Technical Assistance Report

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Policy and Advisory Technical Assistance (PATA)
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People's Republic of China: Strategic Analysis and Recommendations for Achieving the 2020 Low-Carbon Goal

(Cofinanced by the Climate Change Fund)

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 29 November 2013)

Currency unit	–	yuan (CNY)
CNY1.00	=	$0.16435
$1.00	=	CNY6.08

ABBREVIATIONS

ADB	–	Asian Development Bank
btce	–	billion tons of coal equivalent
CC-NDRC	–	Department of Climate Change of the National Development and Reform Commission
GHG	–	greenhouse gas
PRC	–	People's Republic of China
TA	–	technical assistance

TECHNICAL ASSISTANCE CLASSIFICATION

Type	–	Policy and advisory technical assistance (PATA)
Targeting classification	–	General intervention
Sector (subsector)	–	Energy (energy efficiency and conservation, energy sector development, renewable energy)
Theme (subtheme)	–	**Environmental sustainability** (global and regional transboundary environmental concerns)
Climate change	–	Climate change mitigation
Location (impact)	–	Urban (high), national (high)
Partnership	–	Climate Change Fund

NOTE

In this report, "$" refers to US dollars.

Vice-President	S. Groff, Operations 2
Director General	A. Konishi, East Asia Department (EARD)
Team leader	A. Bhargava, Director, Energy Division, EARD
Team members	M. C. Alcantara, Senior Operations Assistant, EARD
	L. Lu, Economics Officer, People's Republic of China Resident Mission, EARD
Peer reviewer	J. Yang, Senior Advisor, EARD

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I. INTRODUCTION

1. In December 2012, the Government of the People's Republic of China (PRC) asked the Asian Development Bank (ADB) during a country programming mission to provide policy and advisory technical assistance (TA) for a study on low-carbon development up to 2020.[1] ADB and the Department of Climate Change of the National Development and Reform Commission (CC-NDRC) and the Ministry of Finance agreed later that the TA will help the PRC undertake a critical strategic analysis in assessing the country's progress towards meeting its country's carbon intensity reduction targets for 2020.[2]

2. The concept paper was approved on 22 October 2013. During the fact-finding mission in October 2013, an understanding was reached with the Ministry of Finance and CC-NDRC regarding the impact, outcome, outputs, implementation arrangements, cost, financing agreements, and outline terms of reference for the TA. The design and monitoring framework is in Appendix 1.

II. ISSUES

3. Sustained rapid economic growth and the large part played by energy-intensive industries in its economy have led to a steep rise in energy demand in the PRC. This demand grew from 1.46 billion tons of coal equivalent (btce) in 2000 to 2.97 btce in 2010 and 3.65 btce in 2012. Because fossil fuels provide about 90% of primary energy needs, greenhouse gas (GHG) emissions have also increased rapidly, and the PRC is now widely recognized as the world's largest generator of GHGs.[3]

4. The government has recognized the challenges posed by the rapid expansion in both energy consumption and GHG emissions. The Eleventh Five-Year Plan, 2006–2010 set the tone for low-carbon development by setting specific targets for energy intensity improvement. In addition, the Renewable Energy Law was enacted in 2006 to diversify the energy mix and allocate a larger share in it to renewable energy. In 2009, the government announced its 2020 low-carbon goal by committing to reduce carbon intensity by 40%–45% by 2020 from the 2005 level.[4] It also aims to increase the share of non-fossil energy in the energy mix to 15% from about 7% during the same period. The government has since adopted a wide range of policy measures to promote energy conservation and mitigate climate change. These led to a 19.1% reduction in energy intensity and rapid growth of non-hydro renewable energy during the 2006–2010 period.[5]

5. The Twelfth Five-Year Plan aims to reduce energy intensity by a further 16% and carbon intensity by an additional 17% during 2011–2015. It also sets a target for increasing the share of non-fossil fuel energy in the overall mix to 11.4% by 2015, up from 7.9% in 2010. In an attempt to moderate the demand growth rate, it emphasizes the need for the country to conserve and use energy more carefully. Despite these steps, making the transition from the energy-intensive

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[1] The TA was included as the *Study on the Key Policies and Actions for China's Low-Carbon Development towards 2020* in ADB. 2013. *Country Operations Business Plan: People's Republic of China, 2013–2015.* Manila.

[2] The TA first appeared in the business opportunities section of ADB's website on 18 November 2013.

[3] GHGs are responsible for climate change. Fossil fuel combustion releases carbon dioxide, which is widely recognized as a major GHG. The energy sector accounts for two-thirds of the PRC's total GHG emissions.

[4] Carbon intensity refers to carbon dioxide emission per unit of gross domestic product. By 2012, the energy intensity had been reduced by more than 24% from the 2005 level.

[5] The International Energy Agency estimates that this energy intensity reduction has avoided more than 300 million tons of coal equivalent consumption in the PRC, thereby avoiding nearly 700 million tons of carbon dioxide emissions.

development of the past to a new low-carbon growth future is proving to be a major challenge for the PRC. This challenge has been complicated by such important external and internal factors as the effects of the 2008–2009 global financial crisis, a slower than expected structural adjustment toward a more services-oriented economy, and rapid urbanization. The opportunities to achieve energy savings at low costs through such steps as the closure of old and inefficient coal-fired power plants and industrial capacity are already being acted upon or have already been realized. So, the remaining opportunities for further improving energy saving tend to be more complex and expensive. Energy intensity declined by only 2.01% in 2011 and 3.64% in 2012, the first 2 years of the 12th plan. Carbon intensity remained unchanged in 2011, although it dropped 3.5% in 2012. Although the PRC now boasts more wind power capacity than anywhere else in the world, integrating it with the grid has presented difficulties that have undermined the full low-carbon returns on investments.[6]

6. Despite its large new investments in energy efficiency, renewable energy, and modern industrial capacity, the PRC's heavy reliance on fossil fuel continues, and the growth in its GHG emissions has not slowed as quickly as planned.[7] The critical gaps in the comprehensive analysis, data, and information needed on the readiness of different industries and provinces to set and meet stricter low-carbon targets constitute an obstacle to improving these results.

7. In recognition of these challenges, the PRC is now finalizing the National Plan for Addressing Climate Change, 2013–2020. The plan stresses the need to address climate change mitigation, set a cap on total energy consumption, and dramatically reduce carbon emission intensity. Since the PRC's committed low-carbon goal for 2020 has a range (para. 4), it is crucial that this goal be more precisely firmed up preferably towards the higher end of the range. The Thirteenth Five-Year Plan for 2016–2020 should correspondingly set the right plan target for carbon intensity reduction to achieve this low-carbon goal. The 13th plan should also set up a robust framework of policies, incentives, and regulations for containment and more aggressive reduction of GHG growth for a much longer period afterwards. To establish the right plan target, policies, and actions, the PRC must (i) comprehensively analyze and assess what has worked well so far, as well as the challenges that have emerged that could put attainment of the low-carbon goal seriously at risk; (ii) compare, evaluate, and identify the right mix of policies, incentives, and regulation to balance socioeconomic development with energy conservation and emission reduction during the 13th plan; (iii) evaluate the readiness of important energy-intensive sectors and provinces to meet more rigorous carbon intensity reduction target and, if needed, recommend a differentiated target mechanism across provinces, industries, and economic sectors to ensure its low-cost achievement; and (iv) study an nationwide implementation mechanism for low-carbon target setting, monitoring, and verification during the plan period.

8. The significance of achieving the PRC's 2020 low-carbon goal to global climate change management cannot be emphasized enough. The proposed TA will help carry out the critical analyses and formulate the appropriate recommendations for the 13th plan. It is closely aligned with the ADB country partnership strategy for 2011–2015, which makes the environmental sustainability of the PRC's economic development a priority. The TA outputs may directly contribute to the government's policy making and carbon emission control programs during the

[6] The installed wind power capacity in the PRC was about 62 gigawatts in 2012, which is higher than the second ranked United States, but electricity generation from wind power in the PRC was only one-half that of the United States.

[7] Based on an estimate by Tsinghua University, the PRC will need more than CNY3.00 trillion in investments in energy conservation and renewable energy during the 12th plan period, compared with about CNY1.75 trillion in investments during the 11th plan period.

13th plan and beyond. The TA may provide critical knowledge work that can be utilized in similar studies across other major emerging economies in the region.

III. THE TECHNICAL ASSISTANCE

A. Impact and Outcome

9. The impact of the TA will be to firm up the PRC's 2020 low-carbon goal and its timely achievement. The outcome will be the adoption of the appropriate carbon intensity reduction target in the 13th plan.

B. Methodology and Key Activities

10. The TA outputs will be (i) assessment through studies of the opportunities for and the challenges to achieving the 2020 low-carbon goal; (ii) preparation of a report on carbon intensity target setting for the 13th plan and a breakdown of targets across economic sectors and provinces; (iii) an economic comparison of emission control policy tools and recommendations on the most appropriate mix of policies; and (iv) implementation guidelines and a framework for the 13th plan's carbon intensity reduction target.

11. During its initial stages, the TA will establish a stakeholder's network of experts from various sectors of the economy and government agencies. Close coordination will be maintained throughout implementation with the executing agency and the stakeholders to ensure that the TA takes into account previous studies, government priorities, existing plans, and the results of complementary projects. The TA will also support study of international experience in market-based carbon-reduction instruments and policies that have worked well in some developed countries, such as a carbon tax, emission trading schemes, and emission performance standards, and examine their relevance to the PRC and the country's readiness for their introduction.

C. Cost and Financing

12. The TA is estimated to cost the equivalent of $1,100,000, of which (i) $800,000 will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF–other sources), and (ii) $150,000 will be financed on a grant basis by the Climate Change Fund.[8] The executing agency will provide counterpart support in the form of counterpart staff, office accommodation, secretarial assistance, domestic transportation, and other in-kind contributions. The cost estimates and financing plan are in Appendix 2.

D. Implementation Arrangements

13. CC-NDRC will be the executing agency. It will provide counterpart staff, office accommodation and facilities, and transport for site visits, as required. CC-NDRC will establish a steering committee of high-level experts in the climate change area from academia, relevant ministries, and the research body of the State Council to oversee TA implementation and provide guidance on the TA outputs.

14. The TA will need about 102 person-months of national consulting services. The outline terms of reference and the types of expertise required from the team of consultants are in

[8] Established by ADB.

Appendix 3. ADB, in consultation with the executing agency, will select and engage national consultants through a consulting firm using the 90%–10% weighted quality- and cost-based selection method, in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). The consulting firm will be required to submit a simplified technical proposal covering all aspects of the terms of reference. Any procurement of goods and services during the TA implementation using TA resources will be in accordance with ADB's Procurement Guidelines (2013, as amended from time to time). Proceeds of the TA will be disbursed in accordance with ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time).

15. The TA will require extensive hands-on knowledge of and experience in dealing with the PRC's low-carbon policies, actions, and programs, as well as a deep understanding of conditions in the economies in the country's various economic sectors and provinces. This makes national consultants the most appropriate choice to undertake the core TA tasks. It is expected that experienced consultants will be engaged from major research institutes, academia, and knowledge centers to help carry out the TA tasks.

16. To supplement the work of the national consultants, high-level roundtables, workshops, and seminars will be organized to which well-known international experts and representatives of international research institutes and government agencies from developed countries will be invited to share knowledge on all key topics. These meetings will make it possible to incorporate the results of an exchange of ideas and brainstorming on critical issues and the lessons and best practices from developed countries in the TA recommendations. ADB and the executing agency will cooperate closely in organizing and managing these gatherings.

17. The TA will be implemented over a 19-month period from 15 January 2014 to 15 August 2015. The consultants will be required to submit TA deliverables and progress reports on time. Detailed requirements for deliverables and reports are included in the outline terms of reference for consultants in Appendix 3.

IV. THE PRESIDENT'S DECISION

18. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of $950,000 on a grant basis, to the Government of the People's Republic of China for Strategic Analysis and Recommendations for Achieving the 2020 Low-Carbon Goal, and hereby reports this action to the Board.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact The PRC's 2020 low-carbon goal firmed up and achieved on time	Carbon intensity reduced by more than 40% from 2005 level by 2020 New market-based policies and actions tested during the 13th plan	Department of Climate Change, NDRC IPCC reports	**Assumptions** Government commitment to achieve the goal is strong throughout the 13th plan. The 13th plan adopts the right targets, policies, and actions to achieve the 2020 low-carbon goal. New policies and actions produce the expected results. **Risk** If growth slows in the 13th plan period, the targets may become too difficult to achieve.
Outcome An appropriate carbon intensity reduction target adopted in the 13th plan	By 2015, a carbon intensity reduction target is selected by the government for the plan period in support of the firmed up 2020 low-carbon goal Recommended action plans and policy framework to overcome potential barriers adopted by national and provincial governments	Public announcement of the 13th plan targets, goals, policies, and action plans	**Assumptions** Timely agreement is reached between government and stakeholders on the 13th plan carbon intensity reduction target. Attainment of the 12th plan energy and carbon intensity reduction targets stimulates bolder action in planning the 13th plan. **Risks** Unanticipated slippage in achieving 12th plan targets softens the approach in the 13th plan targets. The cost of achieving the proposed goal becomes too burdensome for the economy.
Outputs 1. Challenges and opportunities of achieving the 2020 low-carbon goal assessed	Comprehensive report on progress during the11th and 12th plans and gap identification prepared by Q3 2014 SWOC analysis on current policies, programs, and actions, and their relevance for the 13th plan completed by the end of 2014	Consultants' reports TA review missions TA performance reports Workshops and conferences Material for dissemination of related knowledge and experience	**Assumptions** The necessary agencies and research institutes with extensive previous experience are engaged on time. The executing agency remains committed to the TA activities and provides timely guidance and support.

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
2. Report on carbon intensity target setting for the 13th plan and the subtargets across the country prepared	A comprehensive report on a range of carbon intensity targets essential to achieve the 2020 low-carbon goal and a target breakdown across economic sectors and provinces prepared by end of May 2015		**Risk** Data, analyses, and previous reports needed to complete the tasks are unavailable.
3. Economic comparison of emission control policy tools and recommendations on the most appropriate mix of policies prepared	Report on efficacy of ongoing actions and plans and cost–benefit analysis of a more aggressive policy approach to overcome emerging challenges prepared by the end of May 2015 Policy notes on effective emission reduction strategies prepared by June 2015		
4. Implementation guidelines and framework for the 13th plan carbon intensity reduction target completed	Draft implementation plan for the 13th plan to monitor, verify, and control carbon intensity reduction progress and achievements formulated by the end of May 2015		

Activities with Milestones

1. Assessment of challenges and path forward to achieve the 2020 low-carbon goal

1.1 Review status of the PRC's current low-carbon policies and actions, their effects, and the results during 2006–2013 (January–June 2014)

1.2 Analyze emerging challenges and identify key barriers that may threaten attainment of the 2020 low-carbon goal (June–August 2014)

1.3 Conduct high-level roundtable, workshops, and seminars for knowledge sharing and brainstorming on each key topic and for reviewing progressive outputs (four major workshops expected in March 2014, September 2014, January 2015, and June 2015)

1.4 Propose appropriate carbon intensity reduction target for the 13th plan to achieve the low-carbon goal by 2020 (August–October 2014)

1.5 Recommend forward-looking new policies, programs, and actions that will set the right enabling conditions to achieve the desired 2020 low-carbon goal (June–August 2014)

1.6 Examine options for more aggressive policies that could lead to a 45% reduction in energy intensity from the 2005 level by 2020 (August–October 2014)

1.7 Identify areas that will need further strengthening and support (October–December 2014)

2. Carbon intensity reduction target setting for the 13th plan and subtargets across the country

2.1 Based on the 11th and 12th plan experiences, comprehensively analyze the problems, barriers, and experience gained in these mechanisms and their efficacy (January–June 2014)

Inputs

Technical Assistance Special Fund (TASF–other sources): $800,000

Climate Change Fund: $150,000

Item	**Amount** ($'000)
Consultants	630.00
Workshop	190.00
Contingencies and others	130.00

Note: The government will provide counterpart support in the form of counterpart staff, office accommodation, office supplies, and other in-kind contributions.

Activities with Milestones 2.2 Review provincial-level socioeconomic data and macro and micro elements affecting provincial CO_2 emissions (January–August 2014) 2.3 In accordance with the PRC's 2020 low-carbon goal, provincial socioeconomic conditions, and prevailing carbon intensity, propose general principles and ideas on the PRC's 13th plan carbon intensity subtarget breakdown (August–December 2014) 2.4 Taking into account regional differences in socioeconomic situations, propose provincial subtargets (January–March 2015) **3. Economic analysis of emission control policy tools and recommendations on most appropriate mix of policies** 3.1 Undertake a comprehensive review and comparison of international and national schemes that have worked well in capping emissions such as sulfur dioxide and other pollutants, and study how they can be transferred across to cap CO_2 emissions (January–June 2014) 3.2 Design a CO_2 cap system framework taking into account the PRC's situation, drawing on experience internationally of similar mechanisms; propose key elements, integrated framework, and ideas for the PRC's CO_2 emissions cap mechanism (June–December 2014) 3.3 Undertake a regional readiness analysis of various provinces and economic sectors in the PRC for the implementation of a CO_2 cap during the 13th plan; analyze a potential phased approach introducing the CO_2 cap mechanism across the PRC, such as early implementation of CO_2 cap in eastern provinces and later implementation in western and northeastern provinces (January–February 2015) 3.4 Evaluate implementation challenges, issues, and problems in a dual-track approach (CO_2 cap plus carbon intensity reduction approach) during implementation in the 13th plan (March–May 2015) **4. Establishing implementation guidelines and framework for the 13th plan carbon intensity reduction target** 4.1 Review the existing institutional set-up and identify capacity gaps for effective implementation of the 13th plan targets (January–June 2014) 4.2 Select suitable provinces (or autonomous regions) from the eastern, central, and western PRC, and comprehensively analyze the corresponding implementation mechanisms for these provinces to achieve their individual low-carbon targets (June–December 2014) 4.3 Propose adoption of innovative policies and actions to improve the management system and working mechanism, appraisal and reward system, and relevant supporting fiscal policies and market mechanism for each selected province and region (January–March 2015) 4.4 Recommend implementation guidelines and framework for the 13th plan low-carbon target (April–May 2015)	

CO_2 = carbon dioxide; IPCC = Intergovernmental Panel on Climate Change; NDRC = National Development and Reform Commission; PRC = People's Republic of China; SWOC = strength, weakness, opportunities, and constraints; TA = technical assistance.
Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
($'000)

Item	Amount
A. Asian Development Bank[a]	
1. Consultants	
a. Remuneration and per diem	550.00
b. Local travel[b]	20.00
c. Reports, translations and communications	60.00
2. Training, seminars, and conferences (national workshops)[c]	40.00
3. Miscellaneous administration and support costs[d]	50.00
4. Representative for contract negotiations	10.00
5. Contingencies	70.00
B. Climate Change Fund[e]	
1. Training, seminars, and conferences (international workshops)[f]	150.00
Total	**950.00**

Note: The technical assistance (TA) is estimated to cost $1,100,000, of which (i) $800,000 will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF–other sources), and (ii) $150,000 will be financed on a grant basis by the Climate Change Fund. The government will provide counterpart support in the form of counterpart staff, office accommodation, office supplies, and other in-kind contributions.

[a] Financed by the Asian Development Bank (ADB) Technical Assistance Special Fund (TASF–other sources).

[b] Local travel for consultation and data collection.

[c] An advance payment facility, if appropriate, will be provided to the executing agency for the administration of such national workshops, translation and interpretation services, and printing of documents and reports. This need-based advance payment facility will be established only after capacity assessment of the executing agency.

[d] This includes the translation cost associated with each main deliverable of the TA.

[e] Established by the Asian Development Bank. The Climate Change Fund will be front-loaded.

[f] High-level roundtables, workshops, and seminars will be organized to which well-known international experts and representatives of international research institutes and government agencies from developed countries will be invited to share knowledge on all key topics. Administration of such international workshops will be by ADB in close coordination with the executing agency. An advance payment facility, if appropriate, will be provided to the executing agency for such workshops with prior ADB approval after a capacity assessment of the executing agency.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The technical assistance (TA) to the People's Republic of China for Strategic Analysis and Recommendations for Achieving the 2020 Low-Carbon Goal will be implemented in consultation with the executing agency and other stakeholders. The Asian Development Bank (ADB) will select and engage consultants through a consulting firm in accordance with its Guidelines on the Use of Consultants (2013, as amended from time to time) using the quality- and cost-based selection method. Because of the importance of the technical aspects of the consulting services, a quality–cost ratio of 90:10 is proposed. The consulting firm will be required to submit a simplified technical proposal covering team composition, task assignments, work and personnel schedules, and curriculum vitae of the proposed consultants. The preliminary estimates of the type of experts and level of effort in person-months required from each type of expert are summarized below.

2. The project will require about 102 person-months of national experts. Preliminary estimates of the type of experts and level of effort in person-months required from each type of expert are summarized below.

3. To avoid duplicating past efforts, the TA will take into account the body of knowledge that has been developed in this area through multiple studies, reports, and analyses by many experts and research institutes. The consulting team will establish and acknowledge the work that has already been done, benefit from it, and analyze it further when warranted to meet these terms of reference.

A. Consulting Requirements

4. **Team leader and low-carbon development expert (12 person-months).** The team leader must have an economics-related background, a senior research fellowship, with proven experience in formulating major national policies on low-carbon and energy-related issues and in planning and managing relevant research programs. He or she will:

(i) serve as team leader to coordinate all the outputs of the TA and be responsible for the quality of all deliverables;
(ii) organize experts to review low-carbon development policies in the PRC, analyze the problems and emerging challenges under the new situation, set carbon intensity reduction target in the Thirteenth Five-Year Plan for 2016–2020, and put forward new policies ideas for low-carbon development;
(iii) lead relevant experts in summarizing domestic and foreign experiences of carbon intensity target breakdown, investigate regional socioeconomic development, and study the mechanism for carbon intensity target breakdown in the 13th plan;
(iv) propose a framework for the PRC's carbon emissions cap control, and study the PRC's 13th plan carbon emissions cap breakdown scheme;
(v) identify, in consultation with the executing agency, typical provinces for further studies on the implementation arrangement of the proposed low-carbon goal; and
(vi) submit the draft reports of each activity to ADB and the executing agency, receive the comments and suggestions, and incorporate them in the final reports.

5. **Energy efficiency expert (12 person-months).** The consultant must have a professional background related to the energy sector, possess a doctorate or a master's degree and have more than 10 years of work experience in the field of energy conservation. The expert's responsibilities will specifically include but not be limited to the following tasks:

(i) He or she will help review the low-carbon development policies in the PRC, analyze the problems and challenges, set carbon intensity reduction target in the 13th plan, and put forward new policies ideas for energy conservation.
(ii) She or he will review the decline in carbon intensity per unit of gross domestic product since the 11th plan and analyze the impact of energy-saving technologies on this decline. Looking ahead, the expert should analyze how energy conservation and energy efficiency improvements can contribute more under the 13th plan to reducing the carbon dioxide (CO_2) intensity of key energy-intensive areas such as industries, transport, and buildings.
(iii) The consultant will analyze what has worked well internationally in energy intensity reduction and what available technologies are best for ready adoption in the PRC.
(iv) He or she will review and assess the PRC's policies and actions in energy conservation and analyze their effects and drawbacks, as well as compare and evaluate the merits of more aggressive policy support to leapfrog to the best practicable energy efficiency levels in key industries and other energy-consuming sectors.
(v) She or he will investigate and analyze the implementation of the energy intensity reduction targets in the 11th and 12th plans in key regions and summarize the problems and obstacles faced in the implementation of the targets.
(vi) This expert will prepare relevant reports and help the team leader integrate them in the consolidated report.

6. **Energy economists (2 positions, 6 person-months each).** Each of the two energy economists must have a professional background related to energy and economics, possess a doctorate, and have extensive experience in policy research and formulating strategies and plans to deal with climate change and the energy sector. The energy economists will assist all key technical experts and the team leader in the following specific activities:

(i) Both economists will primarily undertake the economic comparisons of emission control policy options and prepare recommendations on most suitable mix of policy options.
(ii) She or he will propose the overall principles and ideas for breaking down the 13th plan carbon intensity reduction targets in to subtargets for provinces and different sectors of the economy in line with the PRC's 2020 low-carbon goal.
(iii) The expert will study the relationship between economic growth, carbon emission, and energy consumption in the 13th plan, and evaluate options for an appropriate CO_2 emission cap, as well as a total energy consumption cap in the 13th plan.
(iv) He or she will review the economic and social development data, energy activities, and other relevant data of individual provinces to establish the relationship between provincial economic growth and carbon dioxide emissions and the sensitivity to each other.
(v) She or he will study the environment capacity and prevalent energy consumption and CO_2 emissions to help identify mechanisms needed to fulfill low-carbon development goals in typical provinces.
(vi) The energy economist will help the team leader in drafting all reports, receiving the comments and suggestions, and incorporating them into the final reports.

7. **Renewable energy expert (7 person-months).** The renewable energy expert must have an engineering background with at least 8 years of professional work experience in the field of renewable energy. The expert's responsibilities will specifically include but not be limited

to the following tasks:

(i) She or he will help analyze the progress achieved so far in the PRC's renewable energy growth and the key issues that may affect the achievement of the specified target of 15% (share of nonfossil fuel in the energy mix) by 2020.

(ii) He or she will select provinces with a high renewable energy use; examine in detail the effectiveness of their existing policies, regulations, and incentives; and identify areas that need urgent attention.

(iii) The expert will examine various policy options and regulations, such as the renewable energy portfolio scheme, to examine their applicability in the PRC. She or he will review a recent backlash against renewable energy in the European Union and new thinking on creating a more level playing field for renewable energy technologies, and consider the effects on the PRC.

(iv) Together with the energy economist and the team leader, the expert will analyze the ongoing tariff incentives for renewable energy and their potential regression and impact on renewable energy development by 2020.

(v) He or she will analyze renewable energy endowments and consumption levels in typical provinces and help study the corresponding implementation mechanisms for these provinces to achieve the low-carbon targets assigned to them.

(vi) The expert will help draft the relevant reports.

8. **Energy system analysis experts (2 positions, 6 person-months each).** Each of the two experts must have an engineering background, a doctorate, with relevant experience of 10 years and above. In particular, both experts must be fully familiar with energy system modeling and formulation of national or local plans for low-carbon energy addressing climate change. The expert will be specifically responsible for the following activities:

(i) Both experts will develop a suitable energy model to help understand the impacts of various policy options to reduce CO_2 intensity in selected province(s) and regions. The analyses will help the team identify mechanisms for assigning targets to different provinces and sectors of the economy in the 13th plan period.

(ii) They will analyze the main challenges of fossil energy structure adjustment to achieve the 13th plan's low-carbon development goals, address barriers, and determine their impact on attaining these goals.

(iii) They will help study and propose the PRC's 13th plan carbon emissions cap and propose key elements, an integrated framework, and ideas for carbon emissions cap control.

(iv) Based on the PRC's current strategy of main functional regions, the relations between three main factors (duties, capabilities, and potentials), game theory, and other methods, the experts will propose two or three approaches in breaking down regional carbon intensity reduction target in 13^{th} plan and identify the advantages and disadvantages of these methods.

(v) Based on the findings, the expert will propose the program for setting up subtargets for the 13th plan carbon intensity reduction and possible regional caps on total carbon emissions in more developed regions of the PRC economy.

(vi) The experts will help draft the relevant reports.

9. **Climate change international policy research expert (9 persons-months).** The expert must have a relevant academic background and rich working experience in the field of international climate change policies, including experience in heading major research related to national climate change. The expert will be responsible for the following tasks:

(i) He or she will assist in the situational analysis of the 2020 low-carbon goal and research in the PRC's carbon emissions cap control.

(ii) She or he will summarize and analyze current international climate change policies, general requirements and schedules under international carbon emissions cap control, and requirements for the PRC's carbon emissions cap control.

(iii) He or she will analyze the likely impact of international climate change dialogue on the PRC's achievement of the 2020 low-carbon development goals. The expert will help the team understand the impact of broader international climate change negotiations on the PRC's future ambitions for and role in containing greenhouse gas emissions, as well as what this may mean in terms of CO_2 emission caps in selected economically developed eastern provinces.

(iv) She or he will research and analyze domestic and international experience under resource and environment-related cap controls—for instance, the PRC's sulfur dioxide cap control, energy consumption cap controls, and air pollutant cap controls in foreign countries—and elicit from this the lessons learned from the successes and the problems in target setting.

(v) The expert will help draft the relevant reports.

10. **Macroeconomic policy experts (2 positions, 6 person-months each).** Each of the two experts should hold a degree in economics or a relevant field with suitable experience in economic research. Both should have participated in national policy making and have published important papers. Working under the team leader, the macroeconomic policy experts will:

(i) help study a business-as-usual approach and the relevant challenges in accomplishing the 2020 low-carbon goal;

(ii) analyze current trends in the PRC's macro economy and in the ongoing industrial restructuring and its potential impacts on carbon emissions intensity reduction;

(iii) analyze the obstacles to the 13th plan's carbon intensity reduction target during industrial restructuring and how they can affect accomplishment of the target;

(iv) propose a macroeconomic policy framework for achieving the 2020 low-carbon target and preparing the PRC for the longer-term carbon-constrained economic development regime; and

(v) prepare relevant reports.

11. **Public policy management expert (12 person-months).** The expert should hold a degree in management or a related discipline and have rich experience in the field of public management. The expert will be responsible for the following specific tasks:

(i) He or she will review and assess the PRC's policies and actions in the 11th and 12th plans on low-carbon development and summarize the problems and obstacles in the management of the PRC's low-carbon development.

(ii) Based on experiences gained in the PRC and abroad, she or he will propose key factors and an overall framework for the PRC's carbon emissions cap control system, as well as for implementing it in typical regions.

(iii) The expert will identify key aspects of public policy that may put at risk the achievement of the 2020 low-carbon goal and propose a suitable approach to overcome these issues.

(iv) He or she will recommend supporting measures and long-term mechanisms that relevant provinces need to implement to achieve the provincial level subtargets in accordance with the 2020 low-carbon goal, such as assessment and evaluation systems, reward and penalty systems, related finance and taxation policies, and market mechanisms.

(v) The expert will help draft relevant reports.

12. **Development economics expert (7 person-months).** The expert must have an economics-related background with relevant development experience in impoverished and minority areas and community building. The expert's specific responsibilities will be to

(i) study the merits and the comparison of carbon emissions cap control and carbon intensity reduction control and formulate the 13th plan breakdown mechanism and its implementation in typical regions;
(ii) summarize and analyze the PRC's regional policy and analyze the challenges for the PRC's developed areas, impoverished areas,' and minority areas in achieving 2020 low-carbon goal;
(iii) make a comprehensive analysis of typical provinces in terms of their economic and social development and industrial characteristics and help analyze the progress in these provinces toward realizing 2020 low-carbon goal; and
(iv) recommend a suitable regional policy for the PRC's low-carbon development and how this can balance the economic growth aspirations of underdeveloped, impoverished, and minority areas.

13. **Public relations expert (7 person-months).** The consultant must hold a degree in public relations with adequate experience in raising public awareness on climate change. The expert will be responsible for the following specific tasks:

(i) He or she will summarize the public acceptance challenges that have affected the low-carbon commitments and programs of many national governments and how these can be used to help formulate an appropriate communication strategy aimed at building public acceptance of the issues of climate change and low-carbon actions.
(ii) She or he will identify key stakeholders, such as nongovernment organizations and major businesses, and evaluate how they can play a more meaningful role.
(iii) He or she will help prepare brochures, public campaign material, and an effective institutional set-up to manage public acceptance of low-carbon development.
(iv) This expert will draft the reports, receiving the comments and suggestions and incorporating them into the final reports.

B. Consulting Requirements

14. The consultants will (i) submit an inception report within 1 month of mobilization; (ii) hold a round table with key stakeholders and a brainstorming workshop with selected high-level international resource persons to integrate international experiences and lessons learned, preferably within 4–6 months of mobilization; (iii) submit a midterm report 6 months after the commencement of consulting services; (iv) submit a second midterm report after 12 months of mobilization; (v) submit a draft final report after 15 months of mobilization; and (vi) submit a final report within 1 month after receiving feedback from the executing agency and ADB on the draft report. The stakeholder round table and brainstorming workshop will be coordinated with ADB.

15. All TA deliverables and progress reports will be written in English. Three copies of each TA deliverable will be submitted to ADB in English and to the executing agency in Chinese. The deliverables and progress reports should address the terms of reference with details appropriate to that stage of the implementation. The consultants will present key findings in stakeholder workshops and seminars.