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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN
IN THE AMOUNT OF US$100 MILLION

AND A

PROPOSED GRANT FROM THE
GLOBAL ENVIRONMENT FACILITY TRUST FUND
IN THE AMOUNT OF US$4.345 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

GREEN ENERGY FOR LOW-CARBON CITY IN SHANGHAI

February 6, 2013

China and Mongolia Sustainable Development Unit
Sustainable Development Department
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective February 6, 2013)

Currency Unit = RMB (Chinese Yuan Renminbi)
US$ 1 = RMB 6.22

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ALCO	Asset Liability Committee	FM	Financial Management
BOS	Bank of Shanghai	FMM	Financial Management Manual
CAR	Capital Adequacy Ration	FYP	Five-Year Plan
CAS	Country Assistance Strategy	GEF	Global Environment Facility
CBRC	China Banking Regulatory Commission	GEMP	Generic Environmental Management Plan
CHEEF	China Energy Efficiency Financing	GDP	Gross Domestic Product
CHUEE	China Utility-Based Energy Efficiency	GEO	Global Environmental Objective
CPS	Country Partnership Strategy	GHG	Greenhouse Gas
CRESP	China Renewable Energy Scale-Up Program	GOC	The Government of China
DA	Designated Account	GPN	General Procurement Notice
DG	Distributed Generation	HVAC	Heating, Ventilation and Air Conditioning
EE	Energy Efficiency	IBRD	International Bank for Reconstruction and Development
EHS	Environmental Health and Safety	ICB	International Competitive Bidding
EIRR	Economic Internal Rate of Return	IFC	International Finance Corporation (WB Group)
ESCO	Energy Service Companies	IFRs	Interim Financial Reports
ESMF	Environmental and Social Management Framework	MDB	Multi-lateral Development Bank
ETS	Emission Trading Scheme	M&V	Measurement and Verification
EXIM	Export-Import Bank	MOF	Ministry of Finance
FI	Financial Intermediary	NA	Not Applicable
FIRR	Financial Internal Rate of Return	NCB	National Competitive Bidding

NDRC	National Development and Reform Commission	RE	Renewable Energy
ORAF	Operational Risk Assessment Framework	RMB	Renminbi (Chinese Yuan)
OM	NDRC	ROA	Return on Assets
O&M	Operation and Maintenance	ROE	Return on Equity
PAD	Project Appraisal Document	SMAO	Shanghai Municipal Audit Office
PBP	Pay Back Period	SME	Small and Medium Size Enterprise
PDO	Project Development Objective	SMFB	Shanghai Municipal Finance Bureau
PIP	Project Implementation Plan	SPD	Shanghai Pudong Development Bank
PFI	Participating Financial Institution	SME	Small and Medium Size Enterprise
PMO	Project Management Office	TA	Technical Assistance
PPG	Project Preparation Grant	T&D	Transmission & Distribution
QBS	Quality-Based Selection	WB	World Bank
QCBS	Quality- and Cost-Based Selection	Wp	Watt (peak)

Regional Vice President:	Axel van Trotsenburg, EAPVP
Country Director:	Klaus Rohland, EACCF
Sector Director:	John Roome, EASSD
Sector Manager:	Mark Lundell, EASCS/ Charles Feinstein, EASWE
Task Team Leader:	Xiaodong Wang, EASWE

CHINA
Green Energy for Low-Carbon City in Shanghai

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PAD DATA SHEET

China

Green Energy for Low-Carbon City in Shanghai

PROJECT APPRAISAL DOCUMENT

East Asia and Pacific Region
China and Mongolia Sustainable Development Unit (EASCS)

Basic Information

Date:	February 6, 2013	Sectors:	District heating and energy efficiency services (80%); Renewable Energy (15%); and General transportation sector (5%)
Country Director:	Klaus Rohland	Themes:	Climate Change (P), Other Urban Development (P); Environmental Policies and Institution (S), Energy, Transport, Environment.
Sector Manager/Director:	Mark Lundell/Charles Feinstein	EA Category:	Financial Intermediary
Project ID:	P127034 and P127035		
Lending Instrument:	Financial Intermediary Loan		
Team Leader(s):	Xiaodong Wang		

Joint IFC: No

Borrower: People's Republic of China

Responsible Agency: Changning District, Shanghai Municipality

Contact:	Mr. Gao Yun	Title:	Deputy Governor
Telephone No.:	021-22051503	Email:	gaoyuncn@sina.com

Responsible Agency: Shanghai Pudong Development Bank

Contact:	Mr. Zheng Dawei	Title:	
Telephone No.:		Email:	

Responsible Agency: Bank of Shanghai

Contact:	Mr. Zhu Huichong	Title:	
Telephone No.:		Email:	

Project Implementation Period: Start Date: July 1, 2013 End Date: June 30, 2018

Expected Effectiveness Date: July 1, 2013

Expected Closing Date: December 31, 2018

Project Financing Data(US$M)

[x] Loan	[X] Grant	[ ] Other
[ ] Credit	[ ] Guarantee	

For Loans/Credits/Others

Total Project Cost :	US$256,000,000	Total Bank Financing :	US$104,345,000
Total Cofinancing :	US$151,655,000	Financing Gap :	0

Financing Source	Amount(US$M)

BORROWER/RECIPIENT	US$151.655
IBRD	US$100.000
GEF Grant	US$ 4.345
Financing Gap	0
Total	US$256.000

Expected Disbursements (in USD Million)

Fiscal Year	2014	2015	2016	2017	2018				
Annual	5.00	15.00	30.00	30.00	20.00				
Cumulative	5.00	20.00	50.00	80.00	100.00				

Project Development Objective(s)

The higher-level global environment objective of the project is to support Shanghai's low-carbon city development by promoting green energy schemes, with a focus on Changning district. The project objectives are to pilot green energy schemes and scale up low-carbon investments in buildings in Shanghai, with a focus on Changning district.

Components

Component Name	Cost (USD Millions)
Component 1. Technical Assistance and Incremental Support for Near Zero-emission Buildings	4.35
Component 2. Low-carbon Investments	100

Compliance

Policy

Does the project depart from the CAS in content or in other significant respects?	Yes [ ]	No [X]
Does the project require any waivers of Bank policies?	Yes [ ]	No [X]
Have these been approved by Bank management?	Yes [ ]	No [X]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No [ ]

Safeguard Policies Triggered by the Project	Yes	No
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

Legal Covenants			
Name	**Recurrent**	**Due Date**	**Frequency**
Effectiveness of the Project Agreement		Prior to effectiveness of the GEF Grant Agreement	
Description of Covenant: The execution and delivery of this Agreement on behalf of the Recipient and the Project Agreement on behalf of the Project Implementing Entity have been duly authorized or ratified by all necessary governmental action.			
Effectiveness of the Loan Agreement		Prior to effectiveness of the GEF Grant Agreement	
Description of Covenant: The Loan Agreement has been executed and delivered and all conditions precedent to its effectiveness (other than the effectiveness of this Agreement) have been fulfilled			
Signing subsidiary agreements		Prior to disbursement	
Description of Covenant Disbursement condition: Changning District Government and Shanghai Pudong Development (SPD) Bank; Changing District Government and Bank of Shanghai, will enter into a Subsidiary Loan Agreement and an opinion (or opinions) or a certificate in relation to such Subsidiary Agreement respectively under terms and conditions acceptable to the Bank, prior to IBRD loan disbursement for the respective PFI.			
Name	**Recurrent**	**Due Date**	**Frequency**
Maintaining project teams	Implementation period		
Description of Covenant Implementation covenant: Throughout the period of implementation of the Project, the Project Management Office, SPD Bank and Bank of Shanghai shall maintain, and cause to be maintained, a Project Team, with terms of reference, staffing and other resources acceptable to the Bank, to be responsible for implementing and coordinating its Respective Part of the Project.			
Name	**Recurrent**	**Due Date**	**Frequency**
Following Operational Manual and Implementation Plan	Implementation period		
Description of Covenant Implementation covenant: The Borrower shall ensure that the Project is carried out in accordance with the Operational Manual and Implementation Plan throughout the period of implementation of the Project.			
Name	**Recurrent**	**Due Date**	**Frequency**
On-lending the IBRD loan to the Participating Financial Intermediaries		After project effectiveness	
Description of Covenant: The Borrower shall make the proceeds of the IBRD Loan available to Shanghai Municipality, and shall cause Shanghai Municipality to make such proceeds available to Changning District, both under terms and conditions approved by the Bank. Changning District shall make such proceeds available to the Participating Financial Intermediaries under the same terms and conditions.			
Name	**Recurrent**	**Due Date**	**Frequency**
Passing on the GEF grant to the project implementing entity		After project effectiveness	
Description of Covenant: The Recipient shall make the proceeds of the GEF Grant available to Shanghai Municipality, and shall cause Shanghai Municipality to make such proceeds available to the Project Implementing Entity, both on a grant basis.			
Name	**Recurrent**	**Due Date**	**Frequency**
Establishing the Project Steering Committee and Project Executive Committee		One month after project effectiveness	
Description of Covenant: Changning District shall establish, not later than one (1) month after the Effective Date, the Project Steering Committee and the Project Executive Committee, with a composition, an institutional framework, functions, and resources satisfactory to the Bank.			

Team Composition

Bank Staff

Name	Title	Specialization	Unit	UPI
Xiaodong Wang	Senior Energy Specialist	Task Team Leader	EASCS	
Ximing Peng	Senior Energy Specialist	Co-Task Team Leader	EASCS	
Yabei Zhang	Energy Economist	Energy Economist	EASWE	
Feng Liu	Senior Energy Specialist	Senior Energy Specialist	SEGES	
Xiaowei Guo	Senior Procurement Specialist	Senior Procurement Specialist	EASR2	
Yi Dong	Sr Financial Management Specialist	Sr Financial Management Specialist	EASFM	
Ning Yang	Environmental Specialist	Environmental Specialist	EASCS	
James Seward	Lead Financial Sector Specialist	Lead Financial Sector Specialist	EASFP	
Holly Krambeck	Transport. Economist	Transport. Economist	EASIN	
Sameena Dost	Senior Counsel	Senior Counsel	LEGES	
Kun Cao	Team Assistant	Team Assistant	EACCF	
Dan Xie	Team Assistant	Team Assistant	EACCF	
Cristina Hernandez	Program Assistant	Program Assistant	EASWE	

Non Bank Staff

Name	Title	Office Phone	City
Noureddine Berrah	Advisor		Washington
James Lacey	Financial Sector Consultant		Dublin
Dilip Limaye	Energy Efficiency Consultant		Philadelphia
Bernard Baratz	Environmental Safeguards		New York
Youxuan Zhu	Social Safeguards Consultant		Beijing

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
China	Shanghai	Shanghai			

I. STRATEGIC CONTEXT

A. Country Context

1. The Government of China (GoC) has 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 period (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.

2. 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 continue to increase rapidly. It is estimated that over the next two decades energy demand and related CO_2 emissions of buildings and appliances would triple and those of transport would more than quadruple as the vehicle fleet would increase ten-fold. The speed and scale of urbanization provides an unprecedented opportunity in the coming years to invest in clean energy technologies to contain carbon emissions related to energy supply and consumption 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 avoid locking cities into a high-carbon growth path for decades to come. *Time is of essence.*

3. Cities are at the core of the action plan to achieve the government's carbon intensity reduction target. They account for 85 percent of China's commercial energy use. CO_2 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 Development and Reform Commission (NDRC) has recently given high priority to lowering carbon emissions in cities to achieve the government's carbon intensity reduction target.

B. Sectoral and Institutional Context

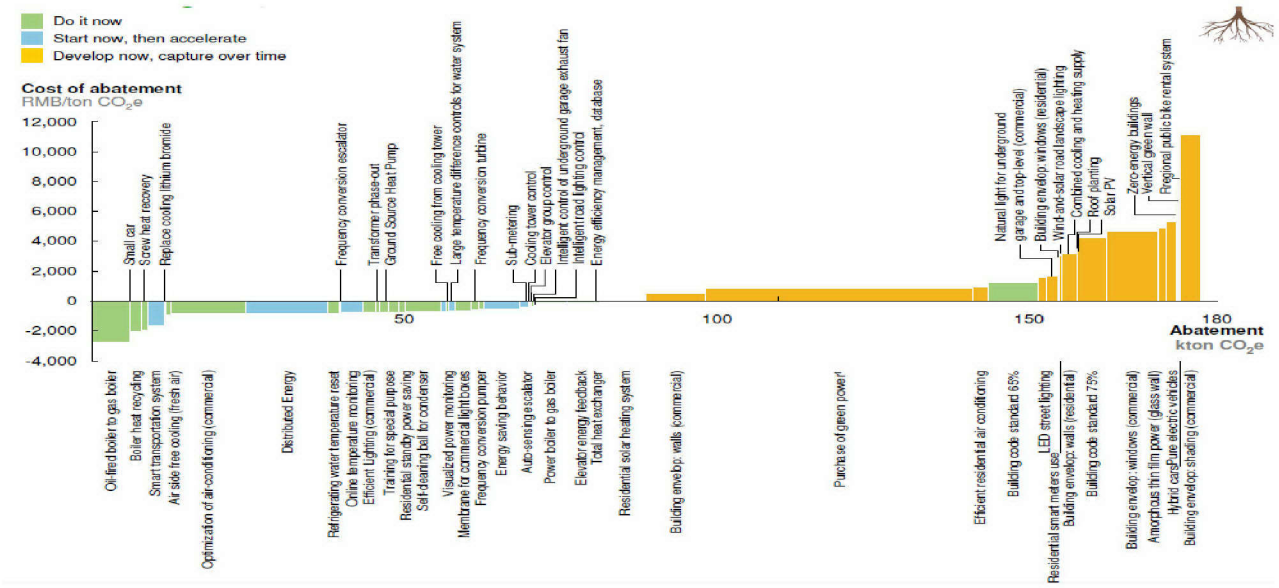
4. **Local government's commitment and vision**: Shanghai municipal and Changning district governments requested Bank support to benefit from international knowledge and best practices. They seek to combine a Bank loan to finance low-carbon investments and a GEF grant for policy advice and business development studies to make the Changning District and Shanghai leaders in designing novel and efficient ways to achieve their carbon intensity reduction targets. Shanghai municipal and Changning district governments are firmly committed to the transition to a low-carbon city, and achieving the carbon intensity reduction targets is one of the highest priorities in their 12th Five-Year Plan (FYP). Shanghai municipal government targets a reduction in carbon intensity and energy intensity by 19 and 18 percent respectively, and a cap on total energy consumption by the end of the 12th FYP period. The Changning district government targets a reduction in energy intensity by 17 percent, and a cap on total energy consumption by the end of the 12th FYP, which would cut the annual growth of total energy consumption by half compared to the current levels. To achieve these targets, both municipal and district governments have allocated dedicated funds to support energy conservation and emission

reduction. Shanghai is also piloting carbon cap and trade scheme under NDRC's pilot programs in five cities and two provinces.

5. In particular, the Changning District government has presented an articulated vision aimed at transforming Changning into a leading low-carbon district in Shanghai and the country, anchoring green growth as the engine for competitiveness of the district. The Changning government has specifically developed a low-carbon district 12th FYP that focuses on improving energy efficiency of buildings, shifting to low-carbon economic structure and energy mix, and adopting innovative mechanisms in multiple sectors. It is also willing to pilot bold policies and incentives that are not yet implemented at the municipal and national levels during the 12th FYP. This proposed project is an important and integral part of the district government's emission reduction program. Benefiting from international experience through this project, Changning government plans to accelerate the speed and enhance the quality and success of this initiative.

6. **Identifying cost-effective abatement options**: Prior to the project identification mission, the 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 the Hongqiao demonstration area in the Changning district, and develop CO_2 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 CO_2 abatement cost curves, bottom-up investigation surveys, and the consideration of ease of implementation to define an investment program to reduce CO_2 emissions were the first of the kind at that time. The abatement cost curve developed under this upstream analytical work allowed the District government to make informed decisions about medium-term targets of CO_2 abatement and identify priority actions and investments to meet them.

Figure 1. Abatement cost curve with ease of implementation in Hongqiao area in 2015



7. The Hongqiao economic and technology demonstration zone is centrally located in Changning, contributing to 28.5 percent of GDP in Changning District with less than 10 percent of its land and population. Changning district is an established district with mostly commercial buildings and few industrial activities. To this end, the Hongqiao area is representative of typical abatement options in Changning district. The abatement cost curve analysis provided an analytical underpinning for the technical assistance and investments selected under the proposed project to support Changning district in 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.

8. **Integrated multi-sector framework to achieve low-carbon target:** From the outset, the municipal and district governments requested adoption of innovative and holistic multi-sector approaches to lower their carbon intensity. Based on the abatement cost curve, the proposed project adopts 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 Changning's low-carbon objective. It should be noted that compact urban form and land use planning are usually key elements to consider in holistic approaches. But Changning is an established district with limited room for urban design and planning.

9. The bulk of carbon emissions (more than 90 percent) in Shanghai come from energy for power, industry, and transport. The low-carbon objective in Shanghai will be achieved largely by improving energy efficiency, and to a lesser degree by greening the energy mix, due to the limited renewable energy resources in Shanghai and the absence of an electricity trade framework. The current electricity supply in Shanghai relies 70 percent on coal, 7 percent on oil and gas, and 23 percent on imported hydro and nuclear. Given the limited available land in Shanghai, future power supply would largely derive from imported power and natural gas, and distributed generation. Despite the planned changes in electricity mix in Shanghai during the 12th FYP period, the CO_2 emission factor is not expected to substantially decrease. Consequently, emission reductions would largely result from energy savings.

10. **Challenges to building retrofit**: Since retrofitting existing buildings presents the largest emission reduction potential in Changning district, the bulk of the proposed investments 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. In Changning district, retrofit of commercial buildings has a much larger emission reduction market than retrofit of residential buildings. However, the single largest barrier to retrofitting 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. In addition, building EE projects typically face the split incentive barrier -- the investors in EE measures and the beneficiaries of energy savings are usually not aligned, for example, tenants typically pay energy bills so owners have little or no incentive to spend on EE investments. It is important to understand the interests of building owners, property management

companies, renters, and ESCOs, so that policies and financing mechanisms will be targeted to the right groups of players.

11. At present, national and municipal governments have mandatory building codes for new buildings, but not for building retrofit. In addition, current building codes in China need improvements. The national building codes require new buildings to meet 50 percent of energy savings compared to the baseline buildings in 1980s, while Shanghai's building codes are a step ahead of national codes requiring 65 percent of energy savings. These buildings codes focus on input-based individual technology requirements rather than performance-based energy consumption (e.g. in kWh/m^2). They, therefore, are not directly linked to total energy savings and emission reduction targets.

12. Building EE projects, in particular the envisaged investments to achieve Changning's ambitious energy saving targets, usually have a long payback period (e.g. 8-10 years), while commercial investors are normally only willing to invest in projects with a 3-5 year payback. The current subsidies provided by the national and municipal governments seem insufficient to induce investments in this market on a large scale. Currently, the national and municipal governments provide a subsidy of 60 Yuan/m^2 (or \$9.5/m^2) for building retrofit achieving national building codes, or 500 Yuan/tce (or \$80/tce) energy savings for ESCOs who invest in EE measures (both industrial and building EE), equivalent to only 3 percent of the capital investment of an average building retrofit investment. For renewable energy in buildings, the national and municipal governments offer a subsidy of 14 Yuan/Wp (or \$2.2/Wp) for rooftop solar PV, and mandates all buildings with less than six stories to install solar water heaters. Additional incentives are therefore critical to improve the financial viability of building retrofit investments and increase market scope to achieve higher emission reductions.

13. To address these barriers to regulations and incentives for building retrofit, the Bank team, in collaboration with the Energy Foundation, has been supporting local counterparts to undertake an upstream analytical work to (a) develop performance-based building energy efficiency benchmarks in kWh/m^2, which could be used to mandate building retrofit; (b) recommend policy frameworks of potential 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 governments; and (c) identify a number of viable business models to bundle small-scale building retrofit projects. This is the first attempt to tackle building retrofit in China. If successful, this will have a wide replication potential nationwide.

14. Adoption of building EE measures requires decisions and actions by many decentralized players, as a result, energy demand is less responsive to price signals. Regulations tend to be more effective. However, bringing about major changes in national building codes and introducing mandates for building retrofit will take time. In the short term, the Changning district government is willing to provide additional funding to achieve its low-carbon vision as a leader of the low-carbon city paradigm. To this end, the district government has issued a decree to provide additional incentives for building retrofit in Changning District, effective on January 1, 2013.

15. In addition, financial institutions are usually reluctant to finance building EE investments, because of (a) the small size of each project (the average size of a typical building retrofit project

usually ranges between US$500,000 and US$1,000,000) and high transaction costs; (b) high credit risks of energy service companies (ESCOs), who typically implement building retrofit projects but normally do not have major assets to offer as collaterals; and (c) the perceived high technical risks and concerns about materialization of projected energy savings.

16. Currently, building retrofit in China is linked to demonstration projects with government budget. The proposed project intends to jump start the building retrofit market and scale up low-carbon investments in buildings through commercial bank financing.

17. In addition to commercial buildings, this project will also support retrofit of government buildings, as the government should lead by example. In Changning, government office buildings, schools, and hospitals offer a high, captive and easier to tap saving potential.

18. **Pushing envelope for new buildings**: While new buildings have to meet mandatory municipal building codes, the proposed project intends to push the envelope further to achieve deeper emission reductions and demonstrate the technical feasibility of future generation of low-emission buildings. To this end, the Bank team, in collaboration with the Energy Foundation, has been supporting local counterparts to undertake an upstream analytical study to confirm the technical feasibility and estimate the incremental costs of low-emission buildings with higher energy efficiency and lower emissions than the municipal building codes and near zero-emission buildings in Shanghai. The study concluded that low-emission buildings achieving 70 percent energy savings (compared to the 65 percent municipal building codes) are financially viable with existing government subsidies, while near zero-emission buildings are technically feasible.

C. Higher Level Objectives to which the Project Contributes

19. The proposed project is fully consistent with the recently approved Country Partnership Strategy (CPS) FY2013–2016 for China, 'supporting greener growth, in particular, shifting to a sustainable energy path'. The Project also contributes to China's efforts to improve energy efficiency, expand use of renewable energy and address climate change during the 12th FYP. It is consistent with the latest National Communication by the Government of China. 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. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

20. ***Higher level global environmental objectives to which the project contributes***: The higher-level global environment objective (GEO) of the project is to support Shanghai's low-carbon city development by promoting green energy schemes, with a focus on Changning district.

21. ***Project-level objective:*** The project objectives are to pilot green energy schemes and scale up low-carbon investments in buildings in Shanghai, with a focus on Changning district.

B. Project Beneficiaries

22. Project beneficiaries include (a) Shanghai Municipality and Changning district government who will be supported to achieve their energy intensity and carbon intensity reduction targets; (b) Shanghai Pudong Development Bank and Bank of Shanghai who will be supported to scale up their green lending businesses; (c) ESCOs, property management companies, and building developers who will receive project funding and government incentives to conduct building retrofits and construct lower emission buildings; (d) building owners and tenants who will reduce energy costs and carbon footprint as a result of living in lower emission buildings; and (e) the global community who benefits from avoided greenhouse gas emissions, which contributes to global climate change mitigation.

C. PDO Level Results Indicators

23. The GEO indicator is carbon intensity reduction in Changning district[1].

24. The project-level indicators are (a) annual energy savings supported by the investments of the project; and (b) annual greenhouse gas emission reductions supported by the investments of the project.

25. The intermediate output indicators of the GEF-funded activities are: (a) innovative building retrofit policies piloted; (b) innovative building retrofit financing mechanisms developed; (c) on-line energy monitoring platform established in Changning; (d) one near-zero emission building piloted; (e) at least one distributed generation center fuelled with renewable energy and natural gas built; (f) non-motorized system piloted in Changning; and (g) low-carbon investments supported by the project.

III. PROJECT DESCRIPTION

A. Project Components

26. The proposed project has two components: (a) a technical assistance and incremental support for near zero-emission buildings component funded by a GEF grant; and (b) a low-carbon investments component funded by an IBRD loan. The GEF component will primarily provide technical assistance and capacity building activities on policies, financing mechanisms, business models of the key abatement options identified in the abatement cost curve (green energy buildings, clean energy supply, and green transport) to support the Changning district government achieving its carbon intensity reduction target. It will also cover part of the incremental cost for a pilot near zero-emission building. The IBRD loan will focus on low-carbon investments in buildings as the bulk of emission reductions in Changning district would come from building retrofit. It intends to scale up building retrofit investments through commercial bank financing.

[1] Carbon emission data are politically sensitive and not available to date in China. It was agreed with the district government to convert the energy intensity reduction target by 2015 (the end of the 12th FYP) and by 2018 (the end of the project) to carbon intensity reduction indicators based on an agreed approach, provided in Annex 1.

27. The technical assistance and capacity building activities under the GEF grant are intended to (a) remove the market barriers and increase the market demand and uptake of the IBRD loan through policy support; (b) support pre-investment studies and due diligence review of the IBRD loan; (c) build capacity of various stakeholders, particularly the participating banks and the government officials, to facilitate project implementation; (d) facilitate measurement and verification of energy savings achieved through the investments; and (e) ensure sustainability and replication of these low-carbon investments on a large scale.

28. The project's main focus is the Changning district, with extension to and replication in the Shanghai municipality. 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 and the Bank of Shanghai (BOS), the two financial intermediaries responsible for channeling the Bank loan.

Component 1. Technical Assistance and Incremental Support for Near Zero-Emission Buildings

29. This component will focus on four sub-components: (a) demand-side energy efficiency and renewable energy measures in buildings, including retrofitting existing buildings and piloting a new near zero-emission building; (b) low-carbon energy supply, including on-site distributed generation from renewable energy and natural gas and a pilot carbon cap and trade scheme; (c) green mobility with a focus on improving public transport and non-motorized infrastructure to discourage the use of private cars; and (d) capacity building for participating banks and government officials and project management support.

30. The PMO has prepared a GEF Project Implementation Plan, with a detailed work plan for each activity and task, outputs, budget, schedule, PMO structure, and plans for supervision and quality control, satisfactory to the Bank; as well as the first year procurement plan.

31. **1.1 Green energy buildings** (indicative cost estimate: US$6.66 million, of which US$2.66 million from GEF grant and US$4 million from the district government and project developers): This sub-component includes providing technical assistance for retrofitting existing buildings and covering part of the incremental cost of a new pilot near zero-emission building. For building retrofit, the GEF funds will be used for technical assistance and capacity building to (a) develop performance-based building energy efficiency benchmarks in kWh/m^2 for additional types of buildings and mandatory policies; (b) recommend business models and financing mechanisms; (c) undertake energy audits, diagnostic and feasibility studies for comprehensive building retrofit to achieve deep emission reductions; and (d) support an on-line energy monitoring platform for measurement and verification (M&V) of energy savings.

32. For piloting the new near zero-emission building, the GEF funds will be used to (a) cover part of the incremental cost (incurred for EE and RE) above the municipal building codes for technical design, marketing campaigns to increase the low-carbon awareness of suppliers, buyers, renters, etc., and investment in low-carbon technologies for the pilot near zero-emission building, while the remaining incremental costs will be covered by district government and project developers. This sub-component will be implemented with cost-shared performance-based sub-grants (see Annex 2 for details); and (b) develop policies and financing mechanisms to

ensure sustainability and replication.

33. **1.2 Low-carbon energy supply** (indicative cost estimate: US$0.4 million from GEF grant): This sub-component includes both on-site distributed generation (DG) from renewable energy and natural gas as well as a pilot carbon cap and trade scheme. The GEF funds will support (a) technical design of the pilot DG center in Changning district; and (b) design and implementation of the pilot carbon emission cap and trade scheme (ETS) in Changning under the municipal ETS framework. With the performance-based building energy efficiency benchmarks as analytical basis to set up a total energy consumption cap for each energy-intensive building, and the on-line energy monitoring platform to provide baseline and M&V data, Changing district is well positioned to pilot carbon cap and trade schemes in the building sector.

34. **1.3 Green mobility** (indicative cost estimate: US$0.9 million, of which US$0.3 million from GEF grant and US$0.6 million from district government): The GEF funds will be used for technical assistance to design and develop implementation plans to improve (a) local public transport routes/systems to connect metro/light rail stations with office buildings to cover the "last mile"; and (b) non-motorized infrastructure and services (pedestrian areas and bike lanes).

35. **1.4 Capacity building and project management support** (indicative cost estimate: US$2.04 million, of which US$0.985 million from GEF grant and US$1.055 million from district government): This sub-component will (a) support due diligence review and promotion of low-carbon investments; (b) build capacity of key stakeholders, particularly the participating banks (SPD Bank and BOS), government officials, and project developers; and (c) cover program management costs, donor coordination activities, and administration including fiduciary duties.

Component 2. Low-carbon Investments

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

37. A US$100 million IBRD loan will be on-lent by the GOC to Shanghai municipal government, then to Changning district government, and finally to the two Participating Financial Institutions (PFIs): SPD Bank and Bank of Shanghai (BOS). These two banks in turn will lend the funds to eligible ESCOs (including leasing companies), building owners, building developers, property management companies, EE/RE equipment vendors, government agencies, government end users, and distributed generation operators for low-carbon investment subprojects. Small and medium size enterprises (SMEs) would likely make up the bulk of the sub-borrowers. The PFIs' on-lending rates will be determined based on market conditions and will adequately cover the financial and operating costs and provide for a reasonable profit margin for the PFIs. The PFIs have also agreed to match the amounts of their respective IBRD loan allocations for low-carbon investments. The sub-project beneficiaries are also expected to contribute 20 percent of project costs in equity investments in the building retrofit component, totaling US$46 million.

38. **2.1 Green-energy retrofitting of buildings** (indicative cost estimate: US$231 million, of which US$85 million from IBRD loan and US$146 million from participating banks and sub-

borrowers): This sub-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.

39. **2.2 New green-energy buildings** (indicative cost estimate: US$15 million from IBRD loan): This sub-component will finance the incremental costs of low-carbon measures, primarily energy efficiency and renewable energy measures for new buildings above municipal building code requirements.

40. **Framework Approach**: Given that there will be many small-scale sub-projects and sub-borrowers for the investment component, a framework approach will be adopted for project implementation. The implementing agencies, SPD Bank and Bank of Shanghai, have developed an Operational Manual, which outlines selection criteria for sub-borrowers and sub-projects (see Annex 2 for details), appraisal procedure and guideline, roles and responsibilities of the PFIs and PMO, PFIs' internal institutional arrangement for project implementation, technical evaluation framework, environmental and social management 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 have reviewed and approved the Operational Manual. During project implementation, the implementing agencies will be responsible for identifying, appraising, and financing sub-projects that meet the criteria in the Operational Manual and receive government approval. The first batch of sub-projects in the lending pipeline has been identified to retrofit 10 buildings, with a total investment of US$10 million (see Annex 2 for details).

B. Project Financing

Lending Instrument

41. The proposed project will use Financial Intermediary Loan.

Project Cost and Financing

42. The proposed project is a fully blended IBRD and GEF project. The total project cost is US$256 million, of which US$100 million IBRD loan, US$4.345 million GEF grant, and the remaining US$151.655 million counterpart funds from the participating banks, sub-borrowers, and the district government. The GEF project design was approved by the Bank management, Chinese government, and the GEF Council in May 2011.

Table 1. Project Cost

Project Components	Project cost (US$ million)	IBRD/GEF Financing (US$ million)	% Financing
1. Component 1. Technical Assistance and Near Zero-Emission Building	10.00	4.345	43%
2. Component 2. Low-carbon Investments	245.75	99.75	40%
Total Baseline Costs	255.75	104.095	40%
Physical contingencies	0.00	0.00	0%
Price contingencies	0.00	0.00	0%
Total Project Costs	255.75	104.095	40%
Interest During Implementation	0.00	0.00	0%
Front-End Fees	0.25	0.25	100%
Total Financing Required	256.00	104.345	40%

C. Lessons Learned and Reflected in the Project Design

43. **Coordination and collaboration with other low-carbon city and building EE programs in China:** The Bank team has closely coordinated with other ongoing and planned low-carbon initiatives and building EE programs both at the national and municipal levels in the Bank's China Sustainable Development portfolio. The proposed Shanghai project complements ongoing efforts, as it targets reduction of carbon and energy intensity in an established district by supporting EE and RE investments in buildings.

44. At the municipal level, (a) the Sino-Singapore Tianjin Eco-city Project, a GEF project under implementation, is providing technical assistance to help build a new development zone in Binhai as an energy and resource efficient and low carbon emission city; (b) the Beijing Rooftop Solar PV Scale-Up (Sunshine School) Project, an IBRD project under preparation, aims to increase the share of solar energy in electricity consumption of selected schools in Beijing; and (c) Urban-Scale Building Energy Efficiency and Renewable Energy Project, a GEF project under preparation, intends to increase EE and on-site RE deployment in buildings in selected Chinese cities. The Bank team will facilitate exchange of experience and lessons learned between Shanghai and these cities.

45. At the national level, (a) the design of the proposed Shanghai project has benefitted substantially from the successful financial intermediary (FI) experience of the ongoing China Energy Efficiency Financing (CHEEF) program, under which three participating banks on-lend IBRD loans to sub-borrowers for industrial and building EE projects; (b) the Second Phase of China Renewable Energy Scale-Up Program (CRESP) intends to support RE policies and pilot RE applications in cities, particularly tackling the issue of grid connection for roof-top solar PVs; (c) Establishing Measurement and Verification System for Energy Efficiency in China aims to establish an energy savings measurement & verification (M&V) methodology and system. The proposed Shanghai project can be an M&V pilot in the building sector using its on-line energy monitoring platform; (d) the Partnership for Market Readiness is assisting China in designing, piloting, and eventually implementing a carbon cap and trade scheme, under which Shanghai is a pilot city; and (e) the ongoing GEF Heat Reform and Building Energy Efficiency Project focuses on new residential building codes in northern China.

46. In addition, the International Finance Corporation (IFC)/GEF China Utility-Based Energy Efficiency (CHUEE) program is aimed at stimulating 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 been involved in few building EE projects, as private investments in the building retrofit market in China are limited. The proposed project will benefit from IFC's cooperation with local banks (IFC has been working with SPD Bank on CHUEE Phase II, and intends to work with BOS on CHUEE Phase III) 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, undertake joint due diligence review of local banks, and undertake potential joint studies on green building benchmarking tools and business models for building retrofit during project preparation and implementation.

47. **Lessons learned and upstream analytical and advisory activities (AAA)**: The proposed project builds on lessons learned from these international and Chinese experiences of low-carbon cities and building EE/RE programs. In addition, three upstream AAA studies provided a solid analytical foundation for the project design: (a) CO_2 abatement cost curves and scenarios; (b) performance-based energy efficiency benchmarks and policies for building retrofit; and (c) incremental costs of low-emission and near zero-emission new buildings.

48. CO_2 abatement cost curves and scenarios are a useful analytical tool to set low-carbon targets for cities and define an investment program to achieve emission reduction targets. The low-carbon city concept in China is not clearly defined, and the cities' low- carbon goals and investment programs are usually determined without analytical underpinning. Under this project, abatement cost curves and scenarios, developed from comprehensive bottom-up surveys, have provided a quantitative, fact-based analysis to help policy makers and investors identify and prioritize potential mitigation measures based on abatement potentials, costs and ease of implementation.

49. In addition, with the Bank support, Shanghai has already piloted a Green Electricity scheme, a pioneer in China. Increased purchase of green electricity from outside Shanghai is a key solution to achieve the low-carbon target, and can spur large demand for green electricity.

50. Furthermore, a dedicated EE credit line, together with TA, is effective in increasing the capacity, interest, and confidence of participating banks in mainstreaming EE financing business line through a learning-by-doing process. The Bank team has recently completed a study on lessons learned from financing instruments for energy efficiency and renewable energy drawing on global experience from the MDBs' portfolio, and the proposed project design has incorporated the study findings. In particular, the CHEEF Program is one of the most successful EE credit line programs in the Bank's portfolio. A dedicated EE credit line can achieve a double leverage effect by first leveraging substantial debt contributions from the participating banks and equity financing from end-beneficiaries, and later revolving the loans that are paid back to the fund. It offers the best prospect for program sustainability. There is accumulating evidence that participating banks continue to provide EE financing after the credit line program is completed. Key ingredients for success include (a) strong management commitment; (b) dedicated teams both at headquarters and branches; (c) incentives to staff; (d) technical assistance to the

participating financial institutions to help them build capacity and defray some of the start-up costs of such initiatives; and (e) aggressive marketing and business development as well as new financial products tailored to EE financing, which are critical to generate sufficient deal flows. A major challenge, however, has been changing the participating banks' underwriting criteria from balance sheet financing that heavily relies on sub-borrowers' credit ranking (favoring large-scale industrial enterprises) to project-based financing that focuses on energy savings (increasing access to financing for ESCOs and SMEs).

Alternatives Considered and Reason for Rejection

51. The district government/PMO as the implementing agency for the IBRD loan was considered but rejected. The proposed project will involve a large number of small-scale building retrofit sub-projects and SME sub-borrowers such as ESCOs. The district government/PMO has limited experience in conducting financial due diligence to on-lend IBRD loan to sub-borrowers. In addition, it would be difficult for the government to implement retrofitting sub-projects for privately owned buildings.

52. Therefore, the financial intermediary approach has been favored, also because of the successful experience with this approach under the Bank's CHEEF program and the IFC's CHUEE program. The financial intermediary approach will jump start EE in buildings and will ensure sustainability as the participating bank learn more about the business line and the private sector enters this new market segment. The lessons learned from the Bank and IFC projects also showed that financial institutions, with more experience and expertise, have a comparative advantage over government agencies in conducting financial due diligence to on-lend IBRD loan to sub-borrowers. Finally, this approach will leverage a substantial amount of funding from the participating banks.

53. One participating financial institution (PFI) as the implementing agency for the IBRD loan was considered at the PCN stage, but rejected later on, because both the municipal and district governments proposed and the Bank concurred to add a second PFI to (a) give more choices to the sub-borrowers for better services from the PFIs; and (b) introduce competition between the two participating banks. As a result, the district government selected the Bank of Shanghai in July 2012 as the second implementing agency for the IBRD loan.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

54. ***Project Steering Committee and Project Executive Committee:*** A Project Steering Committee will be set up to coordinate and replicate policies at the Municipality level. A Project Executive Committee will be established to coordinate the district level government agencies and supervise day-to-day project implementation.

55. ***Project Management Office:*** The PMO has been established and is functional to implement the GEF Project Preparation Grant (PPG), with key staff on board (Director, Deputy Director, technical, procurement, financial management, and safeguards staff). The PMO will be responsible for implementing the GEF component of the Project.

56. Regarding the IBRD loan, the PMO will (a) assist the participating banks in identifying sub-projects; (b) review and provide no-objection to the technical aspects of sub-projects to ensure that the sub-loans follow the Operational Manual and achieve the low-carbon objective in Changning district; (c) conduct environmental and social safeguard due diligence and supervision of sub-projects; and (d) verify energy savings of sub-projects. The Changning on-line energy monitoring platform for building energy consumption provides an innovative tool for the district government/PMO to measure and verify energy savings of the IBRD investments.

57. ***Participating Banks:*** The local government compared a few commercial banks operating in Shanghai, and selected SPD Bank and BOS as the implementing agencies for the following reasons: (a) both banks are committed to green credit businesses, have previous experience with building EE and ESCO investments, and have a strong focus on SME finance; and (b) the Shanghai municipal government is the largest shareholder of SPD Bank and BOS. They both have a large network of customers in Shanghai and Changning district.

58. The participating banks—SPD Bank and BOS--are the implementing agencies for the IBRD loan, responsible for (a) generating a lending pipeline; (b) appraising and approving technical, financial, procurement, and financial management aspects of sub-projects; (c) supervising and monitoring sub-borrowers and sub-projects; and (d) fully disbursing IBRD funds and counterpart co-funding, according to the agreed-upon Operational Manual. The participating banks will bear 100 percent of default risks. They shall follow government policies and World Bank rules and procedures as detailed in the Operational Manual.

59. The district government will on-lend US$40 million IBRD loan to each of the participating banks, and leave US$19.75 million for the two PFIs to compete for on a first come first serve basis. The PFI needs to fully disburse the US$40 million allocation first, before they can start to tap the remaining US$19.75 million to finance eligible sub-projects following the Operational Manual.

60. SPD Bank and BOS have agreed to put in place dedicated teams at headquarter, branch, and sub-branch levels, and develop internal implementation rules and regulations for this project, prior to project effectiveness. During the entire project implementation period, SPD Bank and BOS shall maintain these dedicated teams with adequate staff and resources and apply the Operational Manual satisfactory to the Bank. The detailed implementation arrangement is provided in Annex 3.

61. ***Sub-borrowers:*** The sub-borrowers would be eligible ESCOs (including leasing companies), building owners, building developers, property management companies, EE/RE equipment vendors, government agencies, government end users, and distributed generation operators for low-carbon investment subprojects. Funding from the government and GEF will assist potential sub-borrowers in undertaking energy auditing, diagnostic and feasibility studies, before they apply for loans from the PFIs. Shanghai has about 200 registered ESCOs on the municipal DRC's list of qualified ESCOs eligible for receiving government subsidies.

B. Results Monitoring and Evaluation

62. Monitoring of the implementation of the proposed project will involve: (a) the monitoring of performance indicators as included in the results framework in Annex 1; (b) annual progress reports; and (c) a midterm review of implementation progress. The PMO will be responsible for overall monitoring and systematic evaluation of implementation progress including collection of project performance information from Shanghai Pudong Development Bank and Bank of Shanghai and reporting on the impact and results of the project.

C. Sustainability

63. The likelihood of sustainability of the project is high, given the high commitment of Shanghai Municipality and Changning District to achieve their low-carbon development goals which are also strongly supported by the national leadership for reducing the country's energy intensity and carbon intensity. The financial intermediary approach and GEF support to develop policies, business models, and financing mechanisms will also ensure project sustainability.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

Stakeholder Risk	Rating
Implementing Agency Risk	
- Capacity	Moderate
- Governance	Low
Project Risk	
- Design	Substantial
- Social and Environmental	Low
- Program and Donor	N/A
- Delivery Monitoring and Sustainability	Moderate
- Other (Optional)	
- Other (Optional)	
Overall Implementation Risk	**Substantial**

B. Overall Risk Rating Explanation

64. This project is designed to pilot innovative policies, business models, and clean energy technologies. Building retrofit is one of the most difficult EE market segments that have not attracted much private investments. The district government is committed to providing additional financial incentives, but might face difficulties in designing and implementing mandatory policies for building retrofit as the municipal and district government's authority is not yet clearly delineated. Mitigation measures are being explored, and the GEF support is intended to provide technical assistance and capacity building to remove barriers. However, due to the innovative nature of the initiative, it may take time for the market to respond and the loan may encounter slow disbursement during the initial stage of implementation.

65. The success of this project hinges on two critical factors: financial viability of each sub-project investment and risks of sub-borrowers. To address the viability issue, government incentives are critical to help make low-carbon investments in buildings financially more attractive to investors to open up the market. To this end, the district government has issued adecree to offer additional financial incentives for building retrofit and provided evidence for budget allocation to support such policies, effective on January 1, 2013. To address the risk issue, both PFIs have previous experience with building EE and ESCO financing, and comparative advantages to screen and manage risks. Both PFIs have adopted an innovative financial product that uses energy savings as collaterals--essential for financing ESCOs. The project also plans to develop guarantee mechanisms with GEF support to further mitigate risks.

66. The overall risk is rated as substantial, due to the risks related to building retrofit as described above and the innovative nature of the project. A number of actions have been taken during preparation to minimize this risk. In addition, risk mitigation measures built into project design will be monitored and sufficient implementation support will be provided during project implementation with GEF Grant support.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analyses

Economic Analysis

67. The economic analysis of the project was carried out at both the Changning district level and sub-project levels: (a) at the Changning District level - three alternative abatement scenarios for both 2015 and 2020 were analyzed to estimate the carbon reduction potential in Changning district, as well as the recommended mitigation options to achieve the targets; and (b) economic justification was examined for five typical sub-projects, which were part of the first batch of projects in the lending pipeline envisaged for financing under the proposed project.

68. At the District level, the abatement costs of various carbon mitigation options were analyzed based on a comprehensive survey of buildings in the Hongqiao demonstration area (figure 1). Taking into account the abatement costs, penetration (or abatement potentials) of mitigation technologies, and ease of implementation, three alternative abatement scenarios (Frozen Technology Scenario; Baseline Scenario to meet the national government's target; and Stretch Scenario beyond the national government's target) were analyzed for both 2015 and 2020. The analyses concluded that the total carbon emission in Changning district could be further reduced by 147 and 248 thousand tons of CO_2 equivalent annually in 2015 and 2020 respectively beyond the Baseline Scenario if the mitigation measures would be adopted as recommended in the Stretch Scenario. As a result, in the Stretch Scenario, carbon intensity would be reduced by 23 percent in 2015 and 43 percent in 2020, compared to the level in 2010.

69. Cost benefit analyses were carried out for five typical sub-projects, based on the feasibility studies undertaken by the PMO. These subprojects cover typical buildings to be financed under the project in Changning district--a hotel; an office building; a hospital; a mixed-use commercial building with offices, apartments, and conference halls; and a mixed-use

building with a hotel, restaurants and offices. A more detailed description of these five subprojects is provided in Annex 6. The primary economic benefits are derived from energy savings and environmental benefits from reduced CO_2, SO_2 and particulates emissions. The costs include both capital investments and incremental operating costs of the subprojects. The sub-project investments range from US$ 0.6 to US$ 3.5 million, with all but one sub-project under US$ 1 million. The analyses showed that the EIRRs for the representative subprojects range from 12.4 percent to 33.9 percent, exceeding the 10 percent EIRR benchmark that is normally applied to Bank projects in China. Details of the economic analysis are provided in Annex 6.

Financial Analysis

70. The financial analyses were carried out for five typical subprojects as well. All the sub-projects will be financed by IBRD loans, loans from the PFIs, and equity investments from sub-borrowers. FIRRs with and without government subsidies were calculated. The terms and conditions of the IBRD loans and local loans used in these analyses were those applicable in early 2012. The results showed that the FIRRs for the five sub-projects range from 10.1 percent to 31.9 percent and the payback periods of four sub-projects range from 5.8 to 6.7 years, beyond the normal range of 3-5 years that are attractive for investors. When the government subsidy is considered, the FIRRs increase to 14.4-38.3 percent, and the payback periods of all five subprojects are less than 5 years, ranging from 2.1 to 4.8 years.

Economic and Financial Due Diligence of the Participating Financial Institution

71. **SPD Bank**: SPD Bank is a well-managed bank that has successfully grown its business and profitability, putting in place a large network in the nineteen years since it was established. The bank is one of the leading private sector banks in China, the seventh largest bank in the country and amongst the largest of the private sector banks.

72. The bank has a strong return on equity (ROE) and return on assets (ROA) and a good level of liquidity, as well as a good management team who have a clear understanding of the bank and its strategic direction. The major area of uncertainty relates to the downturn in the Chinese economy and the global recession and the impact it may have on China. However the bank continues to perform well in 2012, is well capitalized, and has one of the best quality loan portfolios in Chinese banks.

73. Overall SPD Bank seems to be a well-managed bank. Its financial results are prepared and audited to IFRS standards. The bank is profitable, well capitalized, highly efficient and appears to have a reasonable quality loan portfolio based on the information provided at the end of 2011. The performance of the bank in the first quarter of 2012 continues to improve on the 2011 result and the bank is projecting to produce record results for 2012. SPD bank has been making solid progress across all areas of its business in recent years and clearly recognises the challenges of the future. The bank has the ability to disburse and manage loans under the proposed project as well as to achieve repayment of these loans. The bank meets all the selection criteria for participating banks.

74. **BOS:** Bank of Shanghai is a well-managed bank that has successfully grown its business and profitability since it was set up in Shanghai in 1995. The bank had its origins in municipal finance organizations and has always had strong links to municipalities. From the outset, BOS has focused strongly on SME finance and as a result has become one of the most successful banks in that sector particularly in the Shanghai area. The bank has now expanded into other key parts of the country but it is still somewhat limited in terms of distribution in comparison to some of the other national banks. The bank is the fourth largest bank in Shanghai, and has a larger market share than SPD Bank in the Shanghai area.

75. The bank has a strong ROE and ROA and a good level of liquidity as well as a good management team who have a clear understanding of the bank and its strategic direction. The major area of uncertainty relates to the downturn in the Chinese economy and the global recession and the impact it may have on China. However, BOS continues to perform well in 2012, and is well capitalized, and has one of the best quality loan portfolios in Chinese banks.

76. Overall Bank of Shanghai seems to be a well-managed bank. Its financial results are prepared and audited to IFRS standards. The bank is profitable, well capitalized, efficient and appears to have a reasonable quality loan portfolio based on the information provided at the end of 2011. The performance of the bank in the first half of 2012 continues to improve on the 2011 result. Bank of Shanghai has a very strong focus and position in the SME sector and is conscious of the challenges it is likely to face in the years ahead. The bank is also focusing on the energy sector and considers green energy an area where it can further develop its SME business. The bank should have the ability to disburse and manage loans under the proposed project as well as to achieve repayment of these loans. The bank meets all the selection criteria for participating banks.

B. Technical

77. SPD Bank and BOS will undertake technical due diligence of each sub-project, and ensure that the subprojects (a) are in compliance with Chinese technical policies and regulations for EE/RE in the building sectors, particularly the safety concerns; (b) fully satisfy the technical eligibility criteria; and (c) are technically feasible. Capacity building will be provided to the participating banks during project implementation. The PMO, with two energy efficiency experts on board, will hire technical consultants as needed to review and approve the technical aspects of all subprojects, on behalf of the district government, to make sure that they comply with the eligibility criteria detailed in the Operational Manual. The PMO is also responsible for measurement & verification of energy savings of sub-projects.

C. Financial Management

78. For the GEF grant, one Designated Account (DA) will be opened and managed by Shanghai Municipal Finance Bureau (SMFB). For the IBRD loan, reimbursement method will be used.

79. A financial management capacity assessment has been conducted by the Bank and actions to strengthen the project's financial management capacity have been agreed with the relevant implementing agencies. The FM assessment has concluded that with the implementation

of these proposed actions, the financial management arrangements will satisfy the Bank's minimum requirements under OP/BP 10.02. Annex 3 provides additional information on Financial Management.

D. Procurement

80. The Procurement Capacity Assessment identified that the key project procurement risks are possible non-compliance and delays in processing procurement, since the PMO is not familiar with Bank Procurement Guidelines and procedures. The PMO needs to strengthen its capacity to carry out procurement effectively and efficiently. The PMO has recognized this and has hired a full-time procurement staff with requisite qualifications who will receive further Bank procurement training during project implementation.

81. Mitigation measures have been discussed and agreed during project preparation with the PMO and the participating banks, and assistance has been provided to them to better understand Bank procurement guidelines and procedures relating to their activities. An Operational Manual has been prepared for the IBRD loan component of the project, detailing the basic guiding principles and procedures to be followed by the participating banks and sub-borrowers under the sub-loans including the main responsibilities of the parties, acceptable procurement commercial practices, and requirements for records management. A procurement plan for the GEF component is prepared and will be finalized before negotiation. More details on procurement are provided in Annex 3.

E. Social (including Safeguards)

82. This project will not trigger involuntary resettlement (OP/BP 4.12). Since the project focuses on retrofitting existing commercial and public buildings, there will be no land acquisition and/or relocation of people. For the component of supporting new near zero-emission buildings and new low-emission buildings, Bank financing will only cover the incremental costs of EE/RE measures. Support will be provided only to the new buildings that have either purchased land in the past and/or receive the land from the government with no new land acquisition. To ensure the new building sites have no outstanding resettlement issues, due diligence review will be carried out by sub-borrowers and the PMO in the subproject screening process, and requirements for such due diligence review have been included in the ESMF.

83. The project will benefit women and men equally. During consultation and assessment with beneficiaries, surveys and interviews will be designed with gender sensitivity to ensure that women are given equal opportunities. For eligible sub-borrowers, guidelines will be developed to ensure that women-owned companies will not be discriminated.

F. Environment (including Safeguards)

84. In accordance with World Bank policy on environment (OP/BP 4.01), the project has been assigned Category FI. Overall, the project is expected to generate significant environmental benefits such as reducing energy consumption and carbon emissions. No indirect and/or long term negative impacts are anticipated given the nature of the project. Potential sub-project related environmental and social issues appear to be minimal. For existing buildings, potential

environmental, health and safety issues include: (a) replacement of energy-intensive equipment and/or introduction of energy efficiency measures; (b) management (removal/disposal) of old equipment; and possibly (c) removal and management of any hazardous materials. For construction of new buildings, potential environmental issues would be related to construction activities, including dust, noise, minor traffic disruptions, and potential handling of construction non hazardous waste.

85. Consistent with the FI assignment, an Environmental and Social Management Framework (ESMF) has been developed as part of the Operational Manual by the participating banks. The ESMF has incorporated comments of the Bank team, and is satisfactory to the Bank. Under the ESMF, the sub-borrowers will need to prepare environmental management plans where warranted.

86. Consultation with relevant government authorities was conducted during project preparation, including Shanghai Changning District Environmental Protection Bureau and Construction and Transport Commission. The ESMF was publicly disclosed at the websites of Changning District Government, SPD Bank, and Bank of Shanghai on September 11, 2012.

G. Other Safeguards Policies Triggered (if required)

68. Not applicable.

Annex 1: Results Framework and Monitoring

Table A1.1 China: Green Energy Schemes for Low-carbon City in Shanghai

PDO Level Results Indicators	Core	Unit of Measurement	Baseline Original Project Start (7/13)	Cumulative Target Values					Frequency	Data Source/ Methodology	Responsibility for Data Collection	Comments
				FY 2014	FY 2015	FY 2016	FY 2017	FY 2018				
1 Accumulated carbon intensity per unit of gross domestic product in Changning District(Percentage).	☐	%	100% (2010)		83.0% (2015)			77.4% (mid 2018)	Annual report	District govt. reports	PMO	This is converted from energy intensity target, based on weighted emission factor of 2.166 tons CO_2/tce according to recent energy mix in Shanghai. The conversion approach is provided in Box A1.
2. Annual energy savings supported by the investments under the project (Tons of coal equivalent)	☐	tons of coal equivalent	0	7,700	23,000	46,000	70,000	76,000	Annual report	Reports of banks and PMO reports	PMO	The average investment costs of building subprojects are assumed as 20,000 Yuan/tce or $3,175/tce
3. Annual carbon dioxide emission reduction supported by the investments under the project (Tons of coal equivalent)	☐	tons of CO_2	0	17,000	50,000	100,000	150,000	165,000	Annual report	Reports of banks and PMO reports	PMO	It is assumed 2.166 tons CO_2/tce, based on the current energy mix in Shanghai. This assumption did not take into account of the expected changes in emission factor in the future.

Intermediate Results Indicators	Core	Unit of Measurement	Baseline Original Project Start (7/13)	Target Values					Frequency	Data Source/ Methodology	Responsibility for Data Collection	Comments
				FY 2014	FY 2015	FY 2016	FY 2017	FY 2018				
Innovative policies piloted under the Project in relation to green-energy retrofitting of buildings	☐		NA			completed			Annual report	Project reports	PMO	
Online energy monitoring platform established under the Project	☐	No. of buildings	100	120	140	160			Annual report	Project reports	PMO	
At least one (1) near zero-emission building piloted under the Project	☐		NA					completed	Annual report	Project reports	PMO	
Innovative financing mechanisms developed under the Project for green-energy retrofitting of buildings			NA			completed			Annual report	Project reports	PMO	
At least one (1) distributed generation center built under the Project			NA					completed	Annual report	Project reports	PMO	
Non-motorized transport system piloted under the Project	☐		NA				completed		Annual report	Project reports	PMO	
Low-carbon investments supported under the Project ($ millions)		US$ million	0	25	74	148	221	246	Annual report	PFI records	PFI	

Box A1: Conversion of Energy Intensity Target to Carbon Intensity Target

The Carbon Intensity Reduction indicator in Changning District was converted from the energy intensity reduction target, following an approach agreed by the Bank team and Changning District Government. The conversion is conducted as follows:

Step 1: Calculation of carbon emission factors for major types of energy in Shanghai

The main types of energy consumed in Shanghai include electricity, oil/gas and coal. In 2011, total final energy consumption in Shanghai amounted to 45.60 million tce, comprising of electricity 17.64 million tce (38.7%), diesel, gasoline and gas 26.94 million tce (59.1%), and coal 1.02 million tce (2.2%).

The carbon emission factor for electricity consumption was calculated based on the electricity supply mix in Shanghai. Taking into account the power import from other provinces, about 22.5 percent of electricity consumption in Shanghai was supplied from non-fossil fuel, and the remaining 77.5 percent was supplied from fossil fuel (coal, gas/oil). Based on the fuel type, generation efficiency, and transmission and distribution losses, the carbon emission factor for electricity consumption was calculated at 0.719 ton CO_2/MWh, equivalent to 2.159 ton CO_2/tce. Though the carbon emission factor for the electricity consumption can be reduced with the increase of non-fossil fuel in the power mix in the coming years, a fixed carbon emission factor for electricity consumption was applied as the power mix in Shanghai will not change much per information provided by Shanghai Municipal Development and Reform Commission.

The carbon emission factor for oil was derived from IPCC database, i.e. 3.16 ton CO_2 per ton of oil consumption, or 2.169 ton CO_2 per tce. The carbon emission factor for coal consumption was calculated based on the typical coal quality and burning efficiency in China, and was derived as 2.240 ton CO_2 per tce.

Step 2: Calculation of weighted average carbon emission factor of energy consumption in Shanghai

Based on the carbon emission factors for electricity, oil/gas and coal, and the mix of final energy consumption in Shanghai, the weighted average carbon emission factor for energy consumption was derived at 2.166 ton CO_2/tce.

Step 3: Identification of the energy intensity reduction targets

The Government of China has allocated the energy intensity target of its 12th FYP (2011-15) to each province. Shanghai Municipal Government has been requested to meet an energy intensity reduction target of 18 percent from 2010 to 2015. The target is allocated to each district in Shanghai subsequently, and the energy intensity reduction target in Changning District is set at 17 percent from 2010 to 2015. The district also committed to the municipal government a further energy intensity reduction target of 13 percent from 2015 to 2020. So the energy intensity will be reduced by about 6.7 percent from 2015 to the project closing date (mid 2018) provided a stable decrease of energy intensity will be kept annually.

Step 4: Conversion from energy intensity reduction targets to carbon intensity targets

Applied the fixed weighted carbon emission factor and energy intensity reduction targets, the carbon emission reduction targets were calculated at 17 percent from 2010 to 2015, and 6.7 percent from 2015 to mid-2018 (project closing date).

Annex 2: Detailed Project Description

China: Green Energy Schemes for Low-carbon City in Shanghai

1. The proposed project is a fully blended IBRD and GEF project. The total project cost is US$256 million, of which US$100 million IBRD loan, US$4.345 million GEF grant, and the remaining US$151.655 million counterpart funds from the participating banks, sub-borrowers, and the district government. The GEF project design was approved by the Bank management, Chinese government, and the GEF Council in May 2011.

2. The proposed project has two components: (a) a technical assistance and incremental support for near zero-emission buildings component funded by a GEF grant; and (b) a low-carbon investments component funded by an IBRD loan. The GEF component will primarily provide technical assistance and capacity building activities on policies, financing mechanisms, business models of the key abatement options identified in the abatement cost curve (green energy buildings, clean energy supply, and green transport) to support the Changning district government achieving its carbon intensity reduction target. It will also cover part of the incremental cost for a pilot near zero-emission building. The IBRD loan will focus on low-carbon investments in buildings as the bulk of emission reductions in Changning district would come from building retrofit. It intends to scale up building retrofit investments through commercial bank financing.

3. The technical assistance and capacity building activities under the GEF grant are intended to (a) remove the market barriers and increase the market demand and uptake of the IBRD loan through policy support; (b) support pre-investment studies and due diligence review of the IBRD loan; (c) build capacity of various stakeholders, particularly the participating banks and the government officials, to facilitate project implementation; (d) facilitate measurement and verification of energy savings achieved through the investments; and (e) ensure sustainability and replication of these low-carbon investments on a large scale.

4. The project's main focus is the Changning district, with extension to and replication in Shanghai municipality. 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 and the Bank of Shanghai (BOS), the two financial intermediaries responsible for channeling the Bank loan.

Component 1. Technical Assistance and Incremental Support for Near Zero-Emission Buildings (table A2.1)

5. This component will focus on four sub-components: (a) demand-side energy efficiency and renewable energy measures in buildings, including retrofitting existing buildings and piloting a new near zero-emission building; (b) low-carbon energy supply, including on-site distributed generation from renewable energy and natural gas and pilot carbon cap and trade scheme; (c) green mobility with a focus on improving public transport and non-motorized infrastructure to discourage the use of private cars; and (d) capacity building for participating banks and government officials and project management support.

6. The PMO has prepared a GEF Project Implementation Plan, with detailed work plan for each activity and task, outputs, budget, schedule, PMO structure, and plans for supervision and quality control, satisfactory to the Bank; as well as the first year procurement plan.

7. **1.1 Green energy buildings** (indicative cost estimate: US$6.66 million, of which US$2.66 million from GEF grant and US$4 million from the district government and project developers): This includes providing technical assistance for retrofitting existing buildings and covering part of the incremental cost of a new pilot near zero-emission building.

8. For building retrofit, the GEF funds will be used for technical assistance and capacity building to

(a) develop performance-based building energy efficiency benchmarks in kWh/m^2 for additional types of buildings, and mandatory policies to retrofit inefficient buildings. This work has started during project preparation, and will continue during project implementation;

(b) recommend market-based business models and financing mechanisms. Each individual building EE investment tends to be quite small, typically around $500,000, as a result, developing viable business models to bundle these small deals are important to reduce transaction costs for financing. In addition, lenders perceive building EE projects as risky due to the high credit risks of ESCOs who normally have a weak balance sheet, and high perceived technical risks that the projected energy savings may not be realized. Therefore, this project will look into risk guarantee mechanism to address these risks.

(c) undertake energy audits, diagnostic and feasibility studies for comprehensive building retrofit to achieve deep energy savings and emission reduction targets; and

(d) support an on-line energy monitoring platform to (i) extend the current coverage of 100 buildings to 160 large buildings in Changing district to collect baseline energy consumption data; (ii) improve its functions as a diagnostic tool to identify low-carbon investment opportunities; and (iii) advance its functions of measurement and verification (M&V) of energy savings of the building EE investments in Changning district.

9. The district government plans to demonstrate at least one new near zero-emission buildings to push the envelope and move towards future generation of low-emission buildings. Through the pilot, this sub-component intends to demonstrate the technical, financial, and commercial feasibility of near zero-emission building, and help drive down costs through the technology learning curve. If successful, the government and developers are expected to replicate this experience with their own funds. For the near zero-emission building pilot, GEF funds will be used to:

(a) cover part of the incremental cost above the municipal building codes, while the remaining incremental costs will be covered by district government and project developers. The district government and the Bank team have consulted a few potential

project developers for new commercial building development in the Hongqiao zone, and some are willing to construct a near zero emission building. The incremental cost of near zero emission buildings, however, is the major barrier to deployment.

A technical study was carried out as part of project preparation to simulate a hypothetical near zero-emission building, and estimated the incremental cost of such a building compared to the municipal building codes. It proposed to adopt more energy efficient insulation for windows, walls, roof, and floor; lighting systems; air conditioning systems; and roof-top solar PV. The results demonstrated that near zero-emission buildings are technically feasible, and could achieve an annual carbon emission of 12 kg CO_2/m^2 (converted from electricity consumption of lighting and HVAC systems). GEF funds will cover no more than half of the incremental costs;

(b) assist developers in technical design of such near zero-emission buildings to integrate EE and RE technologies;

(c) support marketing campaigns to create a brand name to increase low-carbon awareness of suppliers, buyers, and renters, among others for the pilot near zero-emission building. The above three sub-components will be implemented through a cost-shared performance-based sub-grant approach (See box below for details)

> ***Cost-shared sub-grants for near zero-emission buildings***: GEF funds will be used to cost share up to US$1.5 million (or no more than 50 percent) of the incremental costs of technical design, marketing campaigns, and EE/RE investments of a pilot near zero-emission building. The proposal will be prepared by building developers selected by Changning District Government. The PMO will review and evaluate the proposal based on agreed-upon minimum performance criteria in terms of absolute carbon emissions in kg CO_2/m^2 by design. If the PMO approves the proposal, it will be sent to the World Bank for prior review. Once the Bank approves the proposal, the PMO will enter into a sub-grant agreement with the proponent that lays out the eligible technologies, activities, expenditure, performance indicators and disbursement milestones and arrangement. The grant will be disbursed against defined milestone achievements, and based on evidence of actual expenditure. A detailed guideline and criteria for cost-shared sub-grant for near zero-emission buildings has been developed by the PMO, and agreed with the Bank. Procurement of goods and services to be financed out of the cost-shared sub-grants shall follow this guideline.

(d) develop policies of additional incentives and financing mechanisms beyond existing policies at the national and municipal levels to ensure sustainability and replication.

10. **1.2 Low-carbon energy supply** (indicative cost estimate: US$0.4 million from GEF grant): This includes both on-site distributed generation (DG) from renewable energy and natural gas as well as pilot carbon cap and trade.

11. For distributed generation, the GEF funds will support technical design of renewable energy applications, micro-grids for tri-generation of power, heating, and cooling, and potential fuel substitution from oil to gas to pilot DG investments in Changning district.

12. This sub-component will also provide technical assistance to support design and implementation of the pilot carbon emission cap and trade scheme (ETS) in Changning under the municipal ETS framework. Shanghai is piloting carbon cap and trade scheme, under the NDRC five-city-two-province pilot program. With the performance-based building energy efficiency benchmarks as analytical basis to set up a total energy consumption cap for each energy-intensive building, and the on-line energy monitoring platform to provide baseline and M&V data, Changing district is well positioned to pilot carbon cap and trade in the building sector.

13. **1.3 Green mobility** (indicative cost estimate: US$0.9 million, of which US$0.3 million from GEF grant and US$0.6 million from district government): The GEF funds will be used for technical assistance to design and develop implementation plans to improve (a) local public transport route/systems (primarily bus systems) to connect metro/light rail stations with office buildings to cover the last mile. Currently, there is a 1-2 km gap between the metro station and most office buildings in Hongqiao demonstration zone. This has been a key bottleneck preventing more people from riding the metro; and (b) non-motorized infrastructure and services, which involve the design of spatial pedestrian systems and dedicated pedestrian areas and bicycle lanes. These measures are intended to discourage the use of private cars.

14. **1.4 Capacity building and project management support** (indicative cost estimate: US$2.04 million, of which US$0.985 million from GEF grant and US$1.055 million from district government): This subcomponent will (a) support due diligence review, particularly technical and safeguard reviews, and promotion of low-carbon investments; (b) build capacity of key stakeholders, particularly the participating banks (SPD Bank and BOS), municipal and district government officials, PMO, and project developers; and (c) cover program management costs, donor coordination activities, and administration including fiduciary duties.

Table A2.1 Summary of Component 1

Sub-components	Proposed activities	Indicative GEF funds	Indicative co-financing
Green energy buildings	*Building retrofit:* • Develop performance-based benchmarks and mandatory policies; • Recommend financing mechanisms; • Undertake energy audit and feasibility studies; • Support on-line monitoring platform for M&V *New near zero-emission building(s):* • Share incremental costs above the municipal building codes; • Support technical design and marketing campaigns; • Develop policies and financing mechanisms.	$2,660,000 ($1,500,000 Cost-shared sub-grants; $1,160,000 TA)	$4,000,000
Low-carbon energy supply	• Develop technical design for distributed generation; • Support pilot carbon cap and trade.	$400,000 TA	0
Green mobility	• Design and develop implementation plans for local public transport; • Support improved non-motorized infrastructure and services.	$300,000 TA	$600,000
Capacity building	• Support due diligence review and promotion; • Build capacity of PFIs and government officials; • Cover program management costs.	$985,000 TA	$1,055,000
Total		**$4,345,000**	**$5,655,000**

Component 2. Low-carbon Investments

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

16. The proposed IBRD loan will be on-lent by the GOC to Shanghai municipal government, then to Changning district government, and finally to the two Participating Financial Institutions (PFIs): SPD Bank and BOS. These two banks in turn will lend the funds to eligible ESCOs (including leasing companies), building owners, building developers, property management companies, EE/RE equipment vendors, government agencies, government end users, and district heating or cooling system operators for low-carbon investment sub-projects. The PFIs will be responsible for repayment of the IBRD loan and will assume all financial risks. Under OP8.30 requirements, their lending rates will be determined by the market and adequately cover the financial and operating costs and provide for a reasonable profit margin. They have also agreed to match the amounts of their respective IBRD loan allocations for low-carbon investments. The subproject beneficiaries are also expected to contribute 20 percent of project costs in equity investment in the building retrofit component, totaling US$46 million.

17. **2.1 Green-energy retrofitting of buildings** (indicative cost estimate: US$231 million, of which US$85 million from IBRD loan and US$146 million from participating banks and sub-borrowers): 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.

18. The investments will focus on Changning district, where there are about 160 commercial buildings with each building more than 20,000 m^2, including hotels, office buildings, shopping malls, commercial buildings, mixed-used buildings, hospitals, and others; and 60 schools; covering a total of more than 6 million m^2 floor areas. This component also plans to invest a number of distributed generation centers fueled by renewable energy and natural gas. In addition, this project will also extend eligible low-carbon investments in building retrofit to other parts of Shanghai outside Changning district, primarily by counterpart funds.

19. A technical study, carried out as part of project preparation, has conducted surveys and preliminary diagnostic analysis to identify EE and RE investment opportunities for these buildings, particularly detailed analysis for the 100 buildings in Hongqiao demonstration zone. The report estimated total energy savings and emission reductions from these investments, and surveyed building owners' willingness to borrow IBRD loans. Table A2.2 lists an initial lending pipeline generated as part of project preparation.

Table A2.2 Initial Lending Pipeline

Building	Total energy conservation investment (1,000 US$)	Energy savings (tce)	Emission reduction (ton CO_2)
Total	**9,552**	**2876.3**	**6775.1**
Building No.1 (office building)	133	36.6	79.1
Building No.2 (office building)	510	84.2	181.9
Building No. 3 (office building)	557	181.0	392.0
Building No. 4 (office building)	1,418	329.4	711.5
Building No.5 (mixed use)	927	220.9	421.1
Building No.6 (hotel)	628	152.9	330.9
Building No.7 (hospital)	3,356	707.2	1925.0
Building No.8 (mixed use)	700	453.3	979.2
Building No.9 (office building)	789	351.4	758.7
Building No.10 (office building)	599	258.5	561.0

20. **2.2 New green-energy buildings** (indicative cost estimate: US$15 million from IBRD loan): This subcomponent will finance the incremental costs of low-carbon measures, primarily energy efficiency and renewable energy for new buildings above municipal building code requirements. The new buildings eligible for financing under this project shall meet at least 70 percent of energy savings compared to the municipal 65 percent building code.

21. A technical study was carried out as part of project preparation to estimate the incremental costs of such low-emission new buildings to meet 70 and 75 percent of energy savings respectively from case studies in Shanghai. The results demonstrated that achieving 70 and 75 percent of energy savings would have a payback period of 4 and 7 years respectively, with existing government subsidies. Another project preparation study estimated that this project may finance 5-7 such low-emission buildings, based on city planning in Changning district over the next five years.

22. **Framework Approach**: Given that there will be many small-scale sub-projects and sub-borrowers for the investment component, a framework approach will be adopted for project implementation. The implementing agencies, SPD Bank and Bank of Shanghai, have developed

an Operational Manual, which outlines selection criteria for sub-borrowers and sub-projects, appraisal procedure and guideline, roles and responsibilities of the PFIs and PMO, PFIs' internal institutional arrangement for project implementation, technical evaluation framework, environmental and social management 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 have reviewed and approved the Operational Manual. During project implementation, the implementing agencies will be responsible for identifying, appraising, and financing sub-projects that meet the criteria in the Operational Manual and receive government approval. The eligibility criteria of the sub-borrowers and sub-projects have been agreed with the Bank and are listed below:

1. Sub-borrower Eligibility:

The following types of organizations will be considered eligible sub-borrowers

- ESCOs (including leasing companies), which are companies that provide a wide range of services to implement energy efficiency projects with performance based agreements under which the end users pay for these services from the demonstrated energy savings;
- Owners of buildings (including office buildings, shopping centers, hotels, and other commercial and public buildings, and industrial buildings), government agencies, government end users;
- Property management companies;
- EE/RE equipment vendors.
- Distributed generation operators;
- And any other sub-borrowers proposed by the counterparts and agreed by the Bank and the district government

2. Subproject Location:

To be eligible for a loan from the World Bank IBRD funds, the sub-project must be located in the Changning District. At mid-term review, the government and the Bank will review and determine whether the IBRD loans shall be extended to areas outside Changning district but within Shanghai municipality.

The co-financing from the PFIs shall give first priority to sub-projects in Changning District. However, PFIs' funds may be used for financing projects outside of the Changning District, but within Shanghai.

3. Subproject Technical Eligibility

A. Existing Buildings

- The eligible building types shall include: (i) government buildings (public institutions); (ii) state-owned public buildings, airport, etc.; (iii) other commercial buildings including hotels, office buildings, shopping malls, etc.; (iv) industrial buildings; and (v) any other types of buildings agreed by the World Bank and district government;
- The major types of energy efficiency subprojects eligible for financing under the project include: (a) building energy efficiency improvement, including lighting, HVAC (heating, ventilation, and air conditioning), elevators, energy management systems, water heating, building envelope measures (insulation for roof, walls, windows, doors); (b) renewable

energy applications in buildings (roof-top solar PV, wind, 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 the counterparts and agreed by the Bank and district government. The proposed project will not finance any sub-loans involving coal-fired power plants.

- Sub-project investment shall be limited to renovation and retrofit of existing buildings, with a minimum of 10 percent emission reduction, compared to the baseline. When a retrofit subproject does not involve improving comfort levels or expanding utilities/functions, energy savings and emission reductions are calculated following the methodology defined in the Chinese Technical Guidelines for Public Building Retrofit (JCJ 176-2009), or a methodology agreed by the Bank and district government. When a retrofit subproject involves improving comfort level or expanding utilities/functions, particularly building envelops, a Building Simulation Approach, with DOE2 (eQuest) model, will be used to estimate energy savings and emission reductions – The sub-borrower shall calculate the difference in energy consumption and emissions between 2 building simulations: (i) design A – without project; and (ii) design B – with EE/RE measures.
- The cash flow benefit arising only from energy savings[2] associated with the subproject, as estimated using the subproject financial projections prepared by the sub-borrower, shall be adequate to repay the total investment cost of the subproject (before receiving government's subsidies) within a period of twelve (12) years or less[3]. The Operational Manual illustrated detailed methodology and example.
- Sub-projects must meet both eligibility criteria outlined above, and these calculations will be reviewed and verified by the PMO.

B. New Buildings

This project will finance only the incremental costs of low-carbon measures, primarily energy efficiency, renewable energy, distributed generation, and smart meters, for new buildings above municipal building code requirements. The new buildings eligible for financing under this project shall meet at least 70 percent of energy savings compared to the municipal 65 percent building code.

The calculation of incremental investment will be conducted using the following approach:

- Building Simulation Approach – The sub-borrower shall provide the results of 2 building simulations, with DOE2 (eQuest) model: (i) design A that meets Shanghai municipal public building code (65 percent improvement over designs in 1980s); and (ii) design B that exceeds the building code (at least 70 percent improvement over designs in 1980s). Each simulation will include the total energy consumption and investment cost estimates. The difference between the investment costs of designs B and A will be considered the incremental investment. These calculations will be reviewed and verified by the PMO.

[2] Annual cash flow benefit from the energy efficiency improvements associated with the subproject will be calculated as the expected amount of energy saved due to the subproject in any given year multiplied by the expected average energy sale or purchase price for the sub-borrower during that year for each type of energy saved (electricity, gas, oil, coal, etc.).

3 The payback period will be calculated simply as total investment cost (including interest during construction) after any government subsidies divided by the average annual cash flow benefit derived from energy savings associated with the subproject (see footnote 2 for formula), with the average taken over a period not to exceed the first ten years of the subproject operations.

4. Subproject Social and Environmental Eligibility

- The sub-borrower shall have obtained all required environmental approvals from the appropriate local, provincial or state Chinese environmental authorities and shall make available to the PMO copies of all necessary approval documents
- All of the proposed subprojects shall be equivalent to World Bank Categories B or C.
- Subprojects that are screened by the PMO as World Bank Category B shall have their EMP reviewed and approved by the PMO; such subprojects would have minor negative effects to environment, and subprojects that are screened as World Bank Category C and would have negligible negative effects, and have no further safeguard requirements, as per the Bank's OP 4.01 on environmental assessment.
- Subprojects shall not involve any land acquisition and resettlement outside existing premises.

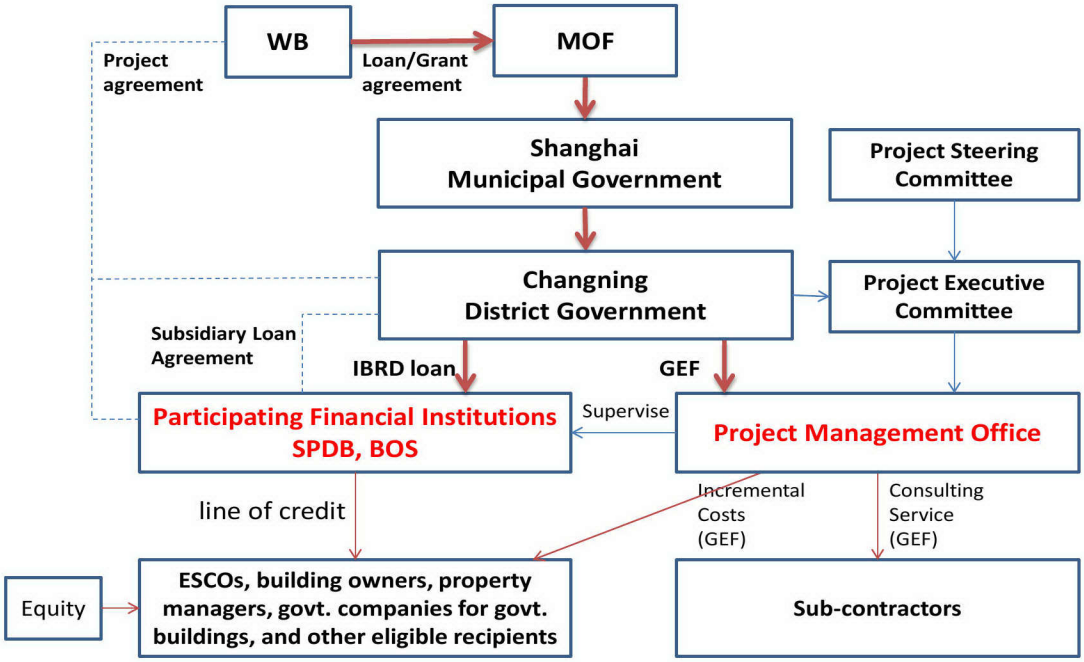
Annex 3: Implementation Arrangements

China: Green Energy Schemes for Low-carbon City in Shanghai

Project Institutional and Implementation Arrangements

1. Figure A3.1 shows the institutional arrangement for project implementation.

Figure A3.1. Institutional Arrangement for Implementation



2. ***Project Steering Committee and Project Executive Committee:*** A Project Steering Committee will be set up to coordinate and replicate policies at the Municipality level. A Project Executive Committee will be established to coordinate the district level government agencies and supervise day-to-day project implementation.

3. ***Project Management Office***: The PMO has been established and is functional to implement the GEF Project Preparation Grant (PPG), with key staff on board. The PMO will be responsible for implementing the GEF component of the Project. The PMO has one Director, two Deputy Directors (financed by counterpart funds), two full-time technical managers, one full-time procurement manager (financed by counterpart funds), one part-time financial management specialist (financed by counterpart funds) and one full-time accountant, and one full-time assistant to the Director. The technical and procurement managers will also be responsible for environmental and social safeguards.

4. Regarding the IBRD loan, the PMO will (a) assist the participating banks in identifying sub-projects; (b) review and provide no-objection to the technical aspects of sub-projects to ensure that the sub-loans follow the Operational Manual and achieve the low-carbon objective in Changning district; (c) conduct environmental and social safeguard due diligence and supervision of sub-projects; and (d) verify energy savings of sub-projects. The Changning on-line monitoring platform for building energy consumption provides an innovative tool for the district government/PMO to measure and verify energy savings of the IBRD investments.

5. ***Participating Banks***: The local government compared a few commercial banks operating in Shanghai, and selected SPD Bank and BOS as the implementing agencies for the following reasons: (a) both banks are committed to green credit businesses, have previous experience with building EE and ESCO investments, and have a strong focus on SME finance; and (b) The Shanghai municipal government is the largest shareholder of SPD Bank and BOS. They both have a large network of customers in Shanghai and Changning district.

6. The participating banks—SPD Bank and BOS--are the implementing agencies for the IBRD loan, responsible for (a) generating a lending pipeline; (b) appraising and approving sub-projects; (c) supervising and monitoring sub-borrowers and sub-projects; and (d) fully disbursing IBRD funds and counterpart co-funding, according to the agreed-upon Operational Manual. The participating banks will bear 100 percent of default risks. They shall follow government's policies and World Bank's rules and procedures as detailed in the Operational Manual.

7. The district government will on-lend US$40 million IBRD loan to each of the participating banks, and leave US$19.75 million for the two PFIs to compete for on a first come first serve basis. The PFI needs to fully disburse the US$40 million allocation first, before they can start to tap the remaining US$19.75 million to finance eligible sub-projects following the Operational Manual.

8. SPD Bank and BOS have agreed to put in place dedicated teams at headquarter, branch, and sub-branch levels, and develop internal implementation rules and regulations for this project, prior to project effectiveness. During the entire project implementation period, SPD Bank and BOS shall maintain the dedicated teams with adequate staff and resources and apply the Operational Manual satisfactory to the Bank.

9. **Shanghai Pudong Development (SPD) Bank**: SPD Bank is one of the leaders in EE investments in China. They have been implementing IFC CHUEE program, AFD EE/RE on-lending program, and ADB building EE project. Under these projects, more than 4,000 SPD Bank staff have been trained in EE lending business. In particular, the Shanghai branch has adopted an innovative financial product that uses energy savings as collaterals--essential for financing ESCOs, and has prior experience in building EE investments. It also has a dedicated department for SMEs. They have an integrated institutional framework for identifying deals, developing financial products, and appraising and approving investments, which is a key success factor for a dedicated EE credit line, as learned from the CHEEF program.

10. To implement this project, the SPD Bank's headquarter will provide policy and technical support and overall guidance; the Shanghai Branch SME Department will be responsible for the

overall implementation of the project including appraisal and approval of sub-loans and development of special financial products; and SPD Bank Hongqiao sub-branch will be responsible for deal origination, pre-appraisal, and supervision.

11. **Bank of Shanghai (BOS):** BOS also has previous experience with EE investments, and piloted an innovative financial product that uses energy savings as collaterals for an ESCO building EE lending. The bank is in discussion with IFC to join their CHUEE program Phase III. To implement this project, BOS has set up a task force, led by the Vice President of BOS. The headquarter SME Department will be in charge of overall project implementation; the branch will appraise, approve, and supervise sub-loans; and Changning sub-branch will be responsible for deal origination. They are also planning an internal reward system to provide incentives for staff to disburse IBRD loans.

12. ***Sub-borrowers***: The sub-borrowers would be eligible ESCOs (including leasing companies), building owners, building developers, property management companies, EE/RE equipment vendors, government agencies, government end users, and distributed generation operators for low-carbon investment subprojects. Funding from the government and GEF will assist potential sub-borrowers in undertaking energy auditing, diagnostic and feasibility studies, before applying for loans from the PFIs. Shanghai has about 200 registered ESCOs on the municipal DRC's list of qualified ESCOs eligible for receiving government subsidies.

13. ***Implementation agency risks:*** Shanghai institutions are among the leader in project implementation capacity in China. This has been demonstrated through the proposed project identification and preparation process. The PMO has hired all the key staff on board. SPD Bank and BOS have agreed to put in place dedicated teams at headquarter, branch, and sub-branch levels, prior to project effectiveness. However, the implementing agencies (PMO, SPD Bank, and BOS) have limited experience in managing Bank projects, although SPD Bank is a partner under the IFC CHUEE program. Therefore, the implementing agencies need to hire qualified experts and strengthen their capacity through training in Bank procurement, financial management, and safeguard policies and procedures, as well as technical due diligence skills. The project will allocate GEF funds for implementation support and capacity building for the implementing agencies. In addition, this operation triggers the Bank's financial intermediary OP8.30, and the Bank Team has undertaken OP8.30 financial sector due diligence on SPD Bank and BOS, who meet all the eligibility criteria (see Annex 6). This risk is therefore rated as moderate with GEF support.

Financial Management, Disbursements and Procurement

Financial Management

14. The FM capacity assessment identified the main risks including: (a) the PMO and the participating banks do not have experience with Bank-financed project; and (b) using the participating banks may bring some fiduciary risks on proper usage of project funds. Mitigation measures to address this risk have been agreed, including: (a) FM training (formal and ad hoc) will be provided to the project financial staff; (b) a Financial Management Manual (FMM) has been prepared and incorporated into the Operational Manual and GEF Project Implementation

Plan to standardize project FM procedures and provide guidance to FM staff; (c) Operation Manual has been agreed during appraisal; and (d) Shanghai Municipal Finance Bureau and the Bank will closely monitor and supervise project implementation.

15. Overall, the residual financial management risk after mitigating measures for the project is assessed as Moderate.

16. *Budgeting.* The annual project implementation plan, including the funding budget and the resources, will be prepared by SPD Bank and BOS and then consolidated by the PMO. Budget variance analysis will be conducted on semi-annual basis by the PMO and the participating banks and necessary actions will be taken to make sure project could be implemented as planned. The Bank will work with the PMO and the PFIs through supervising project budgeting system to enhance their budget preparation and execution during project implementation.

17. *Funds flow.* GEF grant proceeds will flow from the Bank into the project DA to be set up at and managed by SMFB. SMFB will be directly responsible for the management, maintenance and reconciliation of the DA activities. Supporting documents required for Bank disbursements will be prepared and submitted by the PMO to SMFB and the reimbursed funds will be delivered to the PMO from SMFB if the expenditures are paid by the PMO first or the contractors will be paid by SMFB directly.

18. For the IBRD loan, the reimbursement disbursement method will be used. The PFIs will use their own funds to pay the sub-borrowers and then request the reimbursement from the Bank. The Bank is reimbursing the payment of sub-loans. Supporting documents required for Bank disbursements will be prepared and submitted by the PFIs to the PMO, Changning District Finance Bureau and SMFB for review and verification before sending to the Bank for further disbursement processing.

19. The Bank loan will be signed between the Bank and the People's Republic of China through its MOF. Subsidiary loan agreements will be signed between PRC through its MOF and the Shanghai Municipal Government through SMFB, then between SMFB and Shanghai Changning District government through district finance bureaus. Finally, the Changning District Government will on-lend the loan to SPD Bank and BOS, who will bear responsibilities for loan repayment.

20. *Accounting and Fiancial Reporting.* Given the financial intermediary approach adopted by the project, a set of tailored accounting treatment will be designed for the project activities based on the accounting regulation for trust funds issued by MOF.

21. The PMO and the PFIs will be managing, monitoring and maintaining their project accounting records for the activities they implement. Original supporting documents will be retained by them respectively. The PMO is responsible for preparing the project consolidated financial statements. The unaudited semi-annual project interim financial reports (IFRs) will be prepared and furnished to the Bank by the PMO no later than 60 days following each semester (the due dates will be August 15th and February 15th), in the form and substance satisfactory to

the Bank.

22. *Internal Control.* The related accounting policy, procedures and regulations were issued by MOF to uniformly align the financial management and disbursement requirements for the Bank financed projects. Additionally, the project FMM will align the entire project's financial management policies and procedures among all project implementing agencies.

23. *Audit.* Shanghai Municipal Audit Office (SMAO) has been identified as the auditors for the project, and an annual audit report will be issued by SMAO. The annual audit report of project financial statements will be due to the Bank within 6 months after the end of each calendar year. Following the World Bank's formal receipt of the audited financial statements from the borrower, the World Bank will make them available to the public in accordance with the World Bank Policy on Access to Information.

Disbursements

24. Four disbursement methods: advance, reimbursement, direct payment and special commitment are all available for the project. Supporting documents required for Bank disbursement under different disbursement methods will be documented in the Disbursement Letter issued by the Bank.

25. For the IBRD loan, reimbursement disbursement method will be used. One DA for GEF grant in US dollar will be opened at a commercial bank acceptable to the Bank and will be managed by SMFB. The ceiling of the DAs will be determined and documented in the Disbursement Letter.

26. The Bank loan/grant would be disbursed against eligible expenditures (taxes inclusive) as described in tables A3.1 and A3.2:

Table A3.1 Disbursement Category of IBRD Loan

Disbursement Categories	**IBRD Loan**	
	Amount of the Loan Allocated (expressed in USD)	**Percentage of Expenditures to be financed (inclusive of Taxes)**
(1) Sub-loans to be provided by SPD Bank	40,000,000	100% of Sub-loan amount disbursed
(2) Sub-loans to be provided by Bank of Shanghai	40,000,000	100% of Sub-loan amount disbursed
(3) Sub-loans to be provided by both SPD Bank and/or Bank of Shanghai	19,750,000	100% of Sub-loan amount disbursed
(4) Front-end fee	250,000	Amount payable pursuant to Section 2.03 of the Loan Agreement in accordance with Section 2.07 (b) of the General Conditions
(5) Interest Rate Cap or Interest Rate Collar premium	0	Amount due pursuant to Section 2.07(c) of the Loan Agreement
Total	100,000,000	

Table A3.2 Disbursement Category of GEF Grant

Disbursement Categories	GEF Grant	
	Amount Of the Grant Allocated (expressed in USD)	**Percentage of Expenditures to be Financed (inclusive of Taxes)**
Goods, consultants' services, Training, Workshops and Study Tour	2,745,000	100%
Sub-grants	1,500,000	100% of Sub-grant amount disbursed
Incremental Operating Costs	100,000	100%
Total	4,345,000	

27. The PFIs will use the IBRD loan to finance the activities determined in the Loan Agreement. The IBRD loan will reimburse the payment of sub-loans signed between the PFIs and the sub-borrowers.

28. No disbursement for the IBRD Loan payments under Categories (1) and (3) in Table A3.1 unless a Subsidiary Agreement has been executed on behalf of Changning District and Bank of Shanghai; for payments under Categories (2) and (3) in Table A3.1, unless a Subsidiary Agreement has been executed on behalf of Changning District and Shanghai Pudong Development Bank; and for payments under Category (3), unless the allocation of the amount of the Loan to either Category (1) or (2) in Table A3.1 has been fully disbursed.

29. Besides preparing normal disbursement forms, the PFIs are required to provide the following sheet to present the detailed list of Sub-loans made to sub-borrowers.

No.	**Name of end user**	**Contract reference No.**	**Contracted Loan Amount**	**Cumulative paid amount till last period**	**Amount paid this time**	**Cumulative paid amount**

30. GEF grant will finance the eligible activities stated in the Grant Agreement. The detailed description of each activity is as follows:

31. Sub-grant: GEF funds will be used to cost share US$1.5 million (or no more than 50 percent) of the incremental costs of technical design, marketing campaigns, and EE/RE investments of a pilot near zero-emission building. Once the Bank approves the proposal, the PMO will enter into a sub-grant agreement with the proponent that lays out the eligible technologies, activities, expenditure, performance indicators and disbursement arrangement. The grant will be disbursed against defined outputs. Disbursement of the Green-Energy Building Subproject Grant in the amounts and at the intervals specified in the Green-Energy Building Subproject Grant Agreement, upon verification by Changning District of delivery by the Green-Energy Building Subproject Grant Beneficiary of the Outputs set forth in the Green-Energy Building Subproject Grant Agreement.

32. "Training, Workshops and Study Tours" means reasonable travel, room, board and per diem expenditures incurred under the Project by trainers and trainees in connection with their training and by non-consultant training facilitators, including (a) workshops and study tours in foreign countries; (b) course fees; (c) training facility rentals; and (d) training material preparation, acquisition, reproduction and distribution expenses.

33. "Incremental Operating Costs" means the reasonable expenditures directly related to the Project incurred by the Project Management Office, on account of Project implementation, management, coordination, and monitoring and evaluation, in respect of travel costs, vehicle and equipment leasing, rent, maintenance and repair, office rent and supplies, communications costs, Project related consumables, logistics and translation services, production and reproduction of documents required for Project implementation, including training materials, but excluding the salaries and salary supplements of the Recipient's civil servants.

Procurement

34. Capacity assessment. The Procurement Capacity Assessment identified that the procurement risk as moderate for the PMO to implement the GEF grant and for the two PFIs to implement the IBRD loan. The PMO, who will follow the Bank procurement methods to implement the GEF component of the project, is not familiar with the Bank procurement guidelines and procedures. Therefore, the PMO needs to strengthen its procurement capacity. The PMO has recognized this, and has hired a full-time procurement staff with requisite qualifications who will receive further Bank procurement training during project implementation.

35. Mitigation measures have been discussed and agreed during project preparation: (a) key procurement staff in PMO and the PFIs shall attend the procurement training provided by the Bank and Tsinghua University before the project effectiveness; (b) the PMO and the two PFIs shall send their staff to EXIM Bank and Huaxia Bank who have implemented similar programs financed by the Bank to learn from their experience managing and implementing CHEEF projects; and (c) the project Operational Manual shall define the main responsibilities of the PFIs and the project beneficiaries and include procurement principles and the review procedures for all participating entities to follow.

36. Applicable Guidelines. Procurement will be carried out in accordance with the "*Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers*" dated January 2011; and "*Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers*" dated January 2011; and the provisions stipulated in the Loan and Grant Agreements.

Procurement Arrangements

37. *IBRD Loan*: Procurement of works, goods and non-consulting services under the IBRD loan will be undertaken by the respective sub-borrowers in accordance with well-established commercial practices used in private sector in accordance with "Procurement in Loans to Financial Intermediary Institutions and Entities under paragraph 3.13 of the Procurement

Guidelines. To ensure that project procurement will be carried out with economy and efficiency, the Operational Manual, prepared by the participating banks and agreed by the district government and the Bank, has outlined the supervision, oversight and audit arrangements for the sub-loans and the procedures to be followed for the procurement to be carried out by the beneficiaries of the sub-loans. There is no prior review contract for the IBRD loan.

38. *GEF grant*: The GEF grant will finance contracts for various consulting services assignments and goods and equipment such as computers, network facilities and office equipment. The procurement methods and prior review thresholds for GEF grant implementation are summarized in table A3.3. Beneficiaries of the Green-Energy Building Sub-project Grants under the GEF component of the project will be required to procure the goods and services to be financed from the Grant in accordance with procedures ensuring economy and efficiency,[4] including the provisions of the Green-Energy Building Subproject Guidelines.

Table A3.3: Thresholds for Procurement Methods and Prior Review for GEF Grant

Expenditure Category	Procurement Method	Contract Value Threshold (US$)	Prior Review Threshold (US$)
1. Goods and Non-Consulting Services	ICB NCB Shopping Direct contracting	≥1,000,000 <1,000,000 <100,000 None	All ≥500,000 & 1st Contract irrespective of value1st Contract All
2. Consultants Services	QCBS/QBS CQS Individual consultant Single source selection (firm) Sole-source selection (individual)	≥300,000 <300,000	All >=100,000 or identified in Procurement Plan ≥50,000 or identified in Procurement Plan All All

39. The Bank's Standard Request for Proposals shall be used when selecting consultants through QCBS or QBS method. Eligible government-owned universities, research centers, or other institutions in China may be included in shortlists for consultants, provided they, possess the relevant qualifications and are not in a situation of conflict of interest. Single-source selection (SSS) shall be used only in exceptional cases and shall be specified in the Procurement Plan. A sufficiently detailed justification, including the rationale for SSS instead of a competitive selection process and the basis for recommending a particular firm or individual, will be required. For training and workshops planned under the project, detailed programs will be developed by the PMO during project implementation and included in the project annual work plans for the Bank's review. Actual expenditures incurred in accordance with the approved detailed programs will be used as the basis for reimbursement.

[4] Such an approach is specifically allowed for procurement for activities using output-based disbursement (*See* Implementing Output-Based Disbursement Mechanisms for Investment Operations: Operational / Technical Guidance Note to Staff, April 2, 2007, paragraph 21).

40. Procurement Plan and GPN The PMO shall prepare an annual procurement plan for the GEF grant for the Bank's review and no-objection. The IBRD loan is a financial intermediary lending operation. Given the demand-driven nature of the sub-projects, only an indicative list of eligible subprojects has been included in the initial lending pipeline. During project implementation, sub-borrowers as part of their sub-project proposal will provide SPD Bank and BOS a simple procurement plan for activities to be implemented, which will be reviewed as part of the sub-loan appraisal and approval process. The GPN would be published before the project effectiveness.

41. Record Keeping. The PMO will be responsible for maintaining procurement records relating to the GEF Grant. The OM for the IBRD financed FI operation provides details of records to be maintained by the PFIs as well as the beneficiaries. The sub-borrowers are required to maintain complete records of procurement (including contract management records and records of payments) for Bank post review and audits. All procurement records shall be maintained from the period from project preparation to at least two years after the project closing date.

42. Frequency of Procurement Supervision. In addition to annual implementation support missions, the Bank team will conduct procurement post review once a year to ensure that the PMO followed the Bank procurement rules and procedures, and that the participating banks and their sub-borrowers followed the agreed procedures in the Operational Manual. The sampling percentage for the post review will be at least 10% for procurement in the first year. The sampling percentage ratio will be adjusted each year based on the findings of the previous year's post review.

43. Advance Contracting and Retroactive financing. Payment up to an aggregate amount not to exceed $800,000 equivalent made prior to the date of the signing of the legal agreement but on or after January 1, 2013 in respect of eligible expenditures may be financed from the GEF Grant, provided that the procurement requirements and procedures have been met. All contracts to be financed through retroactive financing from the GEF grant are listed in the approved procurement plan and will be subject to prior review.

44. Retroactive financing in the amount of $20,000,000 equivalent made prior to the date of the signing of the legal agreement but on or after November 1, 2012 for eligible expenditures is available for the sub-projects to be financed through the IBRD loan. Advance procurement under the sub-projects shall not be subject to Bank prior review.

Environmental and Social (including safeguards)

45. In accordance with World Bank policy on Environmental Assessment (OP 4.01), this project has received environmental category rating "FI". This rating is normally assigned to projects that involve an intermediary responsible for appraising specific sub-projects to access World Bank fund.

46. Overall, the Project is expected to generate significant environmental benefits such as reducing energy consumption and carbon emissions. No indirect and/or long term negative

impacts are anticipated. Potential sub-project related environmental and social issues appear to be minimal.

47. For existing buildings, potential environmental, health and safety issues include those related to: (a) replacement of high energy use equipment and/or introduction of energy efficiency measures; (b) management (removal/disposal) of old equipment; and possibly (c) removal and management of any hazardous materials. For construction of new buildings, potential environmental issues would be related to construction activities, including dust, noise, minor traffic disruptions, and potential handling of construction non hazardous waste.

48. 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 many sub-borrowers for the investment component, a framework approach was adopted for project implementation. In accordance with OP4.01 Environmental Assessment, an Environmental and Social Management Framework (ESMF) has been developed as part of the Operational Manual.

49. This ESMF is designed to provide guidance on procedures to be followed by the two PFIs--Shanghai Pudong Development (SPD) Bank and Bank of Shanghai (BOS), sub-borrowers, Project Management Office (PMO), and contractors. The ESMF is consistent with Chinese laws and regulations, and World Bank Safeguard policies. The preparation of the ESMF also takes into account relevant World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines. It was concluded that all pertinent guidelines regarding worker health and safety listed in the WBG EHS Guidelines are covered by National and/or Shanghai Municipality rules, regulations, codes etc. Therefore, meeting Chinese construction requirements for buildings and installation of high efficiency energy equipment will also satisfy World Bank requirements.

50. The ESMF outlines key steps for subproject evaluation and implementation, including screening, due diligence, environmental documentation, public consultation and disclosure, review and approval, legal/contractual obligation, and monitoring and reporting. A variety of checklists and a generic environmental management plan (GEMP) are presented in the ESMF in order to support the PMO, PFIs, and sub-borrowers to carry out each key step of sub-project appraisal and implementation. Under the ESMF, the sub-borrowers will need to prepare environmental management plans where warranted.

51. This project will not trigger involuntary resettlement (OP/BP 4.12). Since the project focuses on retrofitting existing commercial and public buildings, there will be no land acquisition and/or relocation of people. For the component of supporting new near zero-emission buildings and new low-emission buildings, Bank financing will only cover the incremental costs of EE/RE measures. Support will be provided only to the new buildings that have either purchased land in the past and/or receive the land from the government with no new land acquisition. To ensure the new building sites have no outstanding resettlement issues, due diligence review will be carried out by sub-borrowers and the PMO in the sub-project screening process, and requirements for such due diligence review have been included in the ESMF.

52. The PMO and the two PFIs have limited experience in managing World Bank projects in the past. The ESMF included a Capacity Assessment and Capacity Development Plan for the

PMO. The SPD Bank and BOS have corporate policies to support China's low carbon economy and green development. However, as financial institutions, they have no technical capacity for supervising environmental or social management procedures of their sub-borrowers. These functions will be performed by the PMO.

53. To strengthen their capacity, a capacity building plan has been developed and included in the ESMF. The PMO will assign a dedicated staff to take overall responsibility of managing the implementation of the ESMF. An environmental management consultant will be engaged by the PMO to provide technical support, including training, guidance to SPD Bank, BOS and sub-borrowers, and review and assist in preparation of environmental documents as required by the ESMF during project implementation. Both SPD Bank and BOS will assign staff to manage the implementation of the ESMF. A Terms of Reference for the environmental management consultant will be submitted to the Bank team for review prior to project implementation.

Public Consultation and Information Disclosure

54. Key stakeholders are the Shanghai Municipal Government, Changning District Government, SPD Bank and Bank of Shanghai, as well as relevant government authorities, including Changning District Environmental Protection Bureau, Changning District Construction and Transport Commission. In preparation of the ESMF, the stakeholders were consulted and their comments have been incorporated into the ESMF accordingly. The ESMF was disclosed at the websites of PMO, SPD Bank and BOS in September 11, 2012. The ESMF was sent to InfoShop on Sep 17, 2012.

55. At project implementation stage, detailed public consultations for sub-projects would normally not be required but rather advanced public notification of the proposed project activities would be used, which would also include a description of the manner in which safeguard issues would be addressed.

Monitoring & Evaluation

56. Annex 1 provides a detailed description of the performance indicators to be tracked under the project, and specifies the source and schedule for data collection. The PMO (with relevant inputs from the two PFIs) will be responsible for the overall M&E system, including regular data collection to assess progress towards achieving results. It will furnish to the Bank semi-annual progress reports on project implementation by February 15 and August 15 of each year, starting with February 15, 2014. In addition, it will prepare a mid-term review report by June 30, 2016. Based on the recommendations of these reports and the Bank's reviews and comments thereon, the PMO will take actions, satisfactory to the Bank, to address any emerging issues in order to meet the targets set in the results framework.

Role of Partners (if applicable)

57. Not applicable.

Annex 4: Operational Risk Assessment Framework (ORAF)

China: Green Energy Schemes for Low-carbon City in Shanghai

Negotiations and Board Package Version

1. Project Stakeholder Risks						
1.1 Stakeholder Risk	Rating	Substantial				
Description: ► Building owners are reluctant to retrofit existing buildings, because (a) energy costs comprise a small share of operating costs; (b) investments usually have a long payback period; (c) construction causes disruptions; (d) uncertainties exist regarding energy savings; and (e) adequate incentives and mandatory regulations are lacking. This risk is rated as substantial before mitigation, and moderate after mitigation. ► Developers are not willing to pilot near zero-emission buildings due to their high incremental costs. This risk is rated as substantial before mitigation, and moderate after mitigation.	**Risk Management:** The district government has issued a draft decree to provide additional financial incentives for building retrofit in Changning District effective on January 1, 2013. Additional technical assistance, particularly on mandatory policies for building retrofit, will be undertaken during project implementation funded by the GEF grant. Stakeholder consultation and promotion workshops will also be held to increase awareness and reach consensus on green buildings during project implementation.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Ongoing
	Risk Management: The project will provide incentives to interested parties with GEF support by (a) sharing incremental costs between the district government and developers; (b) providing technical support to developers on the design of the pilot near zero-emission building; (c) helping developers' to create brand names; and (d) assisting the district government in developing policies to provide additional financial incentives.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Ongoing
2. Implementing Agency (IA) Risks (including Fiduciary Risks)						
2.1 Capacity	Rating	Moderate				
Description: Shanghai institutions are among the leaders in project implementation capacity in China. However, the	**Risk Management:** The PMO has hired key staff (technical, procurement, financial management, and safeguards). The implementing agencies will hire qualified experts and strengthen their capacity through training in Bank procurement, financial management, and safeguards. The project will allocate GEF funds for implementation					

project's three implementing agencies (PMO, SPD Bank, and BOS) have limited experience in managing Bank projects. The CHEEF and CHUEE programs, which use banks as financial intermediaries, have been successful. The SPD Bank is a partner with IFC under their CHUEE program. This risk is therefore rated as moderate.	support and capacity building for the implementing agencies. The Bank team will provide necessary support through training and guidance during supervision missions.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Ongoing
2.2 Governance	Rating	Low				
Description: Political commitment from the municipal government and district government are high. In addition, coordination among different government agencies is good.	**Risk Management:** A Project Steering Committee will be set up to coordinate the Municipality level and will focus on municipal level policies to support the scale up of the low carbon efforts in Changning District. A Project Executive Committee will also be established to coordinate the district level government agencies, and supervise the day-to-day operation of the PMO.					
	Resp: Client	Stage:	Recurrent: ☐	Due Date:	Frequency:	Status: Ongoing
3. Project Risks						
3.1 Design	Rating	Substantial				
Description: The project is designed to pilot innovative policies, business models, and clean energy technologies. Building retrofit is one of the most difficult EE market segments that have not attracted much private investments. Due to the innovative nature of the project, it may take time for the market to respond and the loan may encounter slow disbursement at the initial stage of implementation. The risk is rated as moderate after mitigation.	**Risk Management:** A draft decree to promote the retrofit of existing public buildings in Changning District will be considered by the government, and is likely to be in effect by the end of 2012. GEF support will provide additional technical assistance and capacity building. Bank missions will provide guidance and support on technical issues.					
	Resp: Client and Bank	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Ongoing
3.2 Social and Environmental	Rating	Low				
Description:	**Risk Management:**					

Overall, the Project is expected to generate significant environmental benefits such as reducing energy consumption and carbon emissions. No indirect and/or long term negative impacts are anticipated given the nature of the project. Potential sub-project related environmental and social issues appear to be minimal. An Environmental and Social Management Framework (ESMF) has been developed as part of the Operational Manual. A capacity building plan has also been developed and agreed upon to strengthen the capacity and support of safeguard management of implementing agencies.	Due diligence review will be undertaken to confirm if relevant Chinese environmental laws and regulations have been or are being followed in existing buildings covered by the project and to confirm that land acquisition undertaken for new buildings has followed relevant Chinese laws and regulations, and does not have involuntary resettlement issues. Environment and social safeguard capacity of the PMO, SPD Bank, and BOS will be strengthened with GEF support. Bank missions will monitor compliance with Bank safeguard requirements.					
	Resp: Client and the Bank	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Ongoing
3.3 Program and Donor	Rating					
Description:	**Risk Management:**					
	Resp:	Stage:	Recurrent: ☐	Due Date:	Frequency:	Status:
3.4 Delivery Monitoring and Sustainability	Rating	Moderate				
Description: The district government has developed an online building energy consumption monitoring platform which will serve as an important tool for the project M&E. Monitoring energy savings and GHG emission indicators is included in the Operational Manual. Sustainability	**Risk Management:** The GEF support will build capacity for the PMO and independent third party measurement and verification agencies to undertake M&V tasks. The Bank team will monitor progress during missions and also through review of progress reports, as well as M&E reports.					
	Resp: Client and the Bank	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Ongoing

of the project will require continued government commitment and strong buy-in from key stakeholders. The financial intermediary approach and GEF support to develop policies, business models, and financing mechanisms will support project sustainability.						
3.5 Other (Optional)	Rating					
Description:	**Risk Management:**					
	Resp:	Stage:	Recurrent: ☐	Due Date:	Frequency:	Status:
3.6 Other (Optional)	Rating					
Description:	**Risk Management:**					
	Resp:	Stage:	Recurrent: ☐	Due Date:	Frequency:	Status:

4. Overall Risk

Implementation Risk Rating: Substantial

Description:
This project is designed to pilot innovative policies, business models, and clean energy technologies. Building retrofit is one of the most difficult EE market segments that have not attracted much private investments. The district government can provide additional financial incentives, but might face difficulties in designing and implementing mandatory policies for building retrofit as different government levels' authority on this market segment is not yet clearly delineated. Mitigation measures are being explored, and the GEF support is intended to provide technical assistance and capacity building to remove barriers. However, due to this innovative nature, it may take time for the market to respond and the loan may encounter slow disbursement during the initial stage of implementation. Overall, risk is rated as substantial prior to mitigation, due to the innovative nature of the project and involvement of a large number of stakeholders, but as moderate after mitigation with GEF support. A mid-term review will be conducted to assess the need to adjust the design of the project.

Annex 5: Implementation Support Plan

China: Green Energy Schemes for Low-carbon City in Shanghai

Strategy and Approach for Implementation Support

1. This annex lays out the key activities that the Bank team will implement to appropriately mitigate the risks identified during project implementation. It will focus on the key risks defined in the ORAF and will strive to provide the client with the most effective implementation support. Under the proposed project, the key risks revolve around the implementing agencies' lack of adequate capacity in the effective execution of the project implementation.

2. **Technical Support.** The Bank team has provided extensive technical expertise during project preparation, and will continue to provide extensive technical support to the PMO and to the implementing agencies to effectively monitor and implement the project activities according to the Operational Manual (OM) for the IBRD loan and the Project Implementation Plan (PIP) for the GEF grant. Training and technical assistance activities will also be provided during project implementation by the World Bank.

3. **Procurement.** Procurement implementation support would include:

- Facilitation of a multi-stage training program targeting procurement staff in the PMO to help them to fully understand Bank's procurement guidelines;
- Review of procurement documents and timely provision of feedback on results of prior and post reviews to the parties concerned;
- Monitoring procurement progress against the agreed Procurement Plan for the GEF grant.

4. **Financial Management.** The project financial management will be reviewed and evaluated on a regular basis by the Bank's financial management specialist. S/he will join World Bank's supervision missions and review the implementation of the Financial Management Manual. The specialist will also provide technical support to the project implementing agencies and help with timely resolution of potential financial management issues or any issues identified by the auditors. The review and monitoring will include the evaluation of the adequacy of the financial management arrangements in place, disbursement processes, on-lending arrangements, counterpart fund allocations, and document filing systems.

5. **Environmental and Social Safeguards.** The Bank project's environmental and social development experts will supervise the implementation of the agreed Environmental and Social Management Framework. They would provide guidance to the project implementing agencies on how to best address relevant issues that arise during project implementation. They would also help ensure that the planned community and stakeholders consultations have been undertaken during the project design phase and would continue during the project implementation stage.

Implementation Support Plan

6. Most Bank team members will be based in the China Country Office, located in Beijing. This would ensure rapid and effective response to Borrower's needs for implementation support. In addition, a few Washington-based staff and international consultants would also be part of the task team to bring global experience to the project. Formal supervision and field visits covering all aspects of project implementation will be carried out semi-annually during the early stage of project implementation, complemented by occasional visits by small missions on an as-needed basis. Estimated inputs from different specialists at different stages of project implementation are outlined below.

Table A5.1. Project Implementation Support Input Requirements

Time	*Focus*	*Skills Needed*	*Resource Estimate*	*Partner Role*
First twelve months	• Team and project leadership • Project design and technical supervision • FM & Procurement • Safeguards supervision • Capacity building	• Technical • FM • Procurement • Safeguards	6-7 staff, 2 trips per staff	NA
12-48 months	• Project implementation and supervision • FM, Procurement & Safeguards • M & E	• Technical • Safeguards • FM • Procurement	6-7 staff, 2 trips per staff annually	NA

Table A5.2. Skills Mix Required

Skills Needed	*Number of Staff Weeks*	*Number of Trips*	*Comments*
Task Team Leader	4 SWs during the first year and 3 SWs annually in the following years	2	Country office based
Co-Task Team Leader	3 SWs during the first year and 2 SWs annually in the following years	2	Country office based
Senior Energy specialist	2 SWs	1	Washington based
Energy specialist	2 SWs	1	Washington based
Environmental safeguards specialist	2 SWs during the first year and 1 SWs annually in the following years	1-2	Country office based
Social safeguards specialist	1 SW annually	Field trips as required	Washington based
FM specialist	1 SW annually	1-2	Country office based
Procurement specialist	3 SWs annually	1-2	Country office based

Annex 6. Economic and Financial Analysis

Economic Analysis

1. The economic analysis of the Project was carried out at both the Changning district level and sub-project levels: (a) on the Changning District level – three alternative abatement scenarios for both 2015 and 2020 were analyzed to estimate the carbon reduction potential in Changning district, as well as the recommended mitigation options to achieve the targets; and (b) economic justification was examined for five typical sub-projects, which were part of the first batch of sub-projects in the lending pipeline envisaged for financing under the proposed project.

Analysis of Carbon Reduction Potential in Changning District

Methodology

2. The carbon reduction potential in Changning District is analyzed in three steps: (a) the abatement costs of various available carbon mitigation options in Hongqiao demonstration zone[5], a selected zone in Changning district, were analyzed based on a comprehensive survey of buildings in the zone. A cost supply curve of all identified carbon mitigation options is drawn to display both the levelized cost and carbon reduction potential of each carbon mitigation option by sorting the options by their levelized costs from low to high; (b) three alternative abatement scenarios - Frozen Technology Scenario assuming frozen penetration of existing technologies, and no adoption of new technologies; Baseline Scenario assuming sustainable technology development across all sectors to achieve the national government's target; and Stretch Scenario assuming maximum technical potential under constraints of technology applicability and maturity will be applied so the carbon reduction will beyond the government's target – are analyzed for both 2015 and 2020 to examine the carbon reduction potential in the zone. For each scenario, different penetration of each mitigation technology is assumed taking into account their abatement costs, maturity of technology, and ease of implementation; and (c) the results in Hongqiao demonstration zone are extrapolated to the whole Changning district assuming Hongqiao is representative of Changning District.

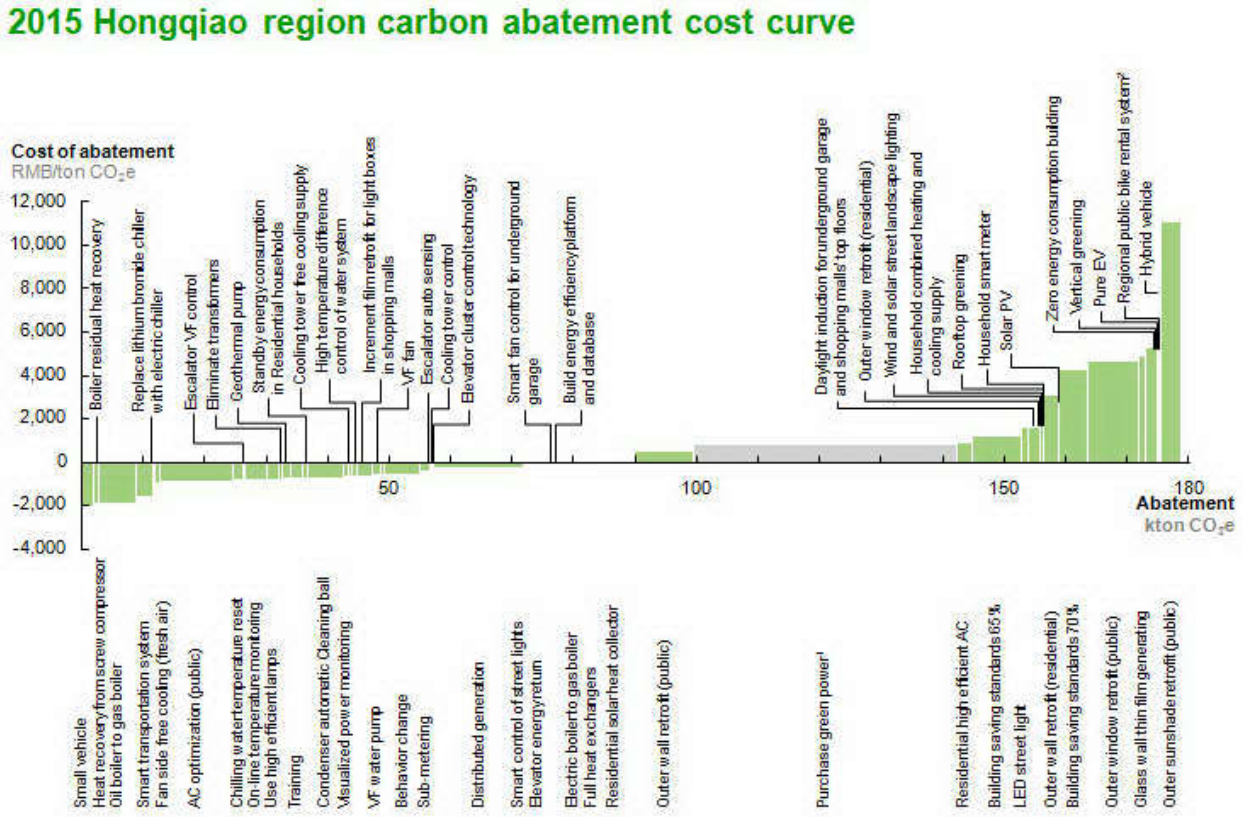
Abatement Cost Supply Curve in Hongqiao Zone

3. Total 58 carbon mitigation technologies were identified as the available options to reduce the carbon emission in Hongqiao zone, as grouped into six technology clusters: existing commercial buildings, existing residential buildings, new buildings, power and grid system, road and traffic, and behavior and capability. These technologies span a variety of sectors, such as building and transportation, and also include purchase of green power[6]. As the building sector contributed over 90 percent of final energy consumption in Hongqiao zone, a detailed survey was conducted for about 50 commercial/public and residential buildings, with their total energy consumption amounting to about 80 percent of total energy consumption of the building sector in the region, to analyze the costs and potential of carbon reduction for each technology. The

[5] Total area of Hongqiao demonstration zone is about 3.15 square kilometers, amounting to about 8.5 percent of the total area in Changning district.
[6] A voluntary Jade Electricity plan has been promoted by Shanghai Municipal Government since 2005.

abatement cost supply curve in Hongqiao zone (2015) is illustrated below.

Figure A6.1. Hongqiao region carbon abatement cost curve



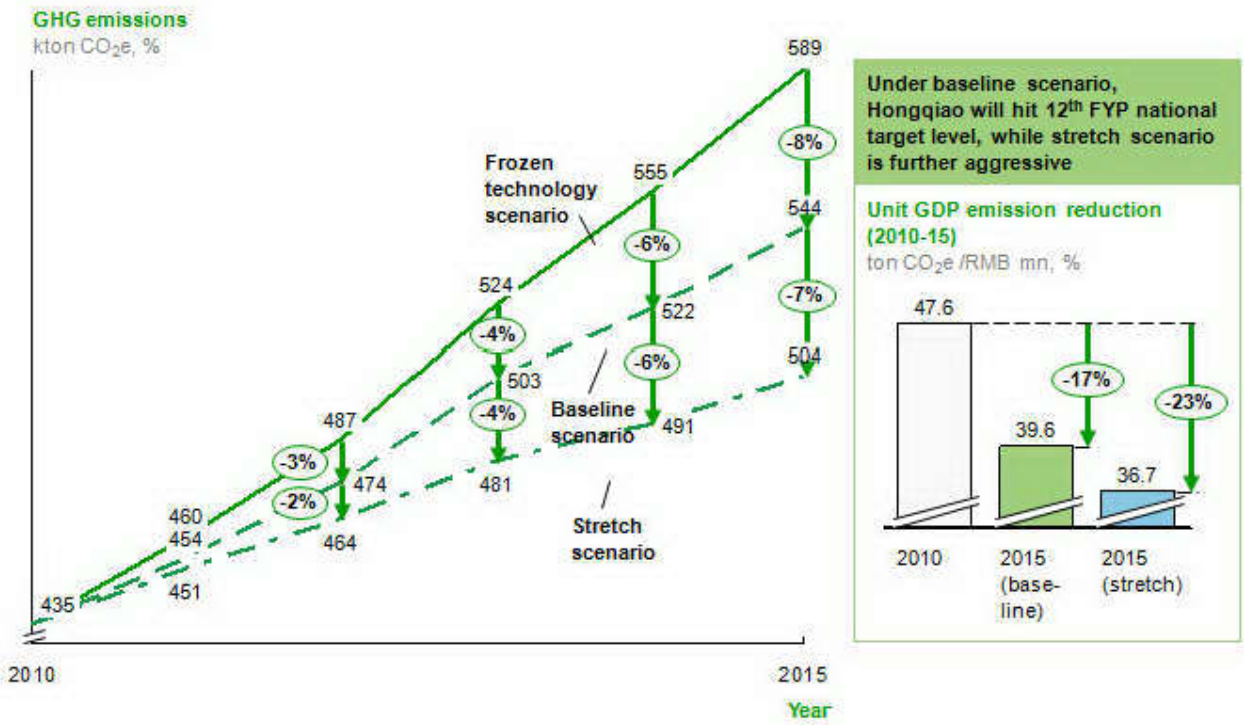
4. It was found that the maximum carbon abatement potential in Hongqiao zone is about 180 thousand tons in 2015 while the abatement opportunities are widely spread across all six clusters. Nonetheless, 85 percent of the total maximum abatement potential is accounted for by three technology clusters – existing commercial buildings, power and grid, and existing residential buildings. The remaining 15 percent is accounted for by new buildings, behavior and capability, and road and traffic clusters. The levelized costs of the carbon abatement options range from about -2,000 Yuan per ton of CO_2 equivalent to more than 10,000 Yuan per ton CO_2e.

Scenario Analysis in Hongqiao Zone

5. The three scenarios were analyzed taking into account the different application of the available carbon abatement technologies. For both Baseline Scenario and Stretch Scenario, three steps are followed to estimate the carbon emission in Hongqiao zone in 2015: (i) the ease of implementation for different technologies was evaluated to consider their economic feasibility, technology readiness and market circumstance, then all 58 technologies are grouped into three categories based on their ease of implementation – easy, medium and difficult; (ii) taking into account both costs and ease of implementation, all 58 technologies were prioritized into a matrix, and grouped into three categories – "do it now" for those mature technologies with low cost and scale applications, "start now then accelerate" for those technologies with low cost but that

should start at a small scale and be ready to roll out when technologies get standardized, and "development now but capture over time" for those technologies with high cost and difficulties for implementation; and (iii) different penetrations were applied for the technologies grouped in step (ii). Higher penetrations were assumed in Stretch Scenario than Baseline Scenario. The Baseline Scenario reflects the 12th FYP national target of 17 percent carbon intensity reduction, while the Stretch Scenario reflects realizable carbon abatement measured on "best effort" basis.

Figure A6.2. Scenario Analysis in Hongqiao Zone



6. The scenario analysis in Hongqiao zone showed that Hongqiao can meet the 12th FYP national target of carbon intensity reduction in 2015 (17 percent below 2010 level, Baseline Scenario) while the carbon intensity can be reduced further by about 23 percent in Stretch Scenario. Total CO_2 emission in Hongqiao zone in 2015 can be reduced from an estimated 589 thousand tons in Frozen Technology Scenario to 544 thousand tons in Baseline Scenario and 504 thousand tons in Stretch Scenario.

7. The carbon emission in Hongqiao zone in 2020 was extrapolated based on the trend from 2010 to 2015, taking into account the assumed incremental building floor space and improvement of comfort levels from 2015 to 2020, which are the main driving factor of carbon emission growth. Technology solutions which will further penetrate markets as technologies mature and become more widely accepted are anticipated. Based on the estimates and assumptions above, it is estimated that CO_2e in the Hongqiao zone will reach around 742 thousand tons by 2020 under the Frozen Technology Scenario, 605 thousand tons under the Baseline Scenario, and 536 thousand tons in the Stretch Scenario. This is equivalent to a reduction of carbon intensity by 36 percent in Baseline Scenario, or 43 percent in Stretch Scenario by 2020 compared to the 2010 level.

Carbon Emission Reduction Potential in Changning District

8. Extrapolating the results in Hongqiao zone to the whole Changning District and assuming that Hongqiao is a representative of the district, the total carbon emission in Changning district could be reduced by 147 and 248 thousand tons of CO_2 equivalent in 2015 and 2020 respectively beyond the Baseline Scenario if the mitigation measures would be adopted as recommended in the Stretch Scenario. As a result, the carbon intensity in the Stretch Scenario would be reduced by 23 percent in 2015 and 43 percent in 2020 compared to 2010 level.

Cost Benefit Analysis for Five Sub-Projects

9. Cost benefit analyses were carried out to estimate the EIRRs of five typical subprojects, based on the feasibility studies undertaken by the PMO. These subprojects cover typical types of buildings to be financed under the project in Changning district – a hotel; an office building; a hospital; a mixed use commercial building with offices, apartments, and conference halls; and a mixed-use building with a hotel, restaurants and offices.

10. The economic costs included investment cost, and additional O&M costs if any. All the costs exclude taxes and duties and financing costs. The primary economic benefits include the energy saving (mainly electricity and diesel) and associated environmental benefits from the reduction of energy consumption. Market prices are adopted to measure the economic values of both electricity and diesel.

Major Assumptions

11. The main assumptions considered in the cost benefit analysis include:

- Carbon emission factors: 0.719 ton CO_2/MWh (electricity); 3.160 ton CO_2/ton (diesel); and 2.130 ton CO_2/1,000 m3 (natural gas). The carbon emission factor for electricity is estimated based on the mix of power generation in Shanghai, and a weighted emission factor from different sources of electricity is calculated, taking into account the transmission and distribution (T&D) losses.

Carbon emission factor for electricity consumption was calculated based on the electricity supply mix in Shanghai. Taking into account the power import from other provinces, about 22.5 percent of electricity consumption in Shanghai was supplied from non-fossil fuel, and the remaining 77.5 percent was supplied from fossil fuel (coal, gas/oil). Based on the fuel type, generation efficiency, and transmission and distribution losses, the carbon emission factor for electricity consumption was calculated at 0.719 ton CO_2/MWh. Though the carbon emission factor for electricity consumption can be reduced by the increase of non-fossil fuel in the power mix over the coming years, a fixed carbon emission factor for electricity consumption was applied as the power mix in Shanghai will not change much per information provided by Shanghai Municipal Development and Reform Commission.

The carbon emission factors for diesel and gas were derived from the IPCC database.

Table A6.1. Main Characteristics of the Five Sample Investment Subprojects

No. of Subproject	1	2	3	4	5
Function of Buildings	Hospital	Hotel	Mixed-use building of hotel, restaurants and offices	Mixed-use commercial building of offices, apartments, and conference halls	Office building
Project Scope	Retrofit air-conditioning, lighting, pumps and windows; replace existing oil boilers with gas-fired distributed generation; install solar PV	Retrofit existing air-condition system; improve exterior-protected construction	Retrofit air-condition system and recover the waste heat	Retrofit air-condition and lighting systems	Retrofit air-conditioning, lighting systems; improve exterior-protected construction; install solar PV etc.
Investment	22.275 million Y	3.98 million Y	3.8 million Y	5.0 million Y	3.5 million Y
Annual Energy Saving *	Electricity: 3,219 MWh; diesel: 271 ton; gas: -585,000 m3 – total 707 tce	Electricity: 194 MWh; diesel: 60.5 ton – total 153 tce	Electricity: -112 MWh; diesel: 203 ton – total 259 tce	Electricity: 1055 MWh – total 351 tce	Electricity: 545 MWh – total 181 tce
Annual Carbon Reduction	1,925 ton CO_2	331 ton CO_2	561 ton CO_2	759 ton CO_2	392 ton CO_2
Economic Life	15-25 years	15-25 years	10 years	20 years	4-25 years
EIRR	14.7%	14.4%	33.9%	19.2%	12.4%

Note: * numbers in minus means additional energy consumption (increase).

- Externality costs and carbon price: 51,328 Yuan/ton (Total Suspended Particulates); 3,353 Yuan/ton (SO_2); 2,382 Yuan/ton (NOx); and US$ 20/ton (CO_2). The externality costs for local pollutants (TSP, SO_2, and NOx) were calculated based on a study carried out by the previous State Environment Protection Agency, and the results were converted to the 2011 level.
- Energy prices: 820 Yuan/kWh (electricity); 7,200 Yuan/ton (diesel); and 2,040 Yuan/1,000 m3 (natural gas), based on the retail prices in Shanghai in late 2011.
- Social discount rate: 12 percent.
- Exchange rate: 6.3 Yuan per US$.

Description of Sub-projects

12. The main characteristics of each sub-project are described in table A6.1. Investments in sub-projects range from 3.5 to 22.275 million Yuan (US$ 0.6-3.5 million), with all but one sub-project under US$ 1 million. The annual energy savings range from 153 to 707 tons of coal equivalent (tce), while the annual carbon reductions range from 331 to 1,925 ton CO_2e.

EIRRs Calculation

13. The analyses showed that the EIRRs for the five typical subprojects range from 12.4 percent to 33.9 percent, exceeding the 12 percent economic discount rate that is normally applied to Bank projects in China. The spreadsheet of EIRR calculation for Sub-project 1 is given in table A6.2, and the spreadsheets for other sub-projects are omitted in this PAD.

Table A6.2. EIRR Calculation of Sample Investment Sub-project (a hospital)

Year	Cost (million Y)			Benefit (million Y)			Net Benefit
	Investment	O&M Cost	Subtotal	Energy Saving	Environmental Benefits	Subtotal	
2013	22.28		22.28				-22.28
2014		0.18	0.18	3.40	0.33	3.73	3.55
2015		0.18	0.18	3.40	0.33	3.73	3.55
2016		0.18	0.18	3.40	0.33	3.73	3.55
2017		0.18	0.18	3.40	0.33	3.73	3.55
2018		0.18	0.18	3.40	0.33	3.73	3.55
2019		0.18	0.18	3.40	0.33	3.73	3.55
2020		0.18	0.18	3.40	0.33	3.73	3.55
2021		0.18	0.18	3.40	0.33	3.73	3.55
2022		0.18	0.18	3.21	0.31	3.52	3.34
2023		0.18	0.18	3.21	0.31	3.52	3.34
2024		0.18	0.18	3.21	0.31	3.52	3.34
2025		0.18	0.18	3.21	0.31	3.52	3.34
2026		0.18	0.18	3.21	0.31	3.52	3.34
2027		0.18	0.18	3.21	0.31	3.52	3.34
2028		0.18	0.18	3.21	0.31	3.52	3.34
2029		0.15	0.15	2.26	0.33	2.58	2.43
2030		0.15	0.15	2.26	0.33	2.58	2.43
2031		0.15	0.15	2.26	0.33	2.58	2.43
2032		0.15	0.15	2.26	0.33	2.58	2.43
2033		0.15	0.15	2.26	0.33	2.58	2.43
2034		0.04	0.04	1.79	0.26	2.05	2.01
2035		0.04	0.04	1.79	0.26	2.05	2.01
2036		0.04	0.04	1.79	0.26	2.05	2.01
2037		0.04	0.04	1.79	0.26	2.05	2.01
2038		0.04	0.04	1.79	0.26	2.05	2.01
NPV@12%			21.1	25.0	2.5	27.5	3.5
EIRR							**14.7%**

Financial Analysis

14. The financial analyses were carried out for the five typical subprojects as well. All the sub-projects will be financed by IBRD loans, loans from the PFIs, and equity investments from sub-borrowers. FIRRs and payback periods were calculated in the cases of with and without government subsidies[7].

15. The results showed that the FIRRs range from 10.1 percent to 31.9 percent and the payback periods of four sub-projects range from 5.8 to 6.7 years, beyond the normal range of 3-5 years that is attractive for investors. When the government subsidy is considered, the FIRRs

[7] Shanghai municipal government has issued a decree to provide subsidies for the retrofit of existing buildings. Changning district government also plans to provide additional subsidies to the eligible building retrofit projects.

increase to 14.4-38.3 percent, and the payback periods of all five sub-projects are less than 5 years, ranging 2.1 to 4.8 years. The results are summarized in table A6.3. The spreadsheet for subproject 1 (a hospital) is given in table A6.4, and the spreadsheets for other subproject are omitted in this PAD.

Table A6.3. Summary of Financial Analysis of the Five Sample Investment Subprojects

No. of subproject	1	2	3	4	5
FIRR - without subsidy	13.0%	13.0%	31.9%	16.5%	10.1%
- - with subsidy	17.3%	23.7%	38.3%	20.2%	14.4%
Payback period – without subsidy	6.6	6.7	2.6	5.8	5.9
- - with subsidy	4.8	3.5	2.1	4.6	4.7

Table A6.4. Financial of Sample Investment Project (a hospital)

Year	Cost (million Y)			Benefit (million Y)			Net Benefit	
	Investment	O&M Cost	Subtotal	Energy Saving	Government Subsidy	Subtotal	Without subsidy	With subsidy
2013	22.28		22.28				-22.28	-22.28
2014		0.18	0.18	3.40	5.84	9.23	3.22	9.06
2015		0.18	0.18	3.40		3.40	3.22	3.22
2016		0.18	0.18	3.40		3.40	3.22	3.22
2017		0.18	0.18	3.40		3.40	3.22	3.22
2018		0.18	0.18	3.40		3.40	3.22	3.22
2019		0.18	0.18	3.40		3.40	3.22	3.22
2020		0.18	0.18	3.40		3.40	3.22	3.22
2021		0.18	0.18	3.40		3.40	3.22	3.22
2022		0.18	0.18	3.21		3.21	3.04	3.04
2023		0.18	0.18	3.21		3.21	3.04	3.04
2024		0.18	0.18	3.21		3.21	3.04	3.04
2025		0.18	0.18	3.21		3.21	3.04	3.04
2026		0.18	0.18	3.21		3.21	3.04	3.04
2027		0.18	0.18	3.21		3.21	3.04	3.04
2028		0.18	0.18	3.21		3.21	3.04	3.04
2029		0.15	0.15	2.26		2.26	2.10	2.10
2030		0.15	0.15	2.26		2.26	2.10	2.10
2031		0.15	0.15	2.26		2.26	2.10	2.10
2032		0.15	0.15	2.26		2.26	2.10	2.10
2033		0.15	0.15	2.26		2.26	2.10	2.10
2034		0.04	0.04	1.79		1.79	1.75	1.75
2035		0.04	0.04	1.79		1.79	1.75	1.75
2036		0.04	0.04	1.79		1.79	1.75	1.75
2037		0.04	0.04	1.79		1.79	1.75	1.75
2038		0.04	0.04	1.79		1.79	1.75	1.75

FIRR	- without subsidy	**13.0%**	
	- with subsidy	**17.6%**	
PBP	- without subsidy	**6.6**	years
	- with subsidy	**4.8**	

Note: PBP is payback period.

Financial Sector Assessment of Participating Banks

Shanghai Pudong Development Bank

Introduction

16. Shanghai Pudong Development Bank (SPD Bank) was established in 1993 in Shanghai and in a relatively short period has become one of the most successful private sector banks in China. The bank initially focused on the business market but later expanded into the retail and SME markets. The bank is now the seventh largest bank in the country. At the end of 2011 the bank had assets of RMB 2,685 billion and recorded a profit for the year of RMB 27.3billion which represented an increase of 42 percent on the previous year. The bank has 741 outlets around the country and more than 30,000 employees. The bank was the first commercial bank to be listed on the stock exchange in 1999.

Key Financial Data	based on year-end audited financial statements		
RMB billions	**31.12. 2011**	**31.12.2010**	**31.12.2009**
Total Assets	2,685	2,191	1,623
Loan Portfolio	1,302	1,124	911
Deposits	1,851	1,640	1,295
Shareholders' Funds	150	123	68
Net Income after tax	27.3	19.2	13.2
ROA	1.02%	0.88%	0.81%
ROE	20.07%	23.27%	25.86%

Ownership

17. The ten largest shareholders of the bank own 51.8 percent of the shares of the bank. The three largest which own more than 40 percent of the bank are all state owned and affiliated. The largest shareholder in the bank is Shanghai International. Mr. Ji Xiaohui is Chairman of the Board of the bank. He has extensive experience in government and banking having previously worked at the Shanghai Municipal Government and with ICBC in Shanghai. He is also chairman of the board of Shanghai International Group Ltd which is largest shareholder in the bank.

Board and Management of the Bank

18. **Board:** The Board of SPD Bank has nineteen members. The board meets about ten times a year to review the performance of the bank and review and approve policies and plans for the future. The board is assisted in its duties by a Supervisory Board which also meets ten times a year. The Supervisory Board is responsible for reviewing in detail the financial and operational reports of the bank as well as non-performing loans, the internal audit function and issues and concerns of the external auditors.

19. **Management**: Mr. Zhu Yucheng is the President of the Bank. The President is supported

by a team of six Executive Vice Presidents and a Chief Financial Officer.

Governance, Internal Audit and Control

20. **Governance and internal control**: SPD Bank has a Board of Directors that represents the shareholders and includes some independent members with extensive financial, legal and business experience.

21. **Internal Audit**: SPD Bank has a very well established internal audit function which has been rated as the best in China on a number of occasions. The Bank has established an Internal Audit Committee which is a sub-committee of the board. This committee has seven members, three of whom are board members and four are individuals with relevant knowledge and experience. The Audit Committee meets at least twice a year. However the main reporting line for the Head of Internal Audit is to the Chairman of the Bank who receives and signs the action plan associated with all internal audit reports. The bank completes about seventy major internal audits each year. The internal audit plan for the year is prepared by the Head of Internal Audit following an evaluation of the risk framework and this plan is submitted to the Chairman and the Board Audit Committee for approval.

22. **Management reporting system**: The bank has a detailed management reporting system in place that provides information on all business aspects from the bank's on line data system. On a daily basis the banks income statement and balance sheet are available to all key management members. On a weekly basis more detailed reports are prepared and on a quarterly basis a detailed financial report is prepared for the board of directors, which highlights the performance for the period in comparison with the plan and also provides explanations for any key variances.

External Auditors

23. **External auditors**: The bank's auditors are PricewaterhouseCoopers. They were appointed in 2010 to replace Ernst and Young who had been auditors for ten years. The bank's accounts are prepared in line with IFRS standards and the audit is in line with IAS standards. The bank also prepares accounts in accordance with Chinese Accounting standards. The audit opinion is clean for 2010 and 2011.

24. **Management Letter:** Ernst and Young issued a management letter following their audit in 2009 and 2010. The 2011 management letter has not been received by SPD Bank from PricewaterhouseCoopers. The bank has a detailed process for dealing with the findings of the management letter which includes presenting the letter and findings to the Executive Board and the Supervisory Board. Ernst and Young issued a management letter following the completion of the 2010 audit. The issues raised were not very significant which supports the view that there is a strong focus on control and compliance within SPD Bank and that the board and management are supportive of this approach.

Capital

25. **Capital adequacy**: SPD Bank had total shareholders' funds at the end of 2011 of RMB 149 billion representing an increase of 21 percent compared to the previous year. The bank increased its capital by in excess of RMB40 billion in 2010 through a private placement of shares. At the end of 2011 the bank's CAR was 11.83 percent, which is well above the minimum requirement of 8 percent and its tier one capital was 9.17 percent which was also well above the minimum requirement of 4 percent. As a result of its strong capital position SPD Bank does not have any plans to raise additional capital in the near term. The bank prepares a three year and five year plan which includes future capital requirements.

Credit and Risk			
	2011	**2010**	**2009**
Assets RMB Bn.	2,685	2,191	1,623
Loans RMB Bn.	1,302	1,124	911
Loan Growth	15.8%	23.4%	33.1%

26. **Movement in loan portfolio**: The bank's loan portfolio increased by 15.8 percent in 2011 and by 23.4 percent in 2010 which represents solid growth. The bank is expecting to grow its portfolio in 2012 by a further 14 percent. Based on the results for the first three months of 2012 the bank is on track to achieve the planned 2012 target. Total loans in this period increased by 4.4 percent. The bank has traditionally had a strong focus on middle sized companies and SME sectors which together with the corporate sector account for 80% of the overall portfolio. The bank has been growing its consumer business especially mortgages and credit cards in recent years and they now make up 20 percent of total lending compared to 17 percent in 2009. The bank has a very strong presence in the manufacturing sector which accounted for 23 percent of the portfolio at the end of 2011. This sector has been under some pressure over the past three years especially due to the downturn in the international demand for some of its products. However SPD Bank is monitoring its customers carefully and to date they have not seen any significant upturn in arrears or late payment from these customers. The bank also has about 14 percent of its portfolio in the real estate and construction sectors where the bank has been active in the financing of commercial and residential developments. This sector continues to perform reasonably well but could develop some signs of strain should the slowdown in the international economy continue. The bank is actively monitoring its real estate exposures and in the first quarter of this year the Supervisory Board carried out a detailed review of this sector. The level of GDP growth in China is still expected to be around 8 percent in 2012 which is good by international standards but significantly down on the double digit growth recorded in the years leading up to 2008. If the economy continues to slow over the next few years and international demand continues to decline, while costs increase in China, this could result in a significant upturn in non-performing loans especially in real estate and construction and also in the manufacturing sector for Chinese banks, including SPD Bank. The bank is also active in lending to the wholesale and retail sectors of the economy as well as the transportation sector, mining industry and energy sector.

27. **SME and Consumer Portfolios:** The bank is actively building its presence in the SME sector. Total SME lending increased by 31 percent in 2011 and accounted for about 15 percent of the portfolio at the year end. SPD Bank has built up a good presence in the SME and mid-sized companies market since the bank was established in 1993. In addition the bank has been

successfully building its presence in the consumer market through its mortgage lending and its credit card business.

28. **Non-performing loans**: The bank has a very low level of non- performing loans. Non-performing loans at the end of 2011 amounted to 0.44 percent which was lower than the 2010 level of 0.51 percent.

	2011	**2010**	**2009**
Problem Loans RMB Bn.	5.827	5.879	7.460
NPL %	0.44%	0.51%	0.80%
NPL Coverage	499%	380%	245%
Provisions/Total Loans	2.19%	1.95%	1.98%

29. The bank has a strong system in place for dealing with problem loans which are generally classified as loans that fail to meet a repayment on the due date. Any such loans have to be transferred to the Special Asset Department at Head Office. SPD Bank has a strong focus on asset quality and the board and management place a strong emphasis on the need to maintain a good quality portfolio. However it will be difficult for SPD Bank to maintain its non-performing loans at the 2011 level especially if the economy continues to slow and international demand does not pick up. The bank is already anticipating some deterioration and has been building up their provisions against losses. SPD Bank has a well-diversified credit portfolio with only 2.5 percent of its portfolio concentrated with its ten largest borrowers.

30. **Credit and risk process:** The bank has a well-developed credit and risk process with a clear division of responsibility between the originator of the loan application and the assessment and approval process. The Relationship Manager is responsible for putting together the loan application and this together with all the necessary supporting information is sent to the Risk Management Department who are responsible for reviewing the application in detail and arranging the necessary approval if it is an acceptable application. The approval process for all loans is carried out by a minimum of two credit officers acting jointly.

31. **Related Party Lending:** SPD Bank has limited activity in this area with some deposits and loans with businesses connected to shareholders or directors. The total outstanding on these deposits at the end of 2010 was RMB 2.8 billion which is less than 0.2 percent of the banks overall deposits portfolio. Loans outstanding amounted to RMB 230 million which is insignificant in the context of the bank's loan portfolio

Liquidity Ratios	**31.12.11**	**31.12.10**	**31.12.09**
Loans/Deposits RMB	71.5%	69.8%	71.6%
Loans/Deposits FX	74.9%	78.2%	56.3%
Liquity Ratio RMB	42.8%	40.3%	48.7%
Liquidity Ratio FX	68.1%	54.5%	55.3%

32. **Movement in deposits:** Total deposits at SPD Bank increased by 13 percent during 2011 and by 26 percent in 2010. In the past the bank has been heavily reliant on the corporate sector for its deposits. However the bank has been growing its individual deposit base at a faster pace

than corporate deposits over the past three years. As a result, at the end of 2011, 34 percent of the bank's deposits are from individuals, compared to 27 percent at the end of 2009. While the banks deposit base has been growing it has not been at a sufficient pace to fund the overall business growth and as a result the bank has become more heavily reliant on deposits and borrowings from banks over the past three years. The bank needs to address this issue so that the bank does not become reliant on such funds to grow its business going into the future. The bank does not have a heavy concentration of its deposits with a small group of customers. In 2011 the ten largest deposit customers accounted for 7 percent of all deposits, which was even lower than the 7.3 percent in 2010.

33. **Liquidity:** The bank maintains a solid level of liquidity with a liquidity ratio of 43 percent in RMB at the end of 2011 which is higher than the 2010 level and considerably in excess of the CBRC requirement of a minimum of 25 percent. The bank had an FX liquidity ratio of 68 percent at the end of 2011 which again exceeds the CBRC requirement of 60 percent. The bank is primarily an RMB bank as about 97 percent of its business is in RMB with the balance primarily in US$.

34. **ALCO:** SPD Bank operates a detailed ALCO process and has an ALCO Committee in place which is chaired by the President of the Bank. The Committee has representatives from all the key areas of the business. The Committee meets on a quarterly basis and more frequently when necessary. At their meetings the Committee focuses on i) performance on the bank , ii) asset and liability allocation strategies, iii) net interest income, iv) liquidity risk, v) interest rate risk, and vi) business and investment plan implementation.

Profitability and Earnings

35. **Profitability:** SPD Bank recorded a profit of RMB 27.4 billion in 2011 which is an increase of 42 percent on the 2010 profit of RMB 19,177 billion. The increase in profitability was due to an increase of 36 percent in net interest income which is the result of the strong growth in business over the past two years. Fees and commission income also increased by 66 percent. Bad debt provisions increased by 64 percent to RMB 7.5 billion. This increase was due primarily to the bank building up its provision levels towards the 2.5 percent target which the CBRC has set down to be achieved by 2014. SPD Bank achieved a level of 2.19 percent at the end of 2011 which is at the start of the three year period and as a result is five times the level required based on the classification of the loan portfolio. Overall 2011 was another very good year for SPD Bank. The bank recorded an ROE of 20 percent which was lower than the 2010 level primarily due to the major capital increase which was carried out in 2010. ROA for 2011 was 1 percent which is an increase compared to both 2010 and 2009. The bank has also an ambitious plan for 2012 which aims to increase profits by 17 percent, loans by 14 percent and deposits by 12 percent. In the first quarter of 2012 the bank continued to improve its performance with assets increasing by 4.5 percent, the loan portfolio by 4.3 percent and deposits by 3.2 percent. The bank recorded a profit of RMB 8.2 billion in the first three months of 2012 which is well in excess of the plan for the period.

36. **Cost Structure and Efficiency:** The bank is operating at a high level of efficiency. The cost income ratio in 2011 was 29 percent which is a further improvement on the previous year's

strong level of 33 percent.

37. **Conclusion and Recommendation:**

- SPD Bank is a well-managed bank that has successfully grown its business and profitability and has put in place a large network in the nineteen years since it was established. The bank is one of the leading private sector banks in China, the seventh largest bank in the country and amongst the largest of the private sector banks.

- The bank has a strong ROE and ROA and a good level of liquidity as well as a good management team who has a clear understanding of the bank and its strategic direction. The major area of uncertainty relates to the downturn in the Chinese economy and the global recession and the impact this may have on China. However the bank continues to perform well in 2012, is well capitalized, and has one of the best quality loan portfolios in Chinese banks.

- Overall SPD Bank seems to be a well-managed bank, with its financial results prepared and audited to IFRS standards. The bank is profitable, well capitalized, highly efficient and appears to have a reasonable quality loan portfolio based on the information provided at the end of 2011. The performance of the bank in the first quarter of 2012 continues to improve on the 2011 result and the bank is projecting to produce record results for 2012. SPD bank has been making solid progress across all areas of its business in recent years and clearly recognizes the challenges of the future. The bank should have the ability to disburse and manage loans under this project as well as to achieve repayment of these loans. The bank meets all the selection criteria for participating banks.

Bank of Shanghai

Introduction

38. Bank of Shanghai was established in 1995 and in a relatively short period has established itself as one of the leading banks in the Shanghai area. The bank brought together a number of municipal financial institutions which helped to provide Bank of Shanghai with a limited business base at the outset. The bank started with a clear focus on the SME and retail sectors particularly in the Shanghai area where it had its main presence. In 2005 the bank established its first branch in the south of the country and now has eight branches and a number of sub branches in other key areas of the country. However the bank still remains a predominantly Shanghai focused bank and about two third of its business is still in this area. Bank of Shanghai has nearly half its portfolio in the SME sector which has been a key focus from the outset. At the end of 2011 the bank had assets of RMB 655 billion and recorded a profit for the year of RMB 5.8 billion which represents an increase of 16 percent on the previous year. The bank has 240 outlets with a strong focus on Shanghai and the coastal area and more than 9,000 employees. The bank has over 40,000 shareholders with the state as the majority shareholder and is not listed on any stock exchange. Bank of Shanghai carries out most of its business in RMB and has a well-diversified loan portfolio of loans and deposits and is not heavily reliant on any particular groups

or individuals.

Key Financial Data	based on year-end audited financial statements		
RMB billions	**31.12. 2011**	**31.12.2010**	**31.12.2009**
Total Assets	655	567	466
Loan Portfolio	307	282	221
Deposits	471	413	348
Shareholders' Funds	35	29	22
Net Income after tax	5.8	5.0	3.6
ROA	0.95%	0.97%	0.87%
ROE	17.9%	19.6%	18.01%

Ownership

39. The ten largest shareholders of the bank own 49.36 percent of the shares of the bank. Eight of these are state owned entities and the only exceptions are HSBC which has been a shareholder of the bank since 2001 and Shanghai Commercial Bank which is a Hong Kong SAR, China based bank with strong links to Taiwan, China. The total state owned shareholding in the bank was 54.2 percent at the end of 2011. Mr. Fan Yifei is Chairman of the Board of the bank.

Board and Management of the Bank

40. **Board:** The Board of Bank of Shanghai has fifteen members. Eight of these represent the major shareholders in the bank, six are independent board members and the President of the Bank is also a board member. The board meets on at least four occasions every year. In 2011 the board held nine meetings. At these meetings the board reviews the performance of the bank and approves policies and plans for the future. The board has a particular focus on the strategic direction of the bank and there is a clear segregation of functions between the board and management with the latter responsible for the day to day management and control of the business. The Board is assisted in the performance of its duties by five sub committees and by a Supervisory Board which meets at least four times a year. The Supervisory Board is responsible for reviewing in detail the financial and operational reports of the bank as well as non-performing loans, the internal audit function and issues and concerns of the external auditors.

41. **Management:** Mr. Jin Yu was appointed as President of the Bank in July 2011 following the resignation of the previous President. He is also the Vice Chairman of the Board of the Bank. Mr Yu is assisted in his role by a team of five Vice Presidents who are responsible for corporate banking which includes SME banking, risk management, finance, information technology and support services. Bank of Shanghai appears to have an experienced management team in place which has a good understanding of the strengths and weaknesses in its business and with a clear understanding of the direction and focus for the future development of the bank.

Governance, Internal Audit and Control

42. **Governance and internal control**: Bank of Shanghai has a Board of Directors that

represents the main shareholders and includes some independent members with extensive financial, legal and business experience. The board functions as a group in carrying out its duties and the members have a broad range of business experience which is important and of considerable value to the bank. The board is heavily reliant on the internal audit function as well as the Supervisory Board to be in a position to confirm that the management of the bank is carrying out its functions in line with the approved procedures and the various legal and regulatory requirements in China.

43. **Internal Audit**: Bank of Shanghai has a strong internal audit function with a staff of more than 70 internal auditors located in headquarter and local branches of the bank. The Audit function reports to the Internal Audit Committee which is a subcommittee of the board with five directors of the bank as its members. Three of these are independent directors and two others are from the group that represents specific shareholders. The committee meets on at least two occasions each year and more often as required. The Audit Committee held three meetings in 2011. At these meetings they reviewed the internal audit work which had been completed as well as reviewed and approved the audit plan for the year. The most important reporting line for the Head of Audit is to the Chairman of the Bank who receives copies of each audit report and is responsible for approving the action plan associated with each of these audits. In addition the Chairman of the Board of Supervisors and the President of the Bank receive a copy of each audit report. The bank completed about 40 internal audits in the first half of the year and expected to complete another 24 in the remaining months of 2012. The Internal Audit Association of Shanghai rated the Bank of Shanghai internal audit function as the most outstanding for the period 2008 to 2010.

44. **Management reporting system**: The bank has a detailed management reporting system in place that provides information on all business aspects using the bank's on line data system. A daily report is prepared which includes an income statement and balance sheet as well as information on loans, deposits and branches. In addition information is provided daily to key executives on loan and deposit interest rates as well as RMB exchange rates. On a monthly and quarterly basis more detailed reports are prepared on the different aspects of the business including a detailed financial report for the board of directors which highlights the performance for the period in comparison with the plan.

45. **Conclusion and Recommendation:**

- Bank of Shanghai is a well-managed bank which has successfully grown its business and profitability since it was set up in Shanghai in 1995. The bank had its origins in municipal finance organizations and has always had strong links to municipalities. From the outset the bank focused strongly on SME finance and as a result has become one of the most successful banks in that sector particularly in the Shanghai area. The bank has now expanded into other key parts of the country but it is still somewhat limited in terms of distribution in comparison to some of the other national banks. The bank is the fourth largest bank in Shanghai and has a larger market share than SPD Bank in the Shanghai area.

- The bank has a strong ROE and ROA and a good level of liquidity as well as a good management team who have a clear understanding of the bank and its strategic direction. The major area of uncertainty relates to the downturn in the Chinese economy and the global recession and the impact it may have on China. However the bank continues to perform well in 2012, is well capitalized, and has one of the best quality loan portfolios in Chinese banks.

- Overall Bank of Shanghai seems to be a well-managed bank, with financial results prepared and audited to IFRS standards. The bank is profitable, well capitalized, efficient and appears to have a reasonable quality loan portfolio based on the information provided at the end of 2011. The performance of the bank in the first half of 2012 continues to improve on the 2011 result. Bank of Shanghai has a very strong focus and position in the SME sector and is conscious of the challenges it is likely to face in the years ahead. The bank is also focusing on the energy sector and considers green energy as an area where it can further develop its SME business. The bank should have the ability to disburse and manage loans under the proposed project as well as to achieve repayment of these loans. The bank meets all the selection criteria for participating banks.

Annex 7: Incremental Cost Analysis

National Development and Global Environment Context

1. The Government of China (GoC) has 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 and carbon intensity by 16 and 17 percent respectively 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.

2. 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 continue to increase rapidly. It is estimated that over the next two decades energy demand and related CO_2 emissions of buildings and appliances would triple and those of transport would more than quadruple as the vehicle fleet would increase 10-fold. The speed and scale of urbanization provides an unprecedented opportunity in the coming years to invest in clean energy technologies to contain carbon emissions related to energy supply and consumption 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 avoid locking cities into a high-carbon growth path for decades to come. *Time is of essence.*

3. Cities are at the core of the action plan to achieve the government's carbon intensity reduction target. They contribute 85 percent of China's commercial energy use. CO_2 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 Development and Reform Commission (NDRC) has recently given high priority to lowering carbon emissions in cities to achieve the government's carbon intensity reduction target.

4. Shanghai municipal and Changning district governments are firmly committed to the transition to a low-carbon city, and achieving carbon intensity and energy intensity reduction targets is one of the highest priorities in their 12th Five-Year Plan (FYP). Shanghai municipal government set ambitious targets a reduction in carbon intensity and energy intensity by 19 and 18 percent respectively, and a cap on total energy consumption during the 12th FYP period. Changning district government targets a reduction in energy intensity by 17 percent, and a cap on total energy consumption at the end of the 12th FYP, which would cut the annual growth of total energy consumption by half compared to the current levels. Shanghai is also part of the pilot carbon cap and trade scheme under NDRC's pilot program in five cities and two provinces. In particular, the Changning District government presented an articulated vision of 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.

Main Barriers to Low Carbon City Implementation in Shanghai

5. Many municipal governments in China have begun to develop eco-cities or low-carbon cities on their own or together with international partners. However, the concept of a low-carbon city is still not clearly defined, and the cities' low- carbon goals and investment programs are usually determined without analytical underpinning.

6. In addition, most of the GEF-supported low-carbon projects worldwide in the past focused on only one sector (energy or transport), or on one segment in the energy sector—either energy efficiency or renewable energy. However, the abatement cost curves and scenarios developed as part of the upstream AAA work for this project demonstrated that achieving low-carbon objectives at a city level requires a holistic multi-sector approach to integrate clean energy on both demand and supply sides as well as green mobility.

7. Since the abatement cost curves and scenarios identified that retrofitting existing commercial buildings offers by far the largest emission reduction opportunity in Changning district, this project is designed to focus on building retrofit. However, scale-up of building retrofit investments faces the following market barriers:

- ***Reluctance of the building owners to retrofit***: The single largest barrier to retrofitting 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 and usually passed through to the tenants; (b) building retrofit investments usually have long payback period; and (c) owners do not want to interrupt commercial operation of the buildings for retrofit.
- ***Lack of mandatory policies:*** Currently, there is no mandatory policy requirement for building retrofit in China. Chinese building codes, which currently apply to new buildings only, need substantial improvements, as they are not directly linked with energy saving and emission reduction targets.
- ***Lack of sufficient financial incentives:*** Building EE projects usually have long payback period, particularly investments to retrofit the building envelop (e.g. roof, walls, windows, and doors), which typically have a payback period of more than 10 years. Most private sector investors are not willing to make an investment beyond a 3-5 years payback period. The financial incentives that are currently offered by the national and municipal governments are insufficient to motivate building owners, developers and property management companies to invest in buildings on a large scale.
- ***Lack of viable business models***: A lack of viable business models also prevents large-scale market uptake of building EE retrofit. First, building EE projects typically face the split incentive barrier -- the investors in EE measures and the beneficiaries of energy savings are usually not aligned, for example, tenants typically pay energy bills so owners have little or no incentive to spend on EE investments. Therefore, it is critical to understand the intricate relationships among building owners, property management companies, renters, and ESCOs, so that policies and financing mechanisms will be targeted to the right groups. Second, individual building EE investment tends to be quite small and dispersed, typically around US$500,000 or smaller, so bundling these small deals are important to reduce transaction costs for financing. Therefore, it is critical to

develop viable business models to identify the potential interested investors and find ways to bundle small-scale building EE projects.

- ***Lack of access to financing***: The financial institutions are usually reluctant to finance building EE investments, because of the small size of the deal, high transaction costs, high credit risks of ESCOs who normally have a weak balance sheet, and high perceived technical risks that the projected energy savings may not be realized.
- ***Performance risk***: Consumer behavior and management of the energy systems are two important factors that influence the actual energy savings of building EE projects, so its projected energy savings may not be fully achieved.

8. The primary barrier to investment in near-zero emission (NZE) buildings is the high incremental cost, which results in payback periods of more than 20 years. NZE buildings also face the classic split incentive barrier—investors/developers bear the high incremental costs, while the renters enjoy the energy saving benefits. There is also a lack of demonstrated technical, financial, and commercial feasibility of these advanced building designs.

9. Low-carbon distributed generation for urban applications can provide significant energy savings and emission reduction potential through renewable energy generation; co-generation of power and heat; and conversion from oil-fired to gas-fired boilers. However, the major barrier to distributed generation in China is that it does not have access to the grid. The solution to this problem is closely linked with envisaged power sector reforms that might materialize during project implementation. This project is unlikely to address this sectoral issue. The Second Phase of the China Renewable Energy Scale-Up Program intends to tackle this issue through policy dialogues and studies at the national level. However, the district government has invited the Shanghai Municipal Grid Company to be part of the project and possibly pilot grid access for some developers and/or pilot innovative solutions such as wheeling and net metering to address this issue. In case the sector issues are not addressed, this pilot project will be designed to produce power from distributed generation for buildings' own consumption to avoid exporting power to the grid.

10. Lack of integration and connection between various modes of urban transport is one the most significant barriers to high ridership of public transport systems in Changning district. This barrier is most evidenced by the "last mile" problem, where there is a 1-2 km gap between the metro station and most office buildings in the zone. In addition, there is often not a convenient means or pathway for traveling this final distance. This barrier is a key bottleneck that prevents more people from taking metro.

Baseline Scenario

11. Despite the government's strong commitment, achieving the government's ambitious energy intensity and carbon intensity reduction targets is very challenging, due to the barriers described above. Without the proposed project, it is expected that Shanghai and the Changning district will continue with incremental progress on building energy efficiency, such as the implementation of the increased new building code to require a 65 percent savings relative to the 1980s baseline. However, given the barriers described in the section above, slow progress is expected in achieving energy efficient retrofits of existing buildings, especially without new policies. For example, the district government plans to retrofit 5 buildings this year as

demonstrations, primarily with traditional command and control approaches—demonstrations with government budget. It appears unlikely that the barriers to building retrofits will be effectively addressed or that the expected 160 buildings (each with more than 20,000 m^2 floor areas) to be retrofitted in the district would be achieved any time soon.

12. New low-emission buildings beyond the municipal building codes and near zero-emission buildings are unlikely to see implementation without the policy push and financial incentives that this project proposes. Similarly, demonstrations of low-carbon energy supply investments with distributed generation centers from renewable energy technologies are unlikely to be implemented without technical assistance made available under the GEF support.

13. A study was recently launched to develop an integrated green transport design for demonstration in Changning district. The integrated design includes (a) improvements in infrastructure and services for non-motorized modes such as pedestrians and bicycles; and (b) planning and evaluation of options for solving the "last mile" problem between the local subway stops and the central business district, possibly with electric-powered buses. However, without GEF funding, it is unlikely that any follow-up activities to this study will be implemented.

GEF Alternative and Barrier Removal Activities

14. The proposed project will remove the barriers identified above through targeted technical assistance activities and an incremental cost investment in a pilot near-zero emission building. The details are described in table A7.1

Table A7.1: Effects and Outcomes of Barrier Removal Activities

Project Components and Activities	*Barrier Removal Effects and Outcomes*
Component 1: Green Energy Buildings **1.1 Building Retrofits**	Addresses barriers to building retrofit described above
Building retrofit policies TA to: Develop performance-based building benchmarks and mandatory policies for retrofitting inefficient buildings. The TA design builds upon the Bank report, "Policy Frameworks and Business Models for Building Retrofit in Changning District, Shanghai," which provided preliminary recommendations for performance-based benchmarking in kWh/m^2 as a the metric to be used for mandating building retrofit as well as for labeling buildings. It also proposed additional financial incentives to be piloted by the District Government.	Addresses barriers to building retrofit (No.1-3) through the design and analysis of specific policies that need further research, including: • Developing minimum building-level energy performance benchmarks for the key commercial and public building categories and sub-categories; • Calculating the economic and financial impacts of the proposed building benchmarks; • Recommending mandatory and incentive policies for those buildings above the minimum benchmarks to retrofit; • Undertaking stakeholder consultations; • Estimating the additional financial incentive levels needed to bring the payback period or FIRR to acceptable levels (e.g. 3-5 year payback). • Developing policy recommendations that are practical and implementable, and distinguish between national, municipal, and district government's authority, and link to the total energy consumption cap at municipal and district levels during the 12th FYP. The outcome will be a comprehensive approach to developing the mandatory and incentive policies for energy efficiency retrofit of commercial buildings that balances the shared responsibilities of government and building owners and managers to achieve the 12th FYP targets for energy efficiency. This comprehensive policy framework is an enabling factor for the development of a pipeline of financeable projects.
Business models and financing mechanisms for building retrofit TA to: Implement market-based mechanisms/business models and financing mechanisms to retrofit existing buildings at a large scale. The TA design builds upon the Bank report, "Policy Frameworks and Business Models for Building Retrofit in Changning District, Shanghai," which identified four preliminary business models to bundle small-scale projects.	Addresses barriers to building retrofit (No. 4-5) through: • Identifying potential investors, viable business models to bundle building EE projects, and modus operandi to minimize interruption of commercial operation when retrofitting buildings. • Developing guarantee mechanisms to mitigate risks for commercial banks to lend SMEs for building retrofit. The outcome will be increased access to financing and more bankable projects.

Support on-line energy monitoring platform Assistance to: set up a monitoring, reporting and verification (MRV) system for energy consumption in buildings in Changning district.	Addresses barrier No. 6 by supporting the expansion of the on-line energy saving monitoring platform to the 160 energy-intensive buildings in Changning district. The outcome will be on-line M&V of energy savings in all the major buildings in Changning.
Energy audit, diagnostic and feasibility studies TA to undertake energy audits and diagnostic and feasibility studies on low-carbon investments in building retrofit.	Addresses barrier No. 1 by supporting investors to undertake energy audits and feasibility studies to identify EE/RE investments in building retrofit, and examining the recommendations. The outcome will be a development of a pipeline of building retrofit investments, and inform the potential investors of energy saving opportunities.
1.2 New Buildings	
Cost-share sub-grants for a pilot near zero-emission building: Assistance to Channing district to: a) Support technical design to integrate new EE and RE technologies into the pilot near zero emission building; b) Develop a market image or brand name to attract suppliers, buyers, users, etc. c) Share incremental costs of the pilot near zero-emission building.	Addresses barriers to near zero-emission buildings by • Identifying most cost-effective near zero-emission building designs; • Promoting and marketing a near zero-emission building; • Lowering the incremental cost (including EE, RE, and smart meters) of a pilot near-zero emission building in Changning. The intended outcome is (a) the design for a pilot near-zero emission building; and (b) demonstrated technical and economic feasibility of a pilot near-zero emission building.
Policy and finance mechanisms for near zero emission buildings: TA to Channing district to identify policies needed for high energy savings and near-zero emission buildings.	To ensure sustainability and replication of the pilot near zero-emission building by developing policies that balance the responsibilities of government and building developers regarding energy efficiency targets for new buildings. The intended outcome is that the policies will stimulate investment in low-emission and near-zero emission buildings in Shanghai.
COMPONENT 2: LOW-CARBON ENERGY MIX	
Design low-carbon distributed generation demonstration TA to Channing district to provide support for technical design of distributed generation demonstrations using renewable energy and combined production of power and heating.	Addresses barrier to distributed generation by supporting technical design of distributed generation demonstrations to reduce the carbon intensity of electricity. The outcome will be successful distributed generation demonstrations for future replication.
TA for pilot carbon cap and trade Assistance to Channing district to pilot carbon cap and trade. Shanghai has already been selected by NDRC to pilot carbon cap and trade.	Explore innovative mechanisms to achieve the carbon emission target cost effectively. The project will provide TA to Changning district and Shanghai municipality to pilot carbon cap and trade among energy-intensive buildings under the Shanghai carbon cap and trade framework. The outcome for Changning district would be the pilot of a carbon cap and trade scheme to cost effectively achieve the carbon emission reduction target.
COMPONENT 3: GREEN MOBILITY	

TA on the feasibility of connecting public transport modes for the "last mile" Assistance to Channing district to increase subway ridership through designing and developing implementation plans for public transport routes/systems to connect metro and commercial buildings for the "last mile".	Addresses barrier to green transport by improving the integration between the local metro station and commercial buildings. The outcome will be an increased share of citizens taking the metro by providing better integrated bus-subway services.
TA on the design to improve non-motorized system Assistance to Channing district to improve new pedestrian walkways and bicycle lanes.	Addresses Barrier to green transport by designing improved pedestrian walkways and bicycle lanes to encourage non-motorized transportation. The outcome will be an increased share of citizens taking non-motorized transportation by providing enhanced walking corridors.
COMPONENT 4: CAPACITY BUILDING	
Support low-carbon investments TA to support developing and promoting low-carbon investments and due diligence review.	Supporting low-carbon investments by: • Identifying a pipeline of bankable projects through promotion • Assisting the PMO and PFIs in undertaking technical and environmental safeguards due diligence of low-carbon investments • Assisting the PMO in verification of energy savings The outcome will be (a) a pipeline of bankable projects; and (b) enhanced quality of low-carbon investments.
Capacity building To build capacity of the PFIs (SPD Bank and BOS), key government agencies, building owners and managers, ESCOs, and other stakeholders to ensure institutional sustainability.	Build capacity of participating banks, ESCOs, building owners, and the government officials The outcome will be increased capacity and awareness of the PFIs, key government agencies, building owners and managers, ESCOs, and other stakeholders.

15. Project management support covers the costs of maintaining the PMO and supporting the project activities. It includes coordination with the World Bank management team, managing all project activities, including overseeing the consultants and subcontractors, and coordinating with Shanghai municipal and Changning district government agencies. The PMO will be responsible for developing activity work plans in accordance with the project implementation plan, maintaining budgets and schedules and ensuring the quality of all deliverables. The PMO must manage all subcontracts, interact with various local agencies and expert groups, and provide office and administrative support and coordination. The PMO is also responsible for supervising environmental and social safeguard of the project, and other fiduciary due diligence.

Incremental Costs and Global Environmental Benefits

16. The incremental costs of the GEF alternative includes (a) all the technical assistance activities; (b) the investment in the incremental cost of a pilot near-zero emission building; (c) the costs of administrative and technical support to project management, monitoring, and evaluation; and (d) low-carbon investments. The total estimated incremental cost is US$256 million, of which proposed GEF financing is $4.345 million. The details are presented in table A7.2.

Table A7.2: Estimated Incremental Cost and Proposed GEF Financing

Components and Activities	Incremental Costs (US$)	Proposed GEF financing (US$)
1. Green Energy Buildings	$6,660,000	$2,660,000
1.1 Building retrofits	$4,560,000	1,060,000
1.1.1 - Policies	$300,000	$300,000
1.1.2 – Financing mechanisms and business models	$60,000	$60,000
1.1.3 – On-line building energy consumption monitoring platform	$2,400,000	$400,000
1.1.4 – Energy audit and diagnostic of investment opportunities	$1,800,000	$300,000
1.2. New buildings	$2,100,000	$1,600,000
1.2.1 – Cost-shared sub-grants to pilot near zero-emission building	$2,000,000	$1,500,000
1.2.2 - Policy	$100,000	$100,000
2. Low-carbon Energy Mix	$400,000	$400,000
2.1 - TA on low-carbon distributed generation	$200,000	$200,000
2.2 - TA for increased purchase of green electricity and carbon cap and trade	$200,000	$200,000
3. Green Mobility	$900,000	$300,000
3.1 – Public transport to link the "last mile"	$500,000	$200,000
3.2 – Improvement in non-motorized mode	$400,000	$100,000
4. Capacity building	$550,000	$550,000
4.1 – Supporting low-carbon investment	$550,000	$550,000
5. Low-carbon investments	$246,000,000	0
IBRD	$100,000,000	
Co-financing from participating banks	$100,000,000	
Equity investment from project beneficiaries	$46,000,000	
PMO Operation	$1,490,000	$435,000
Total	**$256,000,000**	**$4,345,000**

17. The global environment benefits from this project will reduce GHG emissions through improving energy efficiency and increasing use of renewable energy and natural gas. Table A7.3 summarizes the cumulative energy savings and associated CO_2 emissions reductions during the project implementation period. The energy savings estimates are based on the results of the project preparation study that preliminarily identified low-carbon investments in 160 buildings including various types of major buildings in Changning district and 56 schools. Building EE projects, particularly to achieve the district government's envisaged energy saving and low-carbon target, have long payback period and high dollar per ton CO_2 reduction. The project will save over 76,000 tons of coal equivalent (tce) and reduce CO_2 emissions by over 165,000 tons annually at the end of the project. Assuming a 20-year lifetime, the

cumulative energy savings and emission reductions would be 1,500,000 tce and 3,240,000 tons of CO_2 during the lifetime of the investments.

18. Project success is expected to lead to replication throughout Shanghai municipality by replicating and scaling up the policies, business models, and financing mechanisms piloted under the project. Since the project investments focus on building EE/RE measures, the replication potential was roughly estimated based on the percentage of building floor areas of Changning compared to that in Shanghai, which would result in a cumulative energy savings and emission reductions of 21,428,000 tce and 46,285,000 tons of CO_2 during the lifetime of the investment.

Table A7.3: Energy Savings and Emission Reductions in the GEF Alternative

	Cost (M$)	Energy Savings (tce)	CO_2 Emission Reductions (ton CO_2)
Total Project	256	76,000	165,000
Building retrofit (annual)	239	71,500	154,440
New buildings (annual)	17	3,500	7,560
Cumulative over lifetime		1,500,000	3,240,000
Project replication in Shanghai municipality		21,428,000	46,285,000

19. Table A7.4 describes the main assumptions of the incremental cost calculation and summarizes the domestic and global benefits of the project relative to the baseline scenario.

Table A7.4 Incremental Cost Matrix

	Baseline	GEF Alternative	Increment
Domestic benefits	Without the project, due to the barriers described above, slow implementation of building retrofits is expected, primarily with command and control approach; limited implementation of new low-emission buildings beyond municipal building codes; and no pilot near-zero emission buildings and low-carbon distributed generation centers.	• Scaled up investments in building retrofit with market-oriented approach by commercial banks • Demonstration of new low-emission buildings beyond municipal building codes • At least one pilot near zero-emission building • New policies, business models, and financing mechanisms to remove barriers that currently hinder the implementation of building retrofits and new low-emission buildings and stimulate investments in their implementation. • Pilot low-carbon distribution generation centers.	(1) Annual energy savings of over 76,000 tce during the project implementation period, and cumulative 1,500,000 tce over the lifetime of investments. (2) Reduced annual SO_2 emissions of 200 tons and particulates of 90 tons.

		• Pilot non-motorized transport systems	
Global benefits	Without the project, due to the barriers described above, slow implementation of building retrofits is expected; limited implementation of new low-emission buildings beyond municipal building codes; and no pilot near-zero emission buildings and low-carbon distributed generation centers.	• Scaled up investments in building retrofit with market-oriented approach by commercial banks • Demonstration of new low-emission buildings beyond municipal building codes • At least one pilot near zero-emission building • Pilot low-carbon distribution generation centers. • Pilot non-motorized transport systems • Reduced/avoided GHG emissions.	Annual avoided CO_2 emissions of over 165,000 tons during the project implementation period, 3.24 million tons over the lifetime of the investments, and 46 million tons if replicated throughout the Shanghai municipality.
Amount (US$)	Total baseline cost: US$0	(1) Technical assistance: US$10 million (2) Investment: US$246 million Total Project cost: US$256 million	Incremental cost: US$256 million: (1) GEF: US$4.345 million (2) IBRD: US$100 million (3) PFIs: US$100 million (4) Equity: US$46 million (5) District government: US$5.655 million GEF Cost Breakdown (1) Technical assistance: US$2.41 million (2) Investment (incremental cost for near zero-emission building): US$1.5 million (3) Project management: US$0.435 million Total GEF cost: US$4.345 million