.
93. The 13th plan period will test the country's ability to close the water supply–demand gap and its commitment to hold national water consumption down and adhere to the “three red lines” policy, which has set new compulsory targets to control water exploitation, improve efficiency, and reduce water pollution.²⁹ The PRC has opted for increasing water supply without seriously considering how to reduce demand and increase efficiencies, which is an economically and technically viable way of providing more supply. The country has relied on increasing reservoirs, long-distance water transfers, and to a much-lesser degree, desalination, reclaiming of wastewater, and rainwater harvesting. The PRC must turn to demand management. This can be achieved through further reforms of water resource prices and the creation of a water service market, as well as a shift toward more optimal infrastructure, combining both traditional, structural infrastructure investments with nonstructural technological approaches focusing on efficiency and conservation.

B. Key Recommendations for the 13th Five-Year Plan

Recommendation 6-1: Elevate water security to a high-level priority and ensure proper implementation of the national water security strategy.

94. A state water security committee, similar to the new State Energy Committee, should be established to serve as the highest water policy body in the country. The Premier or

²⁸ Greenpeace 2012.

²⁹ In January 2011, in its annual “number one policy document,” the State Council announced to hold national water consumption level to 670 billion cubic meters in 2020. The Ministry of Water Resources says the country will accomplish this by following three red lines: limiting the scale of water exploitation, improving the water use efficiency, and curbing water pollution.

Vice Premier should lead this committee, which will coordinate water policy reforms and implementation across all sectors. The most important work of the committee during the 13th plan period would be to require all energy sector development plans and urban strategies align with the availability of local water resources and developing a long-term national water security strategy that aims at avoiding any gap between water supply and demand in 2050.

95. To provide effective oversight of the country's water resources and policy implementation, the committee needs the support of a more effective body of River Basin Management Commissions. The seven commissions for the country's seven major river basins should be made independent of the Ministry of Water Resources and accountable to the proposed state water security committee. The commissions should also be reformed to have more diverse representation of relevant line agencies and local governments. A priority output of the commissions should be to formulate implementation procedures for their respective basins on how to implement key water policies so that provincial and local governments can develop more effective implementation and enforcement plans, particularly for the "Decree No. 1 on Water" announced in January 2011 and the three red lines policy. Among these implementation procedures to be developed should be a technical handbook on allocating river basin water resources for local government users. The handbook would contribute to more consistent preparation of water allocation plans and agreements at local levels, which is the basis for functioning water markets.
96. The government should formulate a long-term national water security strategy (up to 2050) based on a careful analysis of (i) the increasing demand by 2050 from agricultural intensification, energy development, industrialization, and urbanization; (ii) the implications of water pollution, degraded ecosystems, and climate change on water scarcity by 2050; (iii) the implications on water supply options from the natural limitations from uneven water distribution between north and south, uneven rainfall patterns, and a natural proclivity to droughts; and (iv) optimal infrastructure, including water-saving technologies and other technical, nonstructural investments.
97. During the 13th plan period, the government needs to pay particular attention to the issue of integrating water resources scarcity into the energy development plan. The energy sector in the PRC is the largest industrial water user, and 94.3% of total power generation capacity is heavily reliant on water. Nine out of thirteen provinces identified as the country's key energy bases are experiencing high or extremely high water stress. About 70% of current coalmines are located in water-scarce regions, with 40% located in regions with serious water shortage. The following actions could make development of the energy and water sectors more balanced and sustainable: (i) incorporate the impacts of medium- to long-term national or provincial energy sector development plans on freshwater resources; (ii) introduce incentives and enforce water use targets in energy facilities to improve water use efficiency levels and water recycling ratio; (iii) establish effective regulatory and compliance mechanisms to ensure that the deployment of new technologies aimed at climate change mitigation and air pollution control (i.e., shale gas, carbon capture and storage, and coal-to-gas conversion) does not adversely affect the groundwater resources in water scarce regions; and (iv) increase water tariffs (for energy and industrial consumers to reflect the scarcity and value of water, which would also send price signals to conserve water).

Recommendation 6-2: Build optimal water infrastructure capacity to enhance national water security.

98. In the 13th plan, the government should adopt the following mix of traditional and nontraditional measures to strengthen national water security:³⁰
99. First, promote metering and better meter management to support demand management. The 13th plan should pursue meters for agricultural use (which are currently not metered) and continue to extend meter coverage in cities. The low ratio of metered water users and weak metering management is a major barrier for implementing block tariffs, which is a basic strategy for reducing water demand by charging higher rates for luxury water consumption.
100. Second, rehabilitate urban pipes and invest in leak detection. Leaking pipes are a major cause of revenue loss and water shortages. Investments are not likely to come from private and capital markets, which regard piping systems as sunk costs. The government will have to invest over the next 5 years in rehabilitating underground pipes, building more climate-resilient water infrastructure, and increasing the coverage of urban piped networks.
101. Third, introduce water recycling to all cities, particularly in the north of the country. Development has only begun in reclaiming wastewater for recharging rivers/lakes, city greening, and partial flushing in households. Making better use of high-quality reclaimed wastewater (such as Newater in Singapore) can sharply decrease the energy intensity and cost of water production and at much better rates than desalination.
102. Fourth, install water-saving fixtures for residential and commercial buildings (i.e., water efficient faucets, showerheads, and toilets). Reduced water use in industrial processes and equipment are highly cost-effective measures to decrease total water demand for the same economic output. These measures include broader use of rainwater capture systems in cities for landscape irrigation, heating and cooling systems, and toilets.
103. Fifth, increased agricultural water productivity is essential for the sustainable water management in the country as agriculture accounts for 63% of total water withdrawal in the PRC. More investments are needed to achieve compulsory irrigation efficiency targets of 0.55 by 2020, and 0.6 or above by 2030. The promotion of agricultural best practices can also maximize “crop per drop” yields. This includes proper crop selection for local soil and hydrologic conditions, seed development, and selection of more heat- and drought-tolerant varieties. Best management practices can also increase soil moisture capacity and hold more rainwater to recharge groundwater tables.

³⁰ The 2030 Water Resources Group charted 55 optimal measures to close the 201 bcm gap it projects for the PRC in 2030. Traditional water supply infrastructure would fill as much as 35% of the supply-demand gap. But, most measures are nontraditional or nonstructural. These measures include water-saving fixtures and appliances for domestic users; increased water productivity systems for industry; more efficient irrigation; rehabilitation of damaged irrigation and drainage facilities; extension of small-scale irrigation schemes, multipurpose reservoirs, dams, and water-impounding systems; and reclamation of used water and water-saving fixtures.

104. Finally, protect groundwater resource to ensure the sustainability of the hydrological system.³¹ The central government should establish a groundwater management organization to coordinate, consolidate, and share groundwater information. This also requires independent and professional monitoring and regulatory measures in the provinces. In addition, limits on groundwater extraction should be introduced. Financial resources should be allocated to (i) conduct specific hydrogeological studies, (ii) develop groundwater management plans with all local stakeholders, and (iii) invest in measures and establish monitoring mechanisms for sustainable groundwater management.

Recommendation 6-3: Deepen reforms of the water governance system and strengthen water management.

105. The PRC needs a modern water governance system, which relies on (i) a sound legal framework, (ii) effective institutional arrangements, (iii) transparent decision-making and information disclosure, and (iv) active public participation. The National People's Congress should revise water-related laws to improve clarity, remove contradictions, and bring focus to enforcement and integrated water management. The Water Law needs to be updated and aligned with the basic principle of "building ecological civilization." Legal reforms should address two fundamentals: (i) rights and authorities over water management, and (ii) coordination between jurisdictions and institutions. Governance of water utilities, in particular, would benefit from the separation of the ownership of assets from the management of services. This would encourage a more entrepreneurial approach to utility management, attract private capital, and foster the development of a water service industry.
106. To inform decisions and modernize water management nationwide, the 13th plan should finance a real-time geographic information systems-based monitoring system of various types of water supply, water quality, and water infrastructure. The monitoring system should include a comprehensive water information platform that integrates data from all key authorities from the local levels up.³²

Recommendation 6-4: Reform water pricing to reflect scarcity and promote water services to address externalities.

107. One reason for the current water crisis in the PRC is that water resources and water services are not properly priced and valued. Essential to the 13th plan are further reforms to water resource prices and the creation of water service markets to reflect

³¹ The Ministry of Water Resources reports that the PRC depends on groundwater for about 20% of its water supply, with 60% of that going to agriculture. In the water-scarce northern PRC, about 65% of drinking water comes from groundwater. More than 400 of the PRC's 661 cities use groundwater as their primary source for water. Pollution and over-extraction cause irreparable damage to underground aquifers. In April 2014, the Ministry of Land Resources reported that the quality of groundwater for 60% of the 4,778 spots in 203 cities that it monitors was too poor for drinking.

³² One of the barriers to better water management is the lack of reliable, up-to-date information (such as pollution sources, locations of underground pipes, and groundwater use etc.). Information is often not captured, not shared between departments, or not open to the public. To ensure a water-secure future, the PRC must be able to understand its current water situation and understand future trends.

such factors as scarcity of water resources and “externalities” associated with water services.

108. First, the national government needs to support the local governments in implementing tariff regulations. Local authorities have been slow in implementing tariff regulations.³³ They are concerned about public reactions, especially from the poor. Tariff increases elsewhere have been out of step with metering and set at irrational rates. The state needs to inform local governments on how to use usage-based progressive tariff to protect small users. Cost tiers need a scientific and justifiable basis for charging different rates to different sectors and for households using different amounts of water (total or per capita). Full cost recovery should be reflected in regional and national water management and economic planning. When local governments and the public begin to understand the true costs of water and sewerage, a market consciousness will grow and positively affect how water is allocated and used.
109. Second, the country needs to strengthen water rights administration and pilot water markets. The first step toward establishing water markets is to recognize clear, assured water rights. The second step following the assured water rights is to develop water resource allocations plans. The River Basin Commissions, with support from the central government, should jointly develop and issue a technical handbook on allocating river basin water resources. A handbook would contribute to more consistent preparation of water allocation plans and agreements at local levels. Plans should be based on scientific accounting of water availability, water consumption, and the amounts that must be retained or returned to the environment.
110. The sale or lease of water rights can raise water productivity and environmental returns. The 13th plan can build confidence for water trading by establishing clear entitlements and demonstrating competence in managing, monitoring, and communication. This begins with the capacity to implement, to monitor, and to manage information systems that relate to allocations and rights. The 13th plan should pilot temporary trading where there exists some experience and monitoring infrastructure.
111. Third, the government needs to develop a watershed services market that can attract the private sector. The government has been the predominant buyer of watershed services in its eco-compensation schemes, which has left little room for the private sector. In developing a national eco-compensation policy framework, the government should shift its role to “enabler,” focusing on establishing the regulatory requirements that can create a market that would attract private sector participation.
112. Finally, the government should convert the water resources fee to water tax. Local governments use this fee to fund local water resource management programs. These revenues could be put to better use if they were collected as a tax, which the central government could then allocate to priority basin water projects. Allocations from annual central and local government budgets could also support local water resource management activities.

³³ Regulations allow various fees to recover the full costs of water and sewerage services. The water development fee can cover production costs, the water resource fee can cover environmental and depletion costs, and the sewerage fee can cover waste removal costs.

Recommendation 6-5: Focus on the weakest spots of the country's water security and develop water risk management.

113. The government should extend special efforts to geographical areas where floods, droughts, and pollution hazards are high. At the same time, the government needs to shift from a reactive emergency response system to a proactive risk management system.
114. To develop a water risk management system to increase resilience, the government should adopt the following measures in the 13th plan: (i) build a long-term national water risk mapping system, including flood, drought, supply variability, water stress, and pollution incident; (ii) establish an early warning system to increase resilience of cities and farms; (iii) prioritize vulnerable and sensitive areas; and (iv) introduce insurance schemes (such as crop insurance).
115. During the 13th plan period, it is important to improve domestic water security through chemical management and improved chemical disaster response.³⁴ The government should (i) develop and enforce stringent controls for pollutant discharges from industrial point sources, especially toxic chemicals near urban drinking water sources; (ii) disclose information on chemical pollution and set up training programs for basic emergency response; and (iii) assess chemical-related water risks for new urban areas. New urban development projects should consider potential chemical pollution of water resources.

³⁴ The chemical spill in Songhua River 10 years ago and the recent industrial contamination from the Lanzhou water treatment plant demonstrates the threat of water pollution from chemical incidents. These incidents have polluted precious water supplies, leading to economic loss and potential health risk. Countries such as the United States and the United Kingdom, as well as various European Union member states have developed well-designed chemical management and emergency response systems for clean water. In contrast, both the national emergency response and chemical management system in the PRC are weak.

Subnational Debt Management

A. Strategic Context

116. The Decisions of the Third Plenum recognize that public finance is an important pillar for governing the nation. Looking ahead, subnational borrowing will play a key role in financing the implementation of the announced reforms as improved taxation and fiscal transfers will not suffice to finance the challenges posed by economic modernization and rapid urbanization.
117. Prior to the approval of the amended Budget Law on 31 August 2014, the law forbade subnational governments from borrowing. As a consequence, subnational borrowing in the PRC has been informal and not transparent. The root of the problem lies in the system of intergovernmental fiscal relations that has resulted in a mismatch between fiscal revenue and expenditure obligations in subnational governments, prompting the accumulation of debt.
118. At present, while subnational governments are responsible for 85% of total expenditure, their share of the country's total revenue is around 50%. Unable to borrow to close the gap, and under pressure to meet increasing infrastructure demands from economic transformation and urbanization, subnational governments turned to off-budget financing sources, thus accumulating significant debt. Moreover, almost half of this debt has been incurred by unregulated nontransparent local government investment vehicles, which emerged to circumvent the Budget Law's prohibition on subnational government borrowing.
119. Taking control of this potentially destabilizing situation requires increasing transparency by legalizing and regulating borrowing by subnational governments. Government actions to date to permit bond issuance on a pilot basis by selected subnational governments are steps in the right direction, but greater efforts are required. While the amended Budget Law provides a basic legal framework, the PRC has yet to build a sound regulatory framework to manage subnational government debt efficiently in light of existing challenges.
120. The current reliance on land use fees and unregulated access to off-budget resources is not sustainable. The need is magnified by the financial challenges posed by the government's new urbanization strategy. Advancing urbanization requires large investments in urban infrastructure to accommodate the growing number of rural residents moving into cities. Their entitlements to public goods and services, including the expansion of educational access discussed above, will significantly increase the financial needs of subnational governments.

121. New financing mechanisms are thus required. Subnational bonds will provide an efficient financing option for subnational governments to manage their debt in a fiscally sustainable manner. The adoption of subnational bonds needs to be complemented with a reliable debt management system. In this process, efforts are required to create independent debt rating assessments, supported by early warning systems and mechanisms to deal with subnational fiscal distress.
122. Drawing on relevant international experiences, a wide range of policy recommendations for the PRC are formulated to establish a solid subnational debt management system. The main recommendations are summarized below, covering the establishment of a debt management framework, subnational bond markets, and credit rating and early warning mechanisms.

B. Key Recommendations for the 13th Five-Year Plan

Recommendation 7-1: Adopt a phased mixed regulatory approach to manage subnational borrowing.

123. It is recommended that the PRC adopts a phased mixed regulatory approach to manage subnational borrowing, and gradually adjust this framework depending on how conditions evolve, as detailed below. The gradual approach is particularly important during the transition period as developing a subnational debt management system is a long-term process.
124. In the short to medium term, in light of prevailing soft-budget constraints in the economy and the high expectations for central government bailouts, it is suggested to adopt a combination of rules-based and administrative controls with initial emphasis on the latter. The cases of Brazil and the Republic of Korea are particularly relevant to illustrate both approaches.
125. As the subnational debt management system develops, it is recommended to phase out the administrative controls, and progressively shift to greater reliance on rules-based controls. The process will need to be flexible and the pace at which rules-based controls are introduced would depend on how quickly the overall efficiency of the economy improves, and relevant institutions develop and gain experience in subnational debt management. The cases of Brazil and Mexico offer instructive practical examples of rules-based controls. The case of Argentina, also reviewed, offers important lessons on actions and policies that should be avoided.
126. In the medium to long term, administrative controls could be phased out with increased reliance on rules-based controls. Brazil's Fiscal Stability Law offers relevant insights for the PRC. The PRC will indeed benefit from the resulting advantages of increased predictability and transparency under fiscal rules, while a more mature framework for subnational debt management is being put in place. This will help send clear signals to the market and suppress bailout expectations, resulting in strengthened fiscal discipline in subnational governments.

Recommendation 7-2: Enforce the debt management regulatory framework through supporting legislation.

127. Once subnational borrowing is introduced, it is crucial to enact laws and regulations to contain borrowing within manageable levels to mitigate risks. Lessons during episodes of severe subnational debt crisis in emerging markets in the 1990s highlight the importance of relying on solid *ex ante* regulations. Specific policy recommendations include the following:
- (i) The central government should limit the use of subnational debt to finance only capital investments (golden rule).
 - (ii) The central government should impose an aggregate debt ceiling initially, in particular during the transition to improved budget management and fiscal discipline.
 - (iii) The central government should limit subnational borrowing to fiscally strong subnational governments, and rely on intergovernmental transfers to support fiscally weaker ones.
 - (iv) The central government should require a comprehensive cost-benefit analysis of intended projects prior to endorsing subnational debt financing.
 - (v) Risk-sharing mechanisms should be considered, including PPPs.
 - (vi) As rules cannot be effectively enforced without sanctions for violations, it is suggested that the PRC imposes sanctions to enforce regulations and fiscal prudence.

Recommendation 7-3: Underpin subnational debt management with an improved fiscal framework.

128. A debt management framework cannot address weaknesses in intergovernmental fiscal relations. Reforming intergovernmental fiscal relations is essential to improve fiscal revenue and the accountability of subnational governments. To that end, revising expenditure assignments to clarify the responsibilities at all government levels must be a priority for reform. Reform in revenue assignments should be complemented with reforms of the tax system to ensure that governments at each level have stable tax bases and sufficient revenue autonomy.
129. Moreover, for the purpose of risk management, the adoption of a medium-term planning horizon for revenues, expenditures, and liabilities is recommended. This is critical for two main reasons. First, multiyear budgeting requires governments to make more explicit and consistent statements of policy goals and priorities. For example, if the government's goal is to reduce its debt to a certain level, it has to articulate how this target can be achieved over the coming years within a multiyear budgeting framework. Second, multiyear budget estimates provide projections of fiscal outcomes under alternative economic conditions and government investment plans. In this sense,

multiyear budget estimates function as an early warning signal for policies that are not compatible with the medium-term fiscal objectives of the government. This implies that the authorities have to take into account the effects of long-term projects on future fiscal outcomes both at the subnational and central levels.

Recommendation 7-4: Develop subnational bond markets grounded in a solid regulatory framework.

130. A well-developed subnational bond market would offer several advantages to subnational governments in the PRC, including lower costs, greater availability of resources to finance infrastructure development and urbanization, strengthened fiscal transparency due to implicit credit rating, and contribution to developing a more diversified capital market.
131. The first step to develop subnational bond markets in the PRC is to define its regulatory framework. It should include *ex ante* regulations specifying the borrowing purpose, the type of bonds, and ceilings on bond issuance. *Ex post* regulations to deal with fiscal distress and potential insolvency should be also defined to enhance the credibility of hard-budget constraints for subnational governments.
132. In this context, an independent regulatory body should be appointed to supervise subnational bond financing. Its main functions should include recording and surveillance of all subnational bond financing activities to provide the central government with periodic assessments of the status of subnational bond financing nationwide. It could also be tasked with the close monitoring of the early warning system, including undertaking remedial actions when early warning signals occur.
133. In this context, *ex ante* regulations must be set by the central government to specify the type, purpose, and procedures for subnational borrowing. Hence, it is recommended that the central government restricts subnational borrowing to long-term public capital investments. Moreover, the borrowing purpose should be aligned with national development strategies and goals. Further, the central government, assisted by the National Budget Committee, should impose a bond ceiling for each subnational government. The ceiling could be revised annually in light of the fiscal status of subnational governments.

Recommendation 7-5: Design mechanisms to deal with insolvency.

134. *Ex post* regulations and mechanisms to deal with insolvency should be also developed. International experience shows that subnational insolvency, although not common, is possible due to external shocks or fiscal mismanagement. *Ex post* regulatory systems are designed to deal with insolvent subnational governments through rules to allocate default risk between borrowers and lenders. As such, they enhance the credibility of hard-budget constraints for subnational governments, reduce moral hazard, and emphasize subnational governments' accountability. They also protect the general public from serious adverse consequences of default by a subnational government.
135. Against this background, it is recommended to develop subnational government insolvency legislation. The PRC does not have any formal legal mechanism for such

eventualities, other than through administrative action on a case-by-case basis. The first step would thus be to develop, enact, and enforce the provisions of subnational government insolvency legislation to eliminate expectations of central government bailout. This is key to enhance subnational government's accountability. In this context, it would be appropriate to adopt initially the administrative approach to insolvency as the ability of the judiciary to influence fiscal adjustment in subnational governments is limited compared with the authority of a higher level government under the administrative approach.

Recommendation 7-6: Establish bond management principles.

136. While in principle, any tier of subnational government could issue bonds, it is recommended that the central government only designates fiscally strong provincial governments as bond issuers initially. Provincial governments have larger revenue capacity, a more diversified tax base, and greater ability to manage projects. Moreover, the information asymmetry between the central and provincial governments is lower than that between the central government and city or prefecture governments, simplifying the supervisory role of the central government, and thus reducing risks.
137. Regarding types of bonds, it is recommended to rely primarily on revenue bonds at the initial stages of subnational borrowing development to contain fiscal risks. However, general obligation bonds could be introduced in more advanced localities, but initially within well-defined parameters. In the longer term, once subnational bond markets are mature, general obligation bonds could be introduced more widely and with progressively fewer restrictions.
138. Defining bond maturity and the repayment structure is also important. As subnational bonds typically finance long-term capital investments, it is recommended that the PRC increase bond maturity to match the project's lifespan. This will help avoid the current maturity mismatches that threaten fiscal sustainability in subnational governments, where long-term infrastructure projects are financed by short-term financing vehicles. It is also essential to clearly define the repayment structure for the borrower to pay interest and principal over the life of the liability. This will allow subnational governments to make the necessary financial arrangements to honor their debt service obligations in a timely manner.
139. Effectively managing bond issuance requires institutional support and capacity development. Availing of standardized information across all levels of government is crucial to ensure accurate systematic assessments of risks and liabilities and, hence, fiscal sustainability. To that end, subnational governments should regularly publish their financial reports, and subject them to internal (i.e., upper-tier government) and external (i.e., market) auditing. The financial reports should contain basic descriptions of the key characteristics of the debt, including its nature, terms, certification of compliance with debt limits, and information about the collateral pledged. This area is particularly weak in the PRC and requires substantial investments in capacity development, particularly in the fields of auditing, legal services, and finance.

Recommendation 7-7: Develop credit rating and early warning systems to contain debt risks.

140. As subnational borrowing carries risk, regulations enhancing the creditworthiness and transparency of the bond issuer are indispensable. Hence, in addition to establishing a debt management regulatory framework, the central government has to rely on independent and unbiased credit rating assessments of subnational government debt. This should be complemented by the introduction of early warning systems to monitor subnational government fiscal health.
141. Credit rating and early warning systems are critical elements for risk mitigation in debt management. The credit rating industry in the PRC is still in its infancy and lacks experience in subnational credit rating. An early warning system was introduced in the PRC in 2005 but it failed due to poor enforcement and lack of sanctions. Based on lessons from international experiences, and taking into account features unique to the PRC, policy recommendations to establish credit rating and early warning systems are formulated.
142. The passage of a legal act on credit rating is proposed to regulate the credit rating industry. The act should specify the certification standards, the rating methodology, and a code of conduct for rating agencies. It should also make provisions to designate the regulatory body concerned and the extent of its responsibility and authority. Specific indicators and their corresponding weights to determine the parameters for credit rating in subnational governments in the PRC are recommended.
143. However, international experience suggests that sole reliance on credit rating agencies does not provide investors, lenders, or central governments with full certainty about the risk assessment of subnational borrowers and their debt obligations. For that reason, most countries develop early warning systems, with indicators and respective thresholds which serve as warning signals triggering the implementation of an adjustment plan to correct debt distress at an early stage. To establish an effective early warning system, relevant indicators are proposed, adjusted for PRC-specific risks, as well as other recommendations to make early warning systems functional in the PRC.
144. Further, it is recommended that debt-monitoring plans are prepared for each layer of government engaged in borrowing, including the positions held accountable for meeting the requirements, and sanctions. In addition, any subnational government under watch should prepare action plans in advance to promptly address fiscal distress once the warning signals are triggered.

Further Integration of the People's Republic of China with the International Economic System

A. Strategic Context

145. Since the PRC embarked on reform and opened up in 1978, the country has achieved tremendous economic growth. In 2010, the PRC became the world's second-largest economy, and by 2013 the PRC became the world's largest exporter, second-largest importer, and the world's largest creditor. The PRC is also a leading global destination for foreign investment, and its outbound financial flows have been growing rapidly. While various factors have contributed to this success, the PRC's steady integration into the global markets, particularly its World Trade Organization (WTO) accession, has played a critical role in bringing substantial benefits to the country and the rest of the world.
146. Further integration with the global economic system will continue to serve the country well in the future. The 18th National Congress of the Communist Party pointed out that it is of utmost importance for the country to "adapt to new mega trends of economic globalization, implement more proactive opening up strategies, and establish and improve an open economic system." Further integration will also help deepen domestic reforms and allow the market to play a more decisive role, through better competition, improved transparency, higher product standards, prudent governance, efficient financial services, and easy connectivity and efficient transport and trade logistics.
147. As the PRC becomes increasingly integrated with the global economic system, prospects for the PRC economy will be intricately linked to the health of the regional and global economies. The PRC's domestic policies will have larger spillover effects internationally, and events abroad will also have a greater impact on the PRC. Since the global financial crisis in 2008/2009, the composition of global economic growth has changed. OECD economies experienced relatively slow growth, while emerging market economies experienced faster growth—and Asia had the largest concentration of higher-growth economies. While trade with OECD and other non-Asian partners will continue to grow, the PRC cannot be expected to achieve previous high export growth rates. For these reasons, as the PRC looks to future globalization, it should pay special attention to expanding regional opportunities.
148. The PRC's 13th plan will be implemented in an international economic environment that has changed fundamentally since the last 5-year plan. In this period, the world economy has emerged from the most dramatic slowdown in two generations. While most economies have recovered, opportunities for future growth are changing significantly. To a significant extent, opportunities and challenges for the PRC's globalization are also an expression of domestic economic structure. In this context, the PRC's economy is experiencing an important structural transition over the next 5 years. The three main features of this are rebalancing of aggregate demand and supply, demographic transition, and tapering of aggregate growth.

149. The PRC's transition from a low-wage economy to a consumer economy presents the Asian region with a new set of growth opportunities. While traditional East–West (North–South) trade will continue, regional economic integration will allow Asian economies to diversify exports away from slow-growing western markets to dynamic Asian markets.
150. Expanding international trade would continue to make important contributions to the PRC economy but this expansion should recognize emerging opportunities and risks. The PRC should pursue further globalization through regionalism, and leveraging superior growth and diversity among the Asian economies. It should also draw on comparative regional advantages to produce higher value added goods and services, recognizing the economy's need to sustain higher labor productivity and real wages.

B. Key Recommendations for the 13th Five-Year Plan

Recommendation 8-1: Pursue bilateral, subregional, and regional trade agreements more intensively.

151. The PRC's WTO membership is a valuable source of influence for the country, and its conformity with WTO standards is an important precedent to strengthen relations with each of its trading partners. However, the momentum of the WTO has slowed dramatically, and has not kept pace with rapidly changing trade realities in Asia and elsewhere. Western OECD markets remain important but to respond effectively to emerging trade opportunities in the medium term, the PRC should intensively pursue bilateral, subregional, and regional agreements. As the world's largest exporter, the second-largest importer and the second-largest economy, the PRC is in a good position to present the Asian region with an opportunity to pursue globalism through regionalism.

Recommendation 8-2: Develop a clear and consistent national policy for reciprocal market access.

152. The strongest basis for international market access is reciprocity. This is positive for the PRC because the scale and dynamism of its economy offer unparalleled opportunity to leverage reciprocity for the benefit of PRC exporters and investors. Over the next 5 years, the PRC should take advantage of this with a clear and consistent national policy for reciprocal market access. Due to the unusually large share of activity in the PRC economy, SOEs and the sectors in which they operate offer the government an opportunity to set a strong example for market openness.

Recommendation 8-3: Adopt international standards of goods in the PRC's domestic market.

153. To further promote international trade, the PRC should adopt international standards of goods in the PRC's domestic market. This will further open up the PRC's domestic

market to global products, improve the quality of products, and allow more PRC industries to participate in regional and global trade.

Recommendation 8-4: Support the next generation of multilateralism, including trade and investment facilitation across the Asian region, and promote knowledge-sharing.

154. The PRC should support the next generation of multilateralism, including trade and investment facilitation across the Asian region. In addition to proactive engagement with existing international institutions, the PRC should invest in institutional and infrastructure connectivity, and establish a regional multilateral framework aimed at facilitation of trade, financial integration, and development assistance. Instead of treaty-based, binding trade agreements, this arrangement could be modeled on the OECD, a venue for collaborative dialogue that actively and consistently promotes standard setting, policy coherence, and transparency. These commitments would be essential to achieving inclusive regional growth.

Recommendation 8-5: Keep opening up the PRC's financial markets and the capital account, and further develop the domestic legal framework to protect investors.

155. As an emerging economic hub of the Asia region, the PRC needs to keep improving the financial infrastructure needed for the next generation of domestic and regional growth and trade. Asia has huge reserves of domestic savings, yet its current allocation is well below its potential to promote national and regional growth. Without more determined reform and innovation in the finance sector, the PRC risks a decade or more of slow productivity growth. To promote international investment, the PRC needs to continue to liberalize its financial markets and the capital account, and further develop the domestic legal framework to protect investors.

Recommendation 8-6: Improve the renminbi's international liquidity and risk characteristics through more determined finance sector reforms.

156. The size of the PRC's economy is consistent with reserve currency status but its current financial policy framework is inadequate. Reserve currencies require technologies for managing international financial liquidity and risk, and the adoption is a voluntary global process responding to the quality of these two services to manage international financial liquidity and risk. Over the next 5 years, the best approach to promoting the internationalization of the renminbi is to improve the currency's international liquidity and risk characteristics through more determined finance sector reforms, including capital account opening, interest rate deregulation, central bank independence, and greater participation of the private sector in finance sector.

Recommendation 8-7: Be more proactive in the facilitation of trade with neighboring countries connected by land or sea.

157. The PRC should be more proactive in facilitating trade with neighboring countries via land and sea. This includes improving expediency and consistency in customs administration, prioritizing urban development and expansion at existing borders, and building stronger partnership initiatives for development across the PRC's borders. The latter should include targeted lending and even grants to trading partners for bidirectional trade facilitation, local infrastructure for transport, urbanization, training, and technology transfer.

Recommendation 8-8: Intensify collaboration with neighboring countries in the promotion of regional economic cooperation initiatives for mutual benefits.

158. The PRC's historical growth experience makes it a valuable partner for developing Asia. Across the region, the PRC can promote knowledge-sharing, trade, and investment. The PRC's own development experience contains valuable lessons for its lower-income neighbors, and it can play an influential role in regional development assistance. By improving bilateral and regional trade relations and partnering to expand infrastructure, the PRC can offer its neighbors access to the world's most dynamic internal market. By promoting private Chinese investment overseas, the PRC can help lower-income regional partners overcome domestic savings and technology constraints.
159. The PRC should also intensify its collaboration with its neighboring countries to promote regional economic cooperation initiatives for the mutual benefit of the PRC's border provinces and their neighboring countries to expand regional markets and their economic integration as building blocks for larger economic cooperation initiatives.

Implementation of the 13th Five-Year Plan

A. Guidance from the Third Plenum and Assumptions

160. The Decisions of the Third Plenum provide an anchor for a comprehensive set of reforms across wide-ranging areas over the next decade. The Decisions also acknowledged the eight challenges that are discussed in this report.
161. As explained in previous chapters, if these challenges are not addressed adequately, they could hinder the PRC's efforts in moving toward a high-value economy. The recommendations proposed in the report will help the PRC tackle the eight challenges. They were prepared against the backdrop of current economic and social developments and likely trends, and based on the following general assumptions:
- (i) The 13th plan will effectively translate the development and reform vision of the Decisions into actual policies and programs.
 - (ii) Greater private sector participation and deeper structural reform will be undertaken.
 - (iii) Greater emphasis will be put on ecological civilization, which is essential to sustainable development, curbing costs associated with resource depletion and environmental damage.
 - (iv) Narrowing income inequality and regional disparities will be priorities on the government's reform agenda.
 - (v) Greater efforts will be made to integrate the parallel rural–urban social protection schemes, reducing labor market rigidities and facilitating urbanization.
162. More specifically, it is assumed that for:
- (i) **Industrial transformation**, proactive actions will be taken to let the market play a more decisive role in resource allocation; the government is committed to further deepening institutional reforms to promote innovation, industrial upgrading, and expansion of services and SMEs; and the environment for fair competition will be improved.

- (ii) **Balanced development of rural and urban areas**, agribusiness will be opened up to foreign investment; greater reforms of *hukou* and social security; and land use rights of rural residents will be expanded.
- (iii) **Human resource transformation**, financing, including targeted subsidies, for education will be budgeted and fiscal transfer to support provincial education programs will be increased; quality of education, including teacher professional development and curriculum reforms, will be implemented across all levels of schooling; reforms in tertiary education will continue; and the private sector will play a greater role in the provision of educational services.
- (iv) **Environmental protection**, the government, corporations, civil society, and the public will work together to protect the environment; “green” economic growth will remain a priority; and accountability will be reinforced through increased public monitoring, transparency, and legal recourse.
- (v) **Mitigation and adaptation of climate change**, the government continues to give priority to address mitigation and adaptation issues and availability and accessibility of increased gas and oil supplies to allow an increase of oil and gas imports.
- (vi) **Water security**, water governance, and market-based incentives will be strengthened; inter-sector and inter-agency coordination for conservation of water resources, and more effective usage for agricultural, energy, industrial, and urban purposes will be improved.
- (vii) **Subnational debt management**, tax and fiscal reform measures announced will be implemented; envisaged reforms are backed by legislation and properly enforced; and management and supervision of subnational debt will be strengthened.
- (viii) **Further integration of the PRC with the international economic system**, a stable global economic policy environment that supports PRC commitments to accelerate trade and investment agreements; further deregulates the financial services sector; and accelerates the pace, consistency, and effectiveness of border trade administration.

B. Progress-Monitoring and Course Adjustments

163. Deep and comprehensive reforms require close and effective cross-agency coordination. Reaching consensus on the approaches and detailed policy measures is difficult due to different agency perspectives and the complex nature of the reform agenda. These could delay the implementation of the 13th plan. In implementing the 13th plan successfully, a key challenge would be to address such issues of inter-agency coordination.

164. In addition, unexpected domestic and international events may change the underlying assumptions of the policy recommendations, and pose new challenges for the reform agenda. Under a new environment, some policy recommendations may become less relevant. Hence, flexibility is needed to adjust course as necessary.
165. Domestically, the PRC's leadership is modifying the growth target to the "new normal," and this new pace of growth is expected to continue in the medium to long term as the government focuses on quality of growth rather than quantity of growth. Moreover, huge demands from urbanization, regional disparity, income inequality, and the need for clean air and water as well as social services may create economic, financial, and social risks.
166. Internationally, as a large open economy, the PRC's influence over other countries will continue to increase, while events in the global economy will also increasingly influence the PRC. For example, developed economies could experience an extended period of low-growth, the possible implementation of the Trans Pacific Partnership, and the establishment of the ASEAN Economic Community.
167. With these considerations in mind, it is important to establish a mechanism to monitor the events that will likely affect the implementation of the 13th plan. This could include monitoring the progress of achieving the targets and evaluations to (i) identify policies, programs, and instruments that have worked well and could be further expanded; and (ii) identify the policies, programs, and instruments that did not work well and need to be adjusted or terminated. The traditional arrangement to conduct midterm review of a 5-year program can be replaced by a better arrangement, which would allow more real time monitoring and assessment and dynamic adjustment of the plan.

C. ADB Assistance

168. ADB can support the implementation of the recommendations for the 13th plan through various instruments, such as sovereign and nonsovereign and/or private sector loans, technical assistance, knowledge work and knowledge-sharing, and cofinancing. ADB can also provide support through new lending modalities, such as results-based lending, policy-based lending, and PPP. ADB is open to explore new and innovative lending modality and knowledge support to help the government implement the 13th plan. ADB can also assist in developing a monitoring and evaluation mechanism for 13th plan, either for the whole 13th plan, or parts thereof, related to the eight challenges and the implementation of recommendations made by ADB.
169. Through its long-standing operations in the PRC, ADB has comparative strengths and expertise in the following areas
 - (i) **Environment, natural resources, and agriculture.** ADB can support (a) rural land and environment protection, and ecosystem management; (b) water use efficiency and management; (c) reforestation, rural renewable energy development, and waste management to strengthen climate change adaptation and mitigation; and (d) rural social and financial services, particularly rural pension reform, microfinance, and SME finance to enhance rural livelihood opportunities.
 - (ii) **Energy.** ADB can support (a) energy efficiency and conservation through innovative finance, development of energy service companies, and application of

smart grid technologies; (b) renewable energy, including wind, concentrated solar, biomass, geothermal, and small hydropower; (c) cleaner and lower carbon fossil fuel technologies, and carbon capture and storage; (d) urban energy efficiency and environmental improvement; and (e) the development of regional power trading arrangements.

- (iii) **Transport.** ADB can support (a) road network rehabilitation, rural roads, more effective road maintenance systems, and road safety; (b) efficient and safe railways with strong regional dimensions and facilitation of containerization; (c) urban public transport, nonmotorized transport, multimodal passenger hubs, and traffic demand management; (d) inland waterways and inland ports; and (e) multimodal logistics centers, logistics services, and intelligent transport systems.
- (iv) **Urban development and social services.** ADB can support (a) city-cluster development, (b) industrial upgrading, (c) urban environment improvement, (d) water supply and wastewater management, (e) TVET, and (f) elderly care and health. ADB can also explore various financing modalities, such as PPPs, to support urban and rural development projects.
- (v) **Public management, finance sector, and regional cooperation.** ADB can support the government's efforts to strengthen the policy, legal, fiduciary, and regulatory frameworks and practices to (a) support the market in playing a more decisive role in resource allocation, (b) improve delivery and management of public services, and (c) help create an enabling environment for private sector investment. ADB can also support microfinance, SME finance, green finance, and municipal finance. Moreover, ADB can support regional cooperation and integration initiatives, such as trade facilitation and regional connectivity, through the Greater Mekong Subregion and the Central Asia Regional Economic Cooperation programs.

170. Some examples of ADB's support in these areas include:³⁵

- (i) research on reform of monopoly industries, and operational mechanisms for the market to play a decisive in resource allocation;
- (ii) research on relaxing *hukou* restrictions and agricultural modernization;
- (iii) development of multimodal logistics parks in Chongqing combining railways, roads, and waterways;
- (iv) investments in TVET systems in Hunan, Guangxi, and Guizhou to strengthen the linkage between TVET schools and colleges and industries, and to align the curriculum to competency-based standards and adjusted to meet the needs of new occupations;

³⁵ This is not an exhaustive list.

- (v) research to strengthen education policies, including labor market information systems, graduate employability and tertiary education, expansion of school-enterprise cooperation with enhanced private sector participation in the delivery of education;
- (vi) efforts to help the PRC achieve ecological civilization through green development, following the Memorandum of Understanding signed in January between ADB and the Ministry of Environmental Protection;
- (vii) projects to improve access to clean water, promote pilot water-saving irrigation technology, reduce water pollution, strengthen urban wastewater management, and improve nonstructural aspects of drought and flood management;
- (viii) development of a climate technology promotion mechanism in Hunan, which could be replicated in other provinces;
- (ix) preparation of a public finance reform strategy, and establishment of a sound debt management system; and
- (x) PRC stakeholders' active participation in various initiatives under the Greater Mekong Subregion and Central Asia Regional Economic Cooperation programs on trade policy, trade facilitation, financial integration, and knowledge-sharing.

Transforming toward a High-Income People's Republic of China

Challenges and Recommendations

The People's Republic of China (PRC) has experienced stellar economic performance over the last 3 decades. Gross domestic product growth has averaged 10% per year. Per capita income has increased by a factor of 13. Life expectancy at birth increased from 67 to 73 years. Rapid growth, however, has posed eight challenges for the PRC: industrial transformation, balanced rural–urban development, human resource transformation, environmental protection, climate change mitigation, water security, subnational debt management, and further integration with the international economic system. In 2013, the Asian Development Bank was invited to provide inputs to support the preparation of the 13th Five-Year Plan (2016–2020). This report summarizes key issues and recommends practical policy options to address the PRC's challenges.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to a large share of the world's poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

