

PROJECT INFORMATION DOCUMENT (PID) CONCEPT STAGE

Report No.: PIDC210

Project Name	Green Energy Schemes for Low-carbon City in Shanghai, China (P127035)
Region	EAST ASIA AND PACIFIC
Country	China
Sector(s)	Energy efficiency in Heat and Power (80%), Other Renewable Energy (15%), General transportation sector (5%)
Lending Instrument	Financial Intermediary Loan
Project ID	P127035
Borrower(s)	Government of the People's Republic of China
Implementing Agency	Changning District Government (Shanghai)
Environmental Category	F-Financial Intermediary Assessment
Date PID Prepared/ Updated	13-Feb-2013
Date PID Approved/ Disclosed	17-Feb-2013
Estimated Date of Appraisal Completion	15-Nov-2012
Estimated Date of Board Approval	19-Mar-2013
Concept Review Decision	Track I - The review did authorize the preparation to continue

I. Introduction and Context

Country Context

The Government of China (GoC) is committed to reducing carbon intensity by 40-45 percent from 2005 to 2020. Energy efficiency and renewable energy are expected to contribute significantly to achieving this target. Related ambitious targets include cutting energy intensity by 16 percent during the 12th Five-Year Plan (2011-2015) and increasing the share of non-fossil fuels (renewable energy and nuclear) in primary energy from 8 percent in 2011 to 15 percent by 2020.

China is experiencing rapid urbanization, with projected 300 million people migrating to urban areas over the next 20 years. As a result, energy demand for buildings and transport will increase rapidly – energy demand and related CO2 emissions would triple for the buildings and appliances, and more than quadruple for the transport sector as the vehicle fleet would increase 10-fold over the next two decades. The speed and scale of urbanization provides an unprecedented opportunity to invest in clean energy technologies both at the demand and supply sides today to contain carbon emissions of the country's sprawling cities. The window of opportunity is narrow because urban

form and infrastructure have a long lifetime. Introducing efficient low-carbon technologies into new urban infrastructure today would lock cities into a lower-carbon path for decades to come. Time is of essence.

Cities are at the center stage of the action plan to achieve the government's target to reduce carbon intensity. They contribute 85 percent of China's commercial energy use. CO₂ emissions per capita in Shanghai, Beijing and Tianjin, are already higher compared to leading cities in the world, and are three to four times higher than the national average. To this end, the National Reform and Development Commission (NDRC) has recently given high priority to lowering carbon emissions in cities to achieve the government's carbon intensity reduction target.

Sectoral and Institutional Context

Local government's commitment and vision: Shanghai municipal and Changning district governments requested Bank support to benefit from international knowledge and best practices; and combine investment, policy advice and business development studies to make the Changning District and Shanghai leaders in designing novel and efficient ways to achieve carbon intensity reduction targets. Shanghai municipal and Changning district governments included transition to low-carbon city as one of the high priorities of their 12th Five-Year Plan (FYP). In particular, Changning District government presented an articulated vision aiming at transforming Changning into a leading low-carbon district in Shanghai and the country. It is willing to pilot bold policies and incentives that are not yet implemented at the municipal and national levels during the 12th FYP. Benefiting from international experience through this project, Changning district government plans to accelerate the speed and enhance the quality and success of this initiative.

Identifying cost-effective abatement options: Prior to project identification mission, Changning district government entrusted a Shanghai energy conservation institution, supported by the Bank team and assisted by an international firm, to conduct a comprehensive survey of buildings in Hongqiao demonstration area, and develop CO₂ abatement cost curves to identify abatement potentials, costs, and ease of implementation of various mitigation options (figure 1). Three alternative abatement scenarios (Frozen Technology Scenario; Baseline Scenario to meet the national government's target; and Stretch Scenario beyond national government's target) were developed to determine an ambitious low-carbon target for the Hongqiao area. The use of CO₂ abatement cost curves and bottom-up investigation surveys to define an investment program to reduce CO₂ emissions is the first of its kind. It allowed the District government to make an informed decision about medium-term targets of CO₂ abatement and identify priority actions and investments to meet them.

Figure 1. Abatement cost curve with ease of implementation in Hongqiao area in 2015 (To see Figure 1, please refer to attached document.)

Changning district is an established area with mostly commercial buildings and few industrial activities. To this end, the Hongqiao area is representative in terms of typical abatement options in Changning district. The abatement cost curve analysis provided analytical underpinning for the technical assistance and investments selected under this proposed project to support Changning district achieving its carbon intensity reduction target. The abatement interventions can be grouped into four clusters: (a) retrofit of existing buildings (particularly with efficient air conditioning and building envelope retrofit), accounting for more than half of the emission reductions between the Frozen Technology and Stretch Scenarios; (b) low-carbon energy supply from purchase of green

electricity and distributed generation; (c) low-emission new buildings; and (d) green transport measures.

Integrated multi-sector framework to achieve low-carbon target: From the outset, the municipal and district governments requested for adopting an innovative and holistic multi-sector approach to lower their carbon footprint. Based on the abatement cost curve, this proposed project plans to adopt a comprehensive multi-sector approach to integrate (a) demand-side energy efficiency (EE) measures in buildings; (b) clean energy supply from renewable energy (RE) and natural gas; and (c) sustainable transport such as promotion of clean efficient vehicles and public transport, to achieve low-carbon objective in Changning district.

Challenges to building retrofit: Since retrofitting existing buildings presents the biggest emission reduction potential in Changning district, the bulk of the proposed investment under this project will be dedicated to building retrofit. This is one of the most difficult EE market segments, but has a wide replication potential in China. At present, national and municipal governments have mandatory building codes for new buildings, but not for building retrofit. In addition, the current building codes in China, which require 50-65 percent energy savings compared to the baseline buildings in 1980s, need improvements, as they are not performance-based and focus on individual EE technology requirements rather than actual energy consumption. Furthermore, the existing subsidies provided by the national and municipal governments for building retrofit are not sufficient to attract investments in this market.

Based on the abatement cost curve analysis, retrofitting commercial buildings offers by far the largest emission reduction opportunity in Changning district, compared to government and residential buildings. However, the single largest barrier to retrofit commercial buildings is that owners, usually multiple owners for one building, are reluctant to invest in EE measures, because (a) energy costs are a small share of operating costs; (b) building retrofit investments usually have long payback period; and (c) owners do not want to interrupt commercial operation of the buildings for retrofit. To address this barrier, the Bank team, in collaboration with the Energy Foundation, is supporting the local counterparts to (a) develop performance-based building energy efficiency benchmarks in kWh/m², which can be used to mandate building retrofit; and (b) policy frameworks of mandatory measures and additional financial incentives beyond existing national and municipal government policies that could be piloted under this project by the municipal and district government. This is the first of such efforts to tackle building retrofit in China.

Linkage with other low-carbon city programs in China and lessons learned from international and Chinese experience. The Bank team has closely coordinated with other ongoing and planned low-carbon city programs in the Bank's China Sustainable Development portfolio, notably the Tianjin Eco-city and Beijing Environment projects. The Tianjin Eco-city project is a stand-alone GEF project that provides technical assistance to build a new development zone in Binhai. In Beijing, an IBRD investment is under preparation to support Beijing's program to install solar PV in schools. The GEF Heat Reform and Building Energy Efficiency Project focuses on new residential building codes in northern China. The proposed Shanghai project complements these efforts, as it targets at reduction of carbon and energy intensity in an established district with largely commercial buildings. In addition, the proposed project builds on lessons learned from international and Chinese experiences of low-carbon cities.

In addition, the International Finance Corporation (IFC)/GEF China Utility-Based Energy

Efficiency (CHUEE) program aims at simulating EE investments in China, through a partial risk guarantee facility and advisory services. The bulk of the CHUEE program has focused on industrial EE investments, and it has involved in a few building EE projects, as there has not been much private investments in the building retrofit market in China. The proposed project will benefit from IFC's cooperation with local banks and intends to work with one of them to jump start a business line that has not been attractive to the private sector over the past decade. The Bank team will continue to work closely with the IFC team to explore potential joint investment programs and undertake potential joint studies on green building benchmarking tools and business models for building retrofit during project preparation and implementation. Changning district is an established area with mostly commercial buildings and few industrial activities. To this end, the Hongqiao area is representative in terms of typical abatement options in Changning district. The abatement cost curve analysis demonstrates that retrofitting existing buildings (particularly with efficient air conditioning and building envelope retrofit) accounts for more than half of emission reductions between the Baseline and Stretch Scenarios, followed by purchase of green electricity, distributed generation, low-emission new buildings, and green transport measures.

Relationship to CAS

The proposed project is fully consistent with the Country Partnership Strategy (CPS) for 2006-10 (Report No. 35435-CN) and directly supports a major pillar: managing resource scarcity and environmental challenges. The project also contributes to China's efforts to improve energy efficiency, expand use of renewable energy and address climate change. The project is expected to be in line with the CPS for 2011-2015, which is currently under preparation and aims to support the recently approved 12th FYP. In addition, the proposed project would support the World Bank Group's corporate commitment to increasing energy efficiency and renewable energy lending, and addressing climate change.

II. Proposed Development Objective(s)

Proposed Development Objective(s) (From PCN)

The project development objective is to support Shanghai's quest to become a low-carbon city by developing green energy schemes, with a focus in Changning district, thereby reducing carbon emissions.

The outcome indicator would be achieving carbon intensity reduction target in Changning district; and the output indicators would include, but not be limited to: (a) annual energy savings supported by the project; (b) annual greenhouse gas emission reductions supported by the project; and (c) innovative policy, business model, and financing mechanism demonstrated in the project. Other indicators and quantification of the indicators will be determined during project preparation.

Key Results (From PCN)

The outcome indicator would be achieving carbon intensity reduction target in Changning district; and the output indicators would include, but not be limited to: (a) annual energy savings supported by the project; (b) annual greenhouse gas emission reductions supported by the project; and (c) innovative policy, business model, and financing mechanism demonstrated in the project. Other indicators and quantification of the indicators will be determined during project preparation.

III. Preliminary Description

Concept Description

The proposed project is designed as a fully blended IBRD and GEF project. The total project size is expected to be \$210 million, of which \$100 million IBRD loan, \$4.545 million GEF grant, and the remaining \$105.455 million counterpart funds from the district government, sub-borrowers, and the participating bank. The GEF project design was approved by the Bank management, Chinese government, and the GEF Council in May 2011.

The proposed project has two components: (1) technical assistance and capacity building component funded by the GEF grant; and (2) low-carbon investments component funded by the IBRD loan. The technical assistance component covers both Changning district and Shanghai municipality, with a focus on pilots at district level and replication at municipal level, while the investment component focuses on Changning district. The first component will be implemented by the Project Management Office (PMO), while the second component will be implemented by Shanghai Pudong Development (SPD) Bank (see para 26-33 for details on implementation arrangement).

Component 1. Technical Assistance and Capacity Building

1.1 Green buildings (indicative cost estimate: US\$5.15 million, of which US\$3 million from GEF grant and US\$2.15 million from counterpart funds): This includes both retrofitting existing buildings and supporting new near zero-emission buildings. For building retrofit, the GEF funds will be used to pilot (a) mandatory measures and additional financial incentives; (b) business models and financing mechanisms; and (c) technical design of integrated technology renovation. For new near zero-emission buildings, the GEF funds will be used to (a) cover part of the incremental costs (incurred for EE, RE, and smart meters) above the municipal building codes, while the remaining incremental costs will be covered by district government and project developers; (b) develop policies and financing mechanisms to ensure sustainability and replication; and (c) support marketing campaigns to attract suppliers, buyers, renters, etc. for near zero-emission buildings.

1.2 Low-carbon energy supply (indicative cost estimate: US\$1.59 million, of which US\$0.59 million from GEF grant and US\$1 million from counterpart funds): This includes both on-site distributed generation (DG) from renewable energy and natural gas as well as trading of green electricity and possibly carbon cap and trade. The GEF funds will support (a) feasibility studies to pilot DG investments in Changning district, developing policies and innovative business models to support DG; (b) scale-up of the pilot purchase of green electricity schemes; and eventually (c) pilot carbon cap and trade, as Shanghai is selected as one of the four cities and two provinces under the NDRC pilot carbon cap and trade scheme.

1.3 Green mobility (indicative cost estimate: US\$1 million, of which US\$0.3 million from GEF grant and US\$0.7 million from counterpart funds): The GEF funds will primarily be used for technical assistance for policies, financing mechanisms, and public-private partnership business models, possibly in the following areas: (a) open-source transport data initiative to reduce empty trips of taxi; (b) studying and eventually piloting car-sharing with electric vehicles program; and (c) improved pedestrian infrastructure and services.

1.4 Integrating green energy schemes to achieve low-carbon objectives (indicative cost estimate: US\$2.26 million, of which US\$0.655 million from GEF grant and US\$1.605 million from counterpart

funds): This subcomponent will (a) integrate the above green energy schemes to achieve district's low-carbon objectives, particularly the Measurement & Verification (M&V) methodology and system to monitor and verify energy savings and CO2 emission reductions; (b) build capacity of key stakeholders such as district and municipal government officials and implementing agencies to ensure institutional sustainability; and (c) covering program management costs, donor coordination activities, and administration including fiduciary duties.

Component 2. Low-carbon Investments

The low-carbon investments will focus on building retrofit and new low-emission buildings, with the majority of the investments going to building retrofit.

2.1 Building retrofit (indicative cost estimate: US\$120 million, of which US\$70 million from IBRD loan and US\$50 million from counterpart funds): This component will finance (a) building energy efficiency improvements in commercial and government buildings, such as lighting, HVAC (heating, ventilation, and air conditioning) systems, energy management systems, building envelope insulation measures (roof, walls, windows, and doors); (b) renewable energy applications in buildings (roof-top solar PV, solar water heaters, and ground source heat pumps); (c) distributed generation from renewable energy and natural gas to provide power, cooling, and heating services to buildings; and (d) any other low-carbon initiatives proposed by counterparts and agreed by the Bank.

2.2 New buildings (indicative cost estimate: US\$80 million, of which US\$30 million from IBRD loan and US\$50 million from counterpart funds): This subcomponent will finance the incremental costs of low-carbon measures, primarily energy efficiency, renewable energy, and smart meters, for new buildings above municipal building code requirements (indicative cost estimate: US\$5.15 million, of which US\$3 million from GEF grant and US\$2.15 million from counterpart funds): This includes both retrofitting existing buildings and supporting low-emission new buildings. For retrofitting existing buildings, the GEF funds will be used to provide implementation support for the district to pilot (a) bolder policies to mandate higher energy efficiency or energy consumption quota for existing buildings and provide additional financial incentives for retrofitting inefficient buildings; (b) market-based mechanisms, business models and financing mechanisms to retrofit existing buildings on a large scale; and (c) feasibility studies on integrated approach for comprehensive technology renovation.

Framework Approach: Given that there will be many small-scale sub-projects (typically on average of \$500,000-\$1,000,000 for each sub-project, even if some sub-projects might be greater) and sub-borrowers for the investment component, a framework approach will be adopted for project implementation. The implementing agency, SPD Bank, will develop an Operational Manual, which outlines selection criteria for sub-borrowers and sub-projects, appraisal procedure and guideline, technical evaluation framework, environmental assessment framework, and procurement and financial management frameworks that are consistent with the World Bank and Chinese government rules and procedures. The Changning district government and the Bank will evaluate and approve the Operational Manual at appraisal. During project implementation, the implementing agency will be responsible for identifying, appraising, and financing sub-projects that meet the criteria in the Operational Manual and receive government approval.

IV. Safeguard Policies that might apply

Safeguard Policies Triggered by the Project	Yes	No	TBD
Environmental Assessment OP/BP 4.01	x		
Natural Habitats OP/BP 4.04		x	
Forests OP/BP 4.36		x	
Pest Management OP 4.09		x	
Physical Cultural Resources OP/BP 4.11		x	
Indigenous Peoples OP/BP 4.10		x	
Involuntary Resettlement OP/BP 4.12		x	
Safety of Dams OP/BP 4.37		x	
Projects on International Waterways OP/BP 7.50		x	
Projects in Disputed Areas OP/BP 7.60		x	

V. Tentative financing

Financing Source	Amount
BORROWER/RECIPIENT	151.66
International Bank for Reconstruction and Develo	100.00
Global Environment Facility (GEF)	4.35
Total	256.00

VI. Contact point

World Bank

Contact: Xiaodong Wang
 Title: Senior Energy Specialist
 Tel: 5788+7757 /
 Email: xwang1@worldbank.org

Borrower/Client/Recipient

Name: Government of the People's Republic of China
 Contact: Mr. Yao Licheng
 Title: Direcor, International Department, Ministry of Finance
 Tel: 861068553284
 Email:

Implementing Agencies

Name: Changning District Government (Shanghai)
 Contact: Mr. Gao Yun
 Title: Deputy Governor
 Tel: (86-21) 2205-1503
 Email: gaoyuncn@sina.com

VII. For more information contact:

The InfoShop
The World Bank
1818 H Street, NW
Washington, D.C. 20433
Telephone: (202) 458-4500
Fax: (202) 522-1500
Web: <http://www.worldbank.org/infoshop>