

ASIAN DEVELOPMENT BANK

TAR: PRC 31252

TECHNICAL ASSISTANCE

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR

POWER PRICING STRATEGY: TARIFF SETTING AND REGULATION

May 2003

CURRENCY EQUIVALENTS

(as of 15 April 2003)

Currency Unit	–	yuan (CNY)
CNY1.00	=	\$0.1208
\$1.00	=	CNY8.2772

The exchange rate of the yuan is determined in relation to a weighted basket of currencies of the trading partners of the People's Republic of China. In this report, a rate of \$1.00 = CNY8.30 is used.

ABBREVIATIONS

ADB	–	Asian Development Bank
LRMC	–	long-run marginal cost
PPA	–	power purchase agreement
PRC	–	People's Republic of China
SERC	–	State Electricity Regulatory Commission
TA	–	technical assistance

NOTES

- (i) The fiscal year (FY) of the Government ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

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I. INTRODUCTION

1. During the 2002 Country Programming Mission, the Government of the People's Republic of China (PRC) confirmed its request for technical assistance (TA) from the Asian Development Bank (ADB) to assist the State Electricity Regulatory Commission (SERC) to develop its power pricing strategy with a focus on tariff setting and regulation.¹ In March 2003, the Fact-Finding Mission was fielded to determine the scope of the TA and assess available studies. The Mission held discussions with representatives from the PRC Government and SERC. An understanding was reached on the TA goals, purpose, scope, cost estimates, financing and implementation arrangements, and the consultants' terms of reference. The TA framework is given in Appendix 1.

II. ISSUES

2. Achieving the right balance between the benefits of market pricing for electricity and other social goals is one of the critical issues faced by developing countries. Electricity pricing can be used to influence demand and contribute to rational electricity use, increased economic efficiency, and greater prosperity. For this, the Government needs to cooperate in the newly restructured power sector with the various stakeholders, such as electricity providers, electricity consumers, and the regulator, to establish a fair and cost-reflective tariff system for electricity services that also reduces nontechnical losses.

3. Electricity tariffs in the PRC are regulated by the Government. The electricity tariffs are set at provincial level and usually comprise (i) catalog tariffs² applied to recover (a) costs of state grants for all plants and transmission and distribution built before 1985; (b) loans from the Government for many of the plants and transmission and distribution built after 1985; and (c) costs of power plants financed by joint investment from central, provincial, and local governments; plants of independent power producers; and plants owned by local governments or industries that sell surplus power to the grid; and (ii) state and local surcharges added to consumer tariffs across a province.³

4. The end-consumer tariff structure of the PRC in general comprises six consumer categories: (i) residential, (ii) nonresidential lighting, (iii) commercial, (iv) nonindustry and general industry,⁴ (v) large industry, and (vi) agriculture. A one-time connection fee is applied to new consumers connected to the network, which is determined on the basis of the need to cover investments at the subtransmission and distribution level. In addition, a two-part tariff, consisting of capacity and energy charges, is applied only to large industrial consumers. There is no capacity charge for all other consumers.

5. Between 1990 and 2000, the real end-consumer tariffs in the PRC increased on average by about 7% annually. Based on the estimated long-run marginal cost (LRMC)⁵ of electricity supply and the load characteristics of several provincial power grids in the PRC, on average the current tariff level is about 90–95% of the LRMC of supply for different regions.⁶ While industrial

¹ The TA first appeared in *ADB Business Opportunities* (Internet version) in January 2003.

² By 2001, most of provinces in the PRC applied uniform end-user tariffs at provincial level.

³ The comprehensive price difference was abolished in the second half of 2000. At present, the uniform tariffs include surcharges covering the Electricity Construction Fund, the three Gorges Project Construction Fund, and the City Public Utility Fund. The surcharges are estimated to be 6–10% of electricity bills in 2001.

⁴ This includes large nonindustrial consumers such as airports and ports.

⁵ The concept of marginal cost pricing is useful in attempting to optimize the allocation of resources. However, the higher tariffs that may result from the application of this principle could be detrimental to a country's industrial competitiveness or might deprive lower income consumers of an essential service. In any case, marginal cost valuation provides valuable guidance and benchmarking in establishing efficient tariff structure and level, even if the level of marginal costs is not totally recovered in the average tariff.

⁶ The end-consumer tariffs, however, include government levies that do not accrue to the utility.

consumers are paying tariffs at or higher than the estimated economic costs, residential, commercial, and agricultural users are paying tariffs below their economic costs. Residential and agricultural consumers are the main recipients of subsidies. With the adjustment of industrial structure and the rapid increase in people's living standards, the gap between peak and off-peak demand has been expanding. At present, time-of-day tariffs are applied to some consumer categories. The current time-of-day tariffs do not provide much flexibility or adequate incentive for customers to shift their electricity consumption away from peak hours.

6. The present tariff structure is relatively complex and inequitable, does not fully reflect the structure of supply costs, and does not provide adequate incentives for electricity conservation. Within the same consumer category, consumption at lower voltage level is charged at higher tariff, but the difference is small compared with the difference in supply costs. The pattern of cross-subsidies suggests that the industry sector subsidizes electricity consumption in the agriculture and residential sectors. All consumer categories are paying substantially higher than the LRMC of supply for electricity in the off-peak period, but lower than the supply costs in the peaking period. The current pricing system, which involves substantial cross-subsidies, is not conducive to the efficient use of electricity.

7. As a part of general economic reforms, the PRC has undertaken tariff reforms in recent years. These include (i) unifying consumer tariffs for each consumer category under each provincial-level power system; (ii) rationalizing the classification of consumer categories and making adequate increases in the tariff differential for power supplies at adjacent voltage levels to reflect supply costs; and (iii) improving the two-part tariff system, consisting of capacity and energy charges, by increasing the capacity charge to industrial consumers. These reforms have resulted in a much better tariff level and structure and contributed to substantial efficiency improvement in the PRC's power sector.

8. In December 2002, a major step in restructuring the PRC power sector was taken by establishing five power generation companies and two grid companies to separate generation from transmission and distribution.⁷ Tariff reforms in the PRC, such as separation of transmission and distribution tariffs from the end consumer tariffs, are urgently needed to support the ongoing power sector reforms. In addition, the issues of the stranded power purchase agreements (PPA), emission charge for coal, and social equity need to be analyzed and incorporated into the tariff design and regulation. The current policies for setting electricity tariffs need to be reformed to be compatible with power market design and to increase energy efficiency, promote environment protection, and ensure sustainable development of the power sector.

9. The immediate tariff reform objectives are to design a system with well-designed transmission, distribution, and retail tariffs that are comparable with the power sector reforms. In this system, the generation tariffs will be determined through competition, while the Government will continue to regulate the transmission and distribution tariffs. This requires a transparent tariff regulation framework to ensure successful implementation. The consumer category will be reclassified and the retail tariff structure will be optimized. The longer-term tariff reform objective is that the tariff setting should be based on principles of economic cost of supply while addressing other social concerns. The affordability of tariffs for poor consumers in rural and urban areas will also be taken into account.

⁷ ADB is supporting the restructuring of the power sector under TA 2917 (ADB. 1997. *Technical Assistance to People's Republic of China for Power Sector Restructuring*. Manila). This TA proposed to the Government a well-structured approach for deregulating the power sector. In addition, under the TA 3931 (ADB. 2002. *Technical Assistance to People's Republic of China for Establishing the National Electricity Regulatory Commission*. Manila), the consultants will assist SERC in promoting competition, encouraging new investment, and ensuring that customers receive a fair share of the efficiency gain.

10. Traditionally, electricity subsidies between customer categories (cross-subsidies) have been used in the PRC, without taking into consideration the consumers' ability to pay or their levels of consumption. In the context of the ongoing power market development, a carefully thought-out strategy is needed for phasing out the cross-subsidies and developing appropriate delivery mechanisms for direct subsidies from the Government to low-income groups. For this, the option of lifeline tariff may need to be explored.⁸

11. Lack of electricity supply to meet basic needs could create negative impacts on health, education, and economic development. Also, rural tariffs are generally higher than urban tariffs. The Government is aiming to provide a basic supply of grid-connected electricity to all rural consumers at an affordable tariff through a rural electrification campaign started in 1998. The costs of rural electrification are partially borne by the Government through dedicated funding. The Government also instructed the provincial electricity companies to reduce rural tariffs and bring them in line with the tariff levels for urban consumers. This will lead to an implicit subsidy because the cost of supplying electricity to rural areas is higher than the urban areas. However, the Government considers that such temporary subsidy is justified, as its objective is to ensure that the rural population, in particular the poor, have access to affordable electricity.

12. The financial impact of tariff adjustments on power utilities is an important concern of the tariff reforms. In a more competitive market environment, power utilities' financial performance will need to be improved to ensure the success of power market reforms and a sustainable power development.⁹ Furthermore, the proposed tariff reforms should involve well-targeted and temporary subsidies to reflect social concerns. The proposed tariff reforms should benefit those who really need them and enhance the accessibility, availability, and acceptability of electricity services, particularly in the rural areas. The subsidies involved should be visible in terms of their size, transparent in terms of their sources and beneficiaries, and subject to reduction within a prescribed time period. The tariff reform is an opportunity to create an environment enabling private sector participation in the power sector development.

13. SERC, which will directly report to the State Council, was established in early 2003. Its main functions include implementing the power sector restructuring and enforcing law and regulations in the power sector. The functions of SERC in the area of electricity tariffs are to (i) propose tariff settings and adjustments to the government pricing authority according to market conditions and based on the general tariff guidelines issued by the Government, (ii) review and improve tariff structure and levels, and (iii) determine and regulate fees and charges for ancillary services. To perform its functions, SERC urgently needs to develop tariff setting methodologies and regulatory guidelines, in accordance with the Electricity Law and the tariff guidelines issued by the State Development and Reform Commission. The reform plan will include a detailed implementation schedule and an assessment of the impact of the proposed tariff reforms on consumers.

III. THE TECHNICAL ASSISTANCE

A. Purpose and Output

14. The objective of the TA is to help SERC develop a power pricing strategy a reform action plan focusing on tariff setting and tariff regulation.

⁸ The determination of the desirable level of a lifeline tariff will take into account the electricity consumption patterns and the percentage of disposable income that poor households use for purchase of electricity in terms of purchasing power parity.

⁹ Impact assessments in some provinces indicate that, even with the proposed decrease in rural tariffs, power utilities' financial performance will improve due to the result of efficiency gains in the transmission and distribution of electricity brought about by the improved rural electrification system and the more efficient tariff structure after tariff reforms.

15. The TA will (i) examine key issues related to power tariff setting, tariff regulation, generation tariff under competitive power market, transmission and distribution tariffs, social impact, environmental improvement, and regulation; and develop a strategy and an implementation plan to address these issues; (ii) optimize available power capacity through proper tariff setting and regulation; (iii) assess impacts of power tariff reforms on consumers' affordability, power utilities' financial viability, and environmental protection; (iv) identify and remove barriers to tariff reforms, and develop the necessary policy and regulatory framework; (v) analyze the issue of subsidies and cross-subsidies; and (vi) conduct a consultation workshop with main stakeholders.

B. Methodology and Key Activities

16. The TA will be carried out in three phases. During phase I, the consultants will undertake initial data gathering and preliminary analysis. The consultants will identify the main issues to be addressed to achieve the TA objectives, and the reform measures required to address these issues. Under phase II, the consultants will analyze in detail the issues relating to tariff setting and tariff regulation. In phase III, the consultants will make impact assessments from technical, institutional, economic, social, financial, pricing, environmental, and poverty impact viewpoints, and will formulate an appropriate tariff development strategy and present an action plan. The recommendations of the consultants will be discussed in a workshop with the main stakeholders. The consultants will organize a final workshop with the main stakeholders to disseminate the TA findings and recommendations. The outline terms of reference for consultants are given in Appendix 2.

17. The TA will include an international seminar on tariff setting and tariff regulation. The consultants will help organize this seminar. International and domestic experts will be invited to present papers and participate in the discussions. After the seminar, the consultants will prepare a report summarizing the discussions and identifying issues relevant in the PRC context. The TA includes an international field study to provide exposure to selected PRC personnel on the latest trends and international best practices in tariff setting and tariff regulation. Personnel from SERC and other governmental agencies involved in the policymaking and implementation of tariff setting and tariff regulation will undertake the 2 week study. The consultants will consider the particular needs of the study participants and prepare a study proposal for ADB approval, specifying the (i) objectives of the field study, (ii) institutions to be visited, (iii) agenda for discussions and training, (iv) name and job description of each member nominated to participate in the field study, and (v) costs. Selection procedures for the international field study will have to be acceptable to ADB and take into account considerations of economy and efficiency. At the end of the field study, the participants will submit to ADB a report summarizing the findings and recommendations.

18. The major assumptions and risks that need to be considered for the successful implementation of the TA include inadequate counterpart support, lack of adequate and in-time provision of data, delay in submission of required studies, delay in consultant selection, and poor consultant performance. In addition, the Government's continuing commitment to power tariff rationalization and transparent regulation is necessary for the success of the TA. Efforts will be made to ensure that competent consultants will be recruited in time. SERC is committed to tariff reforms and agreed to provide adequate counterpart support and data when needed. Close coordination among the consultants, executing and implementing agencies, and ADB will further mitigate these risks.

Cost and Financing

19. The TA is estimated to cost \$700,000 equivalent with a foreign exchange cost of \$362,000 and a local currency cost of \$338,000 equivalent (Appendix 3). ADB will provide \$500,000 equivalent to finance \$322,000 of the foreign exchange cost and \$178,000 equivalent of the local currency cost. The TA will be financed on a grant basis by ADB's TA funding program. SERC will contribute \$200,000 equivalent representing about 29% of the TA cost, to finance the remaining foreign exchange cost of \$40,000 and local currency cost of \$160,000 equivalent.

C. Implementation Arrangements

20. SERC will be the Executing Agency for the TA. ADB will engage the services of international and domestic consultants according to its *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for the engagement of domestic consultants. The international consultants will have expertise in (i) tariff setting, (ii) tariff regulation, (iii) LRMC calculation, (iv) environmental assessment, (v) economic and financial analysis, (vi) corporate governance and power sector reforms, and (vii) poverty impact and social assessment. The domestic consultants will have similar expertise. An estimated total of 29 person-months of consulting services will be required: 8 for international and 21 for domestic services.

21. SERC will establish a counterpart team with representatives from SERC and the provinces selected for pilot studies.¹⁰ The counterpart team will closely interact with the consultants during TA implementation.¹¹ SERC will also establish a steering committee comprising senior SERC officials and representatives from other government organizations and agencies involved in formulating and implementing tariff policies. The steering committee will be the apex body that will convey and interpret the government's views on policy issues and generally oversee TA implementation. The counterpart team members will interact with members of the steering committee to seek clarification of issues and matters that fall outside the purview of SERC. SERC will provide interpreters, local transportation, and office space equipped with suitable office facilities in Beijing. Some of the office equipment will be financed under the TA and will be procured by the international consultants in accordance with ADB's guidelines for procurement. The TA is expected to commence in October 2003 and be completed by October 2004.

IV. THE PRESIDENT'S DECISION

22. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$500,000 on a grant basis to the Government of the People's Republic of China for Power Pricing Strategy: Tariff Setting and Regulation, and hereby reports this action to the Board.

¹⁰ The pilot provinces will be selected in phase I of the TA. After reviewing the basic information, the consultants, in close consultation with SERC and ADB, will determine the selection criteria and number of provinces, and recommend the pilot provinces for approval by SERC and ADB.

¹¹ SERC will appoint the counterpart team before the TA negotiations.

TECHNICAL ASSISTANCE FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<p>Goal</p> <p>To help the State Electricity Regulatory Commission (SERC) optimize power operation and development, and promote sustainable growth of the power sector in the People's Republic of China (PRC) by formulating a power pricing strategy and a reform action plan focusing on tariff setting and tariff regulation.</p>	<ul style="list-style-type: none"> • Tariff reforms • Improved power efficiency • An effective tariff-setting mechanism • Effective tariff regulation guidelines • An implementable tariff reform action plan 	<ul style="list-style-type: none"> • Country economic and power sector statistics • Policy dialogue with the Government • Implementation monitoring by SERC and the Asian Development Bank (ADB) 	<ul style="list-style-type: none"> • Willingness to undertake tariff reforms • Sector restructuring continues • Electricity demand continues to grow
<p>Purpose</p> <ol style="list-style-type: none"> 1. Develop a strategy for tariff setting and regulation, and an implementation plan 2. Assess impacts of power tariff reforms on affordability to consumers, financial viability of power utilities, and environmental protection 3. Analyze the issue of subsidies and cross-subsidies 	<ul style="list-style-type: none"> • A power pricing strategy with focus on tariff setting and regulation • A reform action plan • Clear and detailed presentation of impacts 	<ul style="list-style-type: none"> • Technical assistance (TA) final report and TA completion report • Consultation workshop • Review missions • Implementation monitoring by SERC and ADB 	<p>Risks:</p> <ul style="list-style-type: none"> • Inadequate counterpart support • Lack of adequate data • Poor consultant performance <p>Assumptions:</p> <ul style="list-style-type: none"> • Willingness to undertake tariff reforms
<p>Outputs</p> <ol style="list-style-type: none"> 1. A power pricing strategy with focus on tariff setting and regulation 2. An reform action plan 3. Field study report 4. International seminar report 5. Tariff setting methodology 	<ul style="list-style-type: none"> • Identify problem areas and key issues to be studied • Introduce knowledge and experience of other countries • Package of reform and development measures under the strategy • Consultation workshops • Strategy and reform action plan 	<ul style="list-style-type: none"> • Inception report • International seminar report • Field study report • Draft final report • Final report • Review mission • Implementation monitoring by SERC and ADB 	<ul style="list-style-type: none"> • Reform and development measures are relevant and sensitive to local issues • Active counterpart participations • A good household survey
<p>Activities</p> <ol style="list-style-type: none"> 1. Phase I: Preliminary Analysis <ul style="list-style-type: none"> • Participatory activities • Visits to selected provinces • Data gathering and field survey 	<ul style="list-style-type: none"> • Background knowledge is fully assessed 	<ul style="list-style-type: none"> • Meetings with consultants • Review mission reports • Draft final report 	<p>Risks:</p> <ul style="list-style-type: none"> • Lack of counterpart support

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<ul style="list-style-type: none"> • Review of existing policies, rules, and regulations • Identification of key issues <p>2. Phase II: Tariff Settings and Regulatory Function</p> <ul style="list-style-type: none"> • Complete institutional analysis • Calculate long-run marginal Cost calculation • Develop tariff setting methodology • Determine required changes in legal and regulatory environment <p>3. Phase III: Pricing Strategies and Impact Assessment</p> <ul style="list-style-type: none"> • Prepare a reform action plan • Assess impact on economic growth, environment, and poverty <p>4. International Seminar</p> <ul style="list-style-type: none"> • Invite participants • Conduct seminar • Prepare summary report <p>5. Field Study</p> <ul style="list-style-type: none"> • Make travel arrangements • Conduct field study • Prepare summary report <p>6. Consultation Workshop</p> <ul style="list-style-type: none"> • Arrange a consultation workshop • Discuss findings and recommendations <p>Inputs</p> <ul style="list-style-type: none"> • 8 person-months of international and 21 person-months of domestic consulting services • Field study and training for \$60,000 • ADB financing of \$500,000 • SERC contribution of \$200,000 equivalent • Counterpart staff participation • Computer and office facilities 	<ul style="list-style-type: none"> • Clear understanding of existing policies, rules, regulations, and key issues • Sound tariff setting methodology is developed • Clear institutional analysis • Effective tariff regulation • Effective reform action plan • Clear presentation of impacts • Clear agenda • Qualified speakers • Relevant countries and organizations are selected • Training program is good • Number of participants in the workshop • Ownership and commitment to the TA recommendations • Accuracy of cost estimates • Contract variations • Sufficient counterpart facilities 	<ul style="list-style-type: none"> • Consultation workshop report • Final report • TA implementation plan • Implementation monitoring by SERC and ADB • Review mission reports • Consultation workshop report • Final report • Field study report • Implementation monitoring by SERC and ADB 	<ul style="list-style-type: none"> • Lack of adequate data • Late consultant recruitment <p>Assumptions:</p> <ul style="list-style-type: none"> • Good arrangements for International visits • Consultants are selected on time, are suitably qualified, and perform well • International and domestic speakers are qualified, and selected on schedule • A good household survey • Strong TA ownership by the Executing Agency <p>Assumptions:</p> <ul style="list-style-type: none"> • International visits and seminars are arranged efficiently • Good counterpart support and office facilities

OUTLINE TERMS OF REFERENCE FOR CONSULTING SERVICES

1. The technical assistance (TA) will be carried out by a consulting firm with experience in institutional, economic, financial, environmental, and social analyses, impact assessment, electricity tariff design, and analysis of subsidies in the power subsector. The team of international consultants will consist of a tariff specialist, a power economist, a social impact analyst, a financial analyst, and an institutional specialist. The study will require about 8 person-months of international and 21 person-months of domestic consulting services. To ensure effective assistance to the international consultants, the team of domestic consultants will have the same team composition. The consultants will work in close collaboration with the State Electric Regulatory Commission (SERC) and ensure effective know how transfer. The international consultants will be recruited in accordance with *Guidelines on the Use of Consultants* of the Asian Development Bank (ADB).

2. On commencement of the TA, the consultants will do a detailed background study to gain a thorough understanding of the issues related to tariff setting and regulation in the People's Republic of China (PRC). The consultants will review the relevant reports and studies, including those of SERC and international agencies including ADB, World Bank, and other aid agencies. After reviewing the basic information, the consultants will determine the selection criteria and number of pilot provinces, and recommend the pilot provinces for approval by SERC and ADB. The consultants will have discussions with members of the steering committee and counterpart team to obtain a good understanding of the Government's reform directions and establish a sound basis for the TA work. The consultants should evaluate the international experience in related areas and their relevance in the PRC context and tailor their recommendations to reflect the situation in the PRC to ensure they are relevant and can be effectively implemented. The presentation of recommendations should focus on how to go from the current stage of tariff setting, regulation, and reforms to an efficient stage of tariff setting and regulation.

A. Terms of Reference

3. The terms of reference of the consulting services will include, but will not be limited to the following.

1. Phase I: Preliminary Analysis

4. During phase I, the consultants will do the following

- (i) Trace the history of tariff setting and tariff reforms in the PRC, and discuss the significant changes and their impact. Review the country's methodology for tariff setting and collect data on tariff level and structure.
- (ii) Present a clear picture of the situation with regard to electricity tariffs in the PRC, including (a) the current electricity tariff structure and level and in different regions; (b) the basis of the tariff setting and tariff approval procedures; (c) the relationships among the institutions involved; (d) the roles and responsibilities of central and provincial governments in tariff determination; (e) subsidies and cross-subsidies; (f) the financial position and financial governance of power utilities; (g) affordability by consumers; (h) the objectives of electricity tariff reform, including the overall objective and the objective in each development stage; and (i) past reform measures including those for generation, transmission, distribution, and retail tariffs in each development stage.

- (iii) Organize and conduct a household survey to identify the stakeholders of the proposed tariff reforms, the willingness and ability of consumers to pay, and level of surcharges and fees at local level. The survey will provide a base for the impact assessment.
- (iv) Identify the main issues of the present electricity tariffs, including the tariff setting mechanism, tariff regulation, efficiency of current tariff structure/level, and the main obstacles to power tariff reforms. Include the linkages of electricity tariffs to economic growth, social impact, and environmental improvement.
- (v) Review generation tariffs and issues of generation power plants with signed power purchase agreements (PPA). Investigate and analyze the current situation of the foreign-owned generation plants with signed PPAs. These should include investment modes, funding resources, power station types, installed capacity, contracted electricity generation, actual electricity generation, contracted generation tariffs and actual average generation tariffs in the last 5 years.
- (vi) Identify issues of direct access to the market for large consumers. Review and present international experience in this area, including the main objectives, basic conditions, identification of the large consumers, and the arrangements for the direct access.
- (vii) Analyze conditions for the direct access of large consumers in the power market. Include the modes of the electricity market, the treatment of “stranded cost,” transmission and distribution tariffs, ancillary service charges, and retail tariff add-ons. Analyze the impacts of large consumer’s direct access on generators, franchise consumers and power grid companies.
- (viii) Identify the barriers to tariff reforms and measures to remove the barriers, including institutional, ownership, social, and financial constraints.
- (ix) Describe the tariff reform initiatives proposed by the Government to support separation of generation and transmission and distribution, including objectives and the means proposed to achieve these objectives. Assess if these reform measures would be adequate to address the constraints for the power market development and economic growth.
- (x) Calculate the long-run marginal costs (LRMCs) and compare existing tariffs with the LRMC. Based on the LRMC, revenue requirements of typical power utilities, and the existing tariff structure, estimate and analyze existing and projected cross-subsidies, in both economic and financial terms, between consumer categories and regions, taking into account the projected growth in demand and power system expansion.

2. Phase II: Tariff Settings and Regulatory Function

5. During second phase, the consultants will do the following

- (i) Develop pricing mechanisms for the bilateral contract market, spot market, real time market, and ancillary service market based on international practices. Introduce international experience on the judgment and regulation of the power market.

- (ii) Introduce international experience and discuss its relevance in the PRC context to tariff forecast methodology under the competitive power market and treatment of the stranded cost. Develop the generation tariff structure and its adaptability to different electricity market modes in the PRC.
- (iii) Develop measures to address generation tariff pricing, generation ancillary services pricing, treatment of transmission losses and congestion, stranded cost and its treatment, treatment of the emission charge for fossil-fired power plants in power market bidding, and methodology for the price ceiling for the bidding in spot market.
- (iv) Review international experience on the treatment methods and legal problems of the existing long-term PPA under power market reforms. According to the different electricity market modes suggested by SERC, recommend feasible options to deal with the present PPAs and a regulatory framework on the generation tariffs of these power plants.
- (v) Based on the main international regulatory types, experience, and lessons on networks services and their relevance in the PRC context, analyze the proper rate of return on power network investment in line with the development in power network, and calculate the allowable cost and the rational rate of return for a typical power network company.
- (vi) Based on the international electricity tariff regulation frameworks, main experience and lessons and their relevance in the PRC context, develop electricity tariff regulation principles in the PRC, including cost compensation principle, reasonable rate of return principle, and equity principle.
- (vii) Based on the assessment of relevant issues on electricity tariff regulation, recommend electricity tariff regulation contents. According to the electricity market modes in the PRC, analyze the regulation contents for generation tariff, transmission and distribution tariff, and retail tariff, etc.
- (viii) Based on the international experience on the classification of electricity end-users, retail tariff setting, and adjustment methods for franchise consumers, recommend the reclassification of consumer category in the PRC and calculate the reasonable end-user tariff for the consumers in typical electricity network by consumer category and by voltage level.

3. Phase III: Pricing Strategies and Impact Assessment

6. During phase III, the consultants will do the following

- (i) Evaluate the impact of the elimination/reduction of cross-subsidies on households by analyzing household survey data by income groups. Based on the recommendations regarding the subsidy program for vulnerable and low-income groups, determine the Government's budgetary impacts.
- (ii) Assess the impact of changes in electricity prices, particularly rural tariffs and elimination of cross-subsidies, on subsidized consumer groups (particularly the poor) and geographical regions. Analyze social impacts on vulnerable groups and recommend limits to acceptable levels of welfare loss due to tariff reforms.

Consult extensively with the concerned Government agencies. In carrying out the social impact analysis, ensure active participation of vulnerable groups.

- (iii) Assess the impact of subsidies on distorting the economic use of electricity, impeding effective participation of the private sector, and impairing power utilities' performance in a market-oriented environment. Analyze the impact of the subsidies on the financial performance of power utilities.
- (iv) Assess whether, through the reclassification of consumer categories, changes in electricity prices could be partially absorbed by power utilities, hence mitigating to some extent the impact on consumer groups and geographical regions.
- (v) Recommend the policies and regulatory framework on the direct access under the conditions of competitive power market. Recommend reform measures to remove the barriers to tariff reforms. Recommend the preferred authority for proposing and approving tariffs and tariff adjustments. Discuss if different approaches are needed for tariff setting.
- (vi) Recommend a procedure for regulating electricity tariff, including tariff adjustment and disputation settlement procedures. In particular, recommend electricity tariff regulation measures and an electricity tariff regulation regime including electricity tariff adjustment declaration regime, electricity tariff disputation declaration, and arbitration regime.
- (vii) Propose tariff setting mechanisms, taking into account the supply costs and the consumers' willingness and ability. The pricing mechanisms should take into account the LRMC of generation, transmission, and distribution. Where subsidies are suggested, they should be clearly identified and rationalized in accordance with ADB policy on subsidies. Assess whether the cross-subsidies between consumer categories and regions should be removed completely or partly, taking into account relevant experience from developed and developing countries.
- (viii) Assess affordability of electricity for end-users and calculate the affordability for the consumers in pilot provinces, based on international experience with the theories and methodology for analyzing the affordability of electricity and their relevancies to the PRC.
- (ix) Recommend mechanisms for transparent delivery of subsidies or income transfers to vulnerable and low-income groups, to reach the targeted groups effectively and at the lowest cost. If a lifeline tariff is an option, the cost of subsidy and the ways in which this subsidy is to be borne by the Government need to be assessed, and if other approaches such as vouchers to increase social assistance payments are considered, such modalities need to be carefully designed to ensure that the targeted groups can be reached within acceptable costs. Other options, such as payments to compensate suppliers for noncommercial power supply obligations to vulnerable and low-income groups or remote regions, should also be considered.
- (x) Recommend the optimum strategy, mechanisms, and a time-bound action plan. Identify responsible agencies for implementation of different levels. Identify the legal and regulatory changes required for implementing the recommended pricing strategy. Discuss the relevance of the recommended strategy in the

context of the introduction of competitive power market and the PRC social economic conditions.

- (xi) Assess the modes and rules of power markets recommended by SERC. Based on the assessment and the international experiences, recommend generation pricing that is compatible with market conditions and corresponding regulatory content and measure.

B. Field Study and International Seminar

7. The consultants will help organize an international seminar on tariff reforms. International and domestic experts will be invited to present papers and participate in the discussions. After the seminar, the consultants will prepare a report summarizing the discussions, and identifying reforms and development issues of relevance in the PRC context. The consultants will also help organize and conduct a field visit with the participation of key SERC staff, as appropriate, involved in policymaking and implementation of tariff reforms. The visits will be to selected countries to discuss with government officials and regulatory bodies the policy and implementation aspects of electricity tariff setting and regulation. On the completion of the field visit, the consultants will prepare a report summarizing the main issues and findings of the field visit participants.

C. Reports

8. The consultants will submit the following reports:

- (i) An Inception Report. The report will be submitted within 1 month after TA commencement, summarizing the initial findings, and suggesting changes needed (if any) in the TA's approach, methodology, and time schedule. A report on the international seminar, and a report at the end of the international field visit, summarizing the main issues and findings.
- (ii) Draft Final Report and Workshop. One month will be provided for SERC and ADB to review the report. The report will be discussed in a consultation workshop with the participation of main electricity consumers, counterpart team, steering committee members, and key officials from other government agencies involved in tariff policy and implementation. ADB staff will participate in the consultation workshop. The main objectives of workshop are to (a) present, to the policymakers and stakeholders, the findings and recommendations of the TA; (b) facilitate an exchange of ideas and gather comments; (c) increase the ownership and commitment to the TA recommendations; and (d) allow the policymakers to discuss the feedback of stakeholders.
- (iii) Final Report and Final Workshop. One month after the consultation workshop, the consultants will submit the final report, taking into account the comments of SERC and ADB on the draft final report, and the discussions held during the consultation workshop. The consultants will finalize the final report and translate it into Chinese. The consultants will organize a final workshop with the participation of main stakeholders to disseminate the TA findings and recommendations.

COST ESTIMATES AND FINANCING PLAN

(\$ '000)

Item	Foreign Exchange	Local Currency	Total Cost
A. Asian Development Bank Financing^a			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	174,700	0	174,700
ii. Domestic Consultants	0	97,200	97,200
b. International and Local Travel	40,000	7,500	47,500
c. Reports and Communications	8,000	9,000	17,000
2. Equipments ^b	15,000	0	15,000
3. Training, Seminars, and Conferences	15,000	7,000	22,000
4. Field Study	20,000	0	20,000
5. Surveys	0	25,000	25,000
6. Miscellaneous Administration and Support Costs	2,000	5,000	7,000
7. Representative for Contract Negotiations	5,000	0	5,000
8. Contingencies	42,300	27,300	69,600
Subtotal (A)	322,000	178,000	500,000
B. Government Financing			
1. Office Accommodation and Transport	0	60,000	60,000
2. Remuneration and Per Diem of Counterpart Staff	0	42,000	42,000
3. Training, Seminars, and Conferences	0	30,000	30,000
4. Field Study	40,000	0	40,000
5. Others	0	28,000	28,000
Subtotal (B)	40,000	160,000	200,000
Total	362,000	338,000	700,000

^a Financed by the Asian Development Bank's TA funding program .

^b Including three pentium computers, two photocopier, a laser printer, a projector, and a fax machine.

Source: Asian Development Bank estimates.