1. Key Development Issues and Rationale for Bank Involvement

Cities are responsible for 70% of the world’s greenhouse gas (GHG) emissions. Recent estimates suggest that China’s rapid urbanization has significant implications to climate change. Large part of urban growth is taking place in developing countries and China alone is estimated to generate 65,000 km² or 16% of all new urban area in developing countries from 2000 to 2030. Urbanization is projected to rise to about 64% by 2025, which translates to over 350 million more people living in urban area.

China recognizes that “rapid growth” has to go hand in hand with “clean growth”. China has developed the China National Climate Change Program (CNCCP) which establishes targets at the national and local level for mitigating climate change. The CNCCP explicitly calls for city-level strategies to mitigate climate change, because China’s administration is highly decentralized and cities are endowed with substantial authority in implementing key energy efficiency and pollution control measures. For this reason, Ministry of Environmental Protection (MEP) and Ministry of Housing Urban and Rural Development (MHURD) promote the construction of eco-cities—the cities that are significantly more energy efficient, less GHG emission compared to other cities. It is estimated that “eco-city” initiatives are being developed in a least a hundred cities across China. They are very diverse in terms of size and objective. In the absence of comprehensive national standards for eco-city development, cities are adopting various experimental approaches. Some of them follow MEP and MHURDs’ eco-city standards, some cities focus on the renewable energy investment and others claim themselves as “eco-
cities” or “green-cities” with provision of larger green space and landscape improvement. Some of large scale eco-city projects were put on hold due to lack of funding. As comprehensive national eco city standards still require development, it is important to carefully analyze each eco-city’s features and to help it develop its eco-city program as measure to achieve urban sustainability through rational urban planning and energy/resource efficient investments.

Tianjin, China’s third largest city (10.08 million population in 2000), is developing the Sino-Singapore Tianjin Eco-City (SSTEC) in collaboration with Singapore. The Framework Agreement was signed between Chinese and Singaporean Premiers in November 2007. SSTEC is located in the Tianjin Binhai New Area (TBNA), the power house of Tianjin’s economic and demographic growth, which has been experiencing one of the fastest growth rates in China. It is planned that 350,000 people will live in 34.2 km² SSTEC area by 2020. SSTEC has adopted the mixed land use plan to accommodate not only housings but also service-oriented and high technology/environment related industries which will create 190,000 jobs, about 80 % of the working population. As a part of its economic development plans, SSTEC is developing, in its Phase 1 area, a large scale national animation park where 12,000 people will work. The participation of several universities, media and animation companies has been already confirmed.

The Construction Commission of the Tianjin Municipal Government (TMG) and Sino-Singapore Tianjin Eco-City Administration Committee (SSTEAC) form the joint Project Management Office (PMO) for the SSTECP. SSTEAC assumes the overall responsibilities of the design and implementation of SSTEC. Physical implementation of the construction work will be conducted by Tianjin Eco-City Investment and Development Co (TECID) and Sino Singapore-Tianjin Eco-City Investment and Development Co., Ltd (SSTECID). TECID is owned by Tianjin Economic Technological Development Area Investment Holding (TEDA, owned by TMG), Banks, urban development investment companies owned by district governments and private investors. TECID’s responsibilities are: (i) purchasing land and site formation; (ii) construction of basic infrastructure; (iii) construction of public facilities such as schools and hospitals; and (iv) operation and maintenance of public infrastructure. SSTECID is a private joint venture company owned by TECID (50% capital in the form of land), Keppel Corporation (Singaporean investor 40%) and Qatar Investment Authority (10%). SSTECID’s responsibilities are: (i) development of residential and commercial real estate; and (ii) construction of some infrastructure including roads, wastewater and storm water collection system. After the construction of SSTEC, the entire infrastructure will be transferred to TECID which will provide services and maintain the assets under the supervision of SSTEAC. While TECID and SSTECID will construct key infrastructure inside SSTEC, the utility companies in Binhai New Area will construct and operate important regional infrastructure such as Metro Railway system, connecting Tangu and SSTEC, by the Binhai Mass Transit Development Co.Ltd and the water treatment and supply system outside SSTEC by local water companies.

The preliminary estimated investment cost for public infrastructure and facilities (for the whole SSTEC areas), to be constructed by TECID is estimated to be RMB 14.6 billion (US$ 2.4 billion). In addition, the construction of Metro Railway system (12 Km line) is estimated to be RMB 3 billion (US$483 million), which will be funded by the Binahai Mass Transit Development Co Ltd. Combined Heat and Power plant investment is estimated to be RMB 1.1 billion (US$ US$177 million) and to be financed by a power company. The investment cost estimate for residential and commercial real estate development by SSTEAC will be developed in a phased manner. The detailed financing plan for these investments is to be developed.

SSTEC is intended to be a model eco-city that is energy/resource efficient and low GHG emission, while it maintains economic viability and social harmony. SSTEC has many distinguished features as “eco-city”, among others: (i) selected through competitive process among four candidate cities and
obtained the strong political support from the Prime Minister office; (ii) converted non-arable salt land
into valuable economic land, without sacrificing scarce agricultural land; (iii) introduced global
experiences and knowledge through the partnership with Singapore; (iv) adopted Transit Oriented
Development (TOD) plan, integrating the transport plan and land use including proper Floor Area Ratio
(FAR) allocation which has led to high population density at about the same level as the city center of
Tianjin; (v) adopted mixed land use plan, reducing the commuting transport needs outside SSTEC; (vi)
adopted energy efficient building standard higher than the national standard and promoting renewable
energy use; (vii) plan low per capita water consumption (not exceeding 120 liter per day per capita and
high rate of water generation (exceeding 50% ) from non-conventional water sources; (viii) maintain
social harmony by providing affordable public rental houses no less than 20 % of total housing stock;
and (ix) adopted 26 quantitative and qualitative Key Performance Indicators to set the goals of SSTEC
and to monitor its progress and made them public.

SSTEC master plan has also its weaknesses and entails associated risks. Those are: (i) SSTEC’s 400m x
400m large block separated by wide roads which is typical in Chinese large cities, without further
subdivision may risk to contribute to physical disconnection between blocks and not to facilitate
pedestrians and cyclists’ move across blocks; (ii) Achieving the following KPIs would be very challenging:
(a) Green Transport Mode Share 90% by 2020; (b) Solid waste recycling rate 60% by 2013; (c) Renewable
energy use 20% by 2020. In particularly, KPI of Green Transport Mode share would be the most challenging, in light of increasing car ownership in China in the future. Furthermore,
SSTEC’s master plan focuses on urban plan, construction and technology/engineering aspects, but it
does not provide adequate explanation on non-physical aspects required for the master plan
implementation. These include; (i) what policy, regulatory and incentive measures will be adopted to
achieve the objectives of SSTEC master plan; (ii) what institutional mechanism will be developed to
operate and to maintain the infrastructure and utilities as well as to coordinate the different stakeholders
such as regional governments, SSTECAC, private sectors and residents; (iii) how SSTEC investments
will be decided and financed and what will be their impact on SSTECAC’s fiscal situation.

The Master Plan presents the overall theme of SSTEC by laying out project guidelines, planning
principles, development goals, as well as the economic and environmental goals of the project. The major
challenges for SSTECAC are to mainstream SSTEC’s concept in the downscaling and to develop
refinement process going from the overall Master Plan to the next planning and implementation stages.
For this reason, TMG and SSTECAC requested the Bank to prepare GEF Sino-Singapore Tianjin Eco-
City Project (SSTEC). The proposed SSTEC will focus on the most critical areas to implement the
SSTEC master plan, particularly its objectives related to energy/resource use efficiency. Firstly, it will
help SSTECAC to develop the policy, regulatory, institutional, financial and monitoring mechanism
which are still missing. Secondly, the project will help the development of public transport system which
is back bone for Transit Oriented Development (TDO) which integrate transport and land use. Thirdly,
the project will support the promotion of the energy efficient green building as the building sector
accounts for 80% of energy use and GHG emission in SSTEC.

The most urgent and important task is to establish enabling policy, regulatory institutional, financial and
monitoring mechanisms for SSTEC master plan implementation. In doing so, it is important to develop
sound finance management and control system at both project and municipal level. It is also critical to
establish effective institutional mechanism for coordination and collaboration among different
stakeholders such as TMG, district governments, SSTECAC, TEDA, TEIDC, SSTECID, private real
estate developers as well as households and businesses which will migrate to SSTEC area.

Transport is the fastest growing source of GHG emissions, with motorization, as the main drive,
especially in urban areas. SSTEC master plan promotes the Green Transport (public transport, walk and
bicycle). The design approach is to (i) adopt Transit-Oriented Development (TOD) plan with high density land use around the public transport network; and (ii) integrate green transport and urban facilities, making access to them easier, safer and more attractive. The immediate challenge for this sector is that the construction of Metro Railway, linking between the exiting Tangu Metro Railway station and SSTEC, which was scheduled for 2011, has been postponed. As the mass public transport system is indispensable to promote the green transport, the proposed GEF project will help SSTECAC develop the public transportation system, based on the efficient bus service system including possible BRT system as the first phase of SSTEC’s public transport system, till the Metro Line will be constructed. In terms of the green transport KPI, while 30 percent green transport mode share target by 2013 is not difficult to achieve, 90 per cent target by 2020 would be challenging, in light of the expected increase of private car ownership in China and compared to the achievement of Curitiba 70% and Tokyo 60%. In any scenario, the provision of fast, safe, reliable and affordable public transport system is the most important measure for promoting green transport.

The achievement of SSTEC energy efficiency and low GHG emission target largely depends on how well its energy efficiency strategy can be realized in buildings as building sector accounts for 80% of the energy consumption of the entire eco-city. The main approaches reflected in the Master Plan includes the application of a green building evaluation standard (GBES) and targets for energy efficiency and low GHG emission, space heating and domestic hot water services. As a result, the overall energy use in the buildings is expected to be significantly lower than comparable buildings in other Chinese cities. The main challenges to SSTEC in advancing its energy efficiency, or more generally, green agenda in buildings, lie in the development and implementation of a robust green building evaluation standard, utilization of most appropriate heating/cooling technologies (striking a balance between district heating/cooling and distributed heating/cooling) and adoption of policies and institutional arrangements which enhance and incentivize energy efficiency and conservation.

**Rationale for Bank Involvement**

The project objective is consistent with one of five pillars of the Country Partnership Strategy: managing resource scarcity and environmental challenges. This pillar supports China’s effort to meet its ambitious goals for creating a more resource-efficient, less polluting society under the 11th plan. It also supports China’s undertaking to improve energy efficiency, to expand use of renewable energy and to address climate change.

The proposed project falls in with the GEF climate change focal area. The project’s main components: (i) public transport system development and (ii) green building promotion; are consistent with the GEF strategic objective to: (1) promote energy-efficient technologies and practices in the appliance and building sectors; and (2) facilitate market transformation for sustainable mobility in urban areas leading to reduced GHG emissions. They also fall under two strategic programs: (1) promoting energy efficiency in residential and commercial buildings (strategic program 1); and (2) promoting sustainable innovative system for urban transport (strategic program 5).

The proposed project will reflect the outputs and lessons learned from the GEF-World Bank-executed Projects: China World Bank Urban Transport Partnership Program (UTPP) and Heat Reform and Building Energy Efficiency Project (HRBEE). The proposed project will reflect the lessons learned through these experiences in demonstrating green buildings and development of the green transport system. A key lesson learned from HRBEE is that regular building design review and construction inspection process are critical to achieve energy efficiency goal. The proposed GEF project will also benefit from the activities being carried out in UTPP to develop guidelines for sustainable transport system. In addition, the Bank has conducted the analysis of SSTEC and provided a set of
recommendations in its TA report. Each component of the GEF project reflects the findings of this TA in order to help SSTECAC address these recommendations in further design, construction and management of SSTEC to the extent possible. This also includes piloting the city based calculation of GHG. The proposed project will also build on the concept and methods developed under the ECO² Ecological Cities as Economic Cities Initiative, the World Bank’s new urban development business line adopted as an integral part of the World Bank’s urban strategy.

2. Proposed Project Development Objective

Project Development Objective: The objective of the project is to help SSTECAC, through the implementation of Phase 1, to develop SSTEC as energy and resource efficient and low GHG emission city. SSTECP will also provide the lessons learned from Phase 1 implementation of SSTEC to other cities in China which intend to be energy and resource efficient cities.

3. Preliminary Project Description

To achieve above mentioned objective, the project consists of the following three components. The Tianjin Construction Administration Commission and SSTECAC will jointly implement the project together with the Tianjin Eco-City Investment and Development Co., Ltd (TEIDC). The construction work (leveling and piling works and construction of some roads) of Phase 1 has been carried out since September 2008 and the construction work of the two pilot buildings will be started in May-June 2010. It is expected that the Phase 1 will be completed by 2013-2015. The GEF project will be implemented from 2010 to 2015. The most of the project activities will be implemented in the period of 2010 -2013, except for the monitoring, evaluation, the eco city advisory panel and dissemination strategy preparation.

Component 1: TA, Software and Equipment for Implementation Framework of SSTEC Master Plan (GEF US$1,400,000)

This component will provide TA, software and equipment required for development of the implementation framework of SSTEC Master Plan in the following areas.

Eco-City Chief Advisor and Advisory Panel
• Provide an overview and guidance for the implementation of the SSTEC master plan, on strategic and selected key technical issues based on the international best practices, including independent professional review of the reports prepared under GEF SSTECP. TA advisory services cover selected technical issues, but not any feasibility study.

Policy, Regulatory Incentive and Institutional Mechanism
• Policy, regulatory, incentive and institutional mechanism for promoting efficient energy/resource use in the following sector: (i) water: reducing water consumption, increasing water production from non-traditional sources; (ii) solid waste: reducing waste generation and promoting solid waste recycling (iii) energy: promoting energy efficient investment and renewable energy use, except for green building promotion to be supported under Component 3; and (iv) transport: promoting green transport trip other than public transport system development to be supported under Component 2.

Finance Mechanism
• Finance and economic analysis for project investment decision (life time cost benefit analysis)
• Financing mechanism and plan for investment and operation and maintenance
- SSTEC fiscal finance model based on the investment plans.

**Monitoring and Evaluation.**

- Review of Key Performance Indicators (KPIs) and development of additional secondary performance indicators, if necessary (e.g. GHG emission by transport sector)
- Calculation of city based GHG emission on a pilot basis.
- Updated Project Implementation Schedule
- Management Information System for Project Progress Monitoring and Evaluation

**Capacity Building**

- Beside on the job training in the above mentioned areas, provide training on selected subjects such as: integrated urban planning and management, city-based one system approach and life time cost analysis. This sub-component include visit to the global best practice cities and participation in international conferences.

**Dissemination Strategy**

- Develop strategy for dissemination of the SSTEC’s successfully adopted technologies and systems as well as lessons learned to other cities in China

**Component 2: Public Transport System TA**

(gef us$750,000)

TA to help SSTECAC develop the public transport system, focusing on the bus transport system including possible BRT which will be introduced as the first step of the SSTEC public transport system.

TA will finance the study on bus service system comprised of the following two parts.

**Part 1 Option Analysis**

- Review the transport sector master plan of SSTEC proposing three-tier (Metro Railway, Light Railway and Bus), multi-modal integrated public transport system proposed for SSTEC in light of the delay of the construction on the Metro Railway, the first tier public transportation system.
- Assess the impact of the delay of the construction of the Metro Railway, including the causes for the delay, the magnitude of delay (i.e. longevity of service period of alternative system)
- Based on the above information, propose a few alternative options for alternative public transport system based on efficient bus services with pros and cons from technical, financial, economic, social and environmental points of view and help the TMG, SSTECAC and other related entities to adopt the most optimal option

**Part 2 Feasibility Study and Implementation Study of the Option Adopted**

In case the ordinary bus system is adopted:

- Develop five year bus service plan for internal and external bus services
- Prepare a desired specification for bus (fuel and energy efficiency and pollution control) and service quality
- Preliminary design for key infrastructure needed (bus terminal and depots)
- Prepare the cost estimate
- Prepare revenue (tariff and subsidies) and financial estimate for operations of services
- Propose the institutional arrangement for bus operator and regulator
• Phasing-out plan of some of external or internal bus trunk lines when Metro Railway and Light Railway will be constructed in the future.
• EA/EMP and Social Impact Assessment, including preparation of the RAP, if needed.

In case the BRT system is adopted: In addition to the above,
• Establishment of BRT corridors and associated infrastructure based on assessment of the demand, bus route, regional link, SSTEC trunk and feeder routes.
• Operational integration among trunk and feeder BRT and ordinary bus services
• Identification of appropriate from of bus priority, including service planning modifications, bus lanes on the side and center of the road
• Review of EA/EMP and Resettlement Action Plan
• Phasing plan of BRT system to Metro Railway system when the Metro Railways System will be constructed.

Component 3: Green Building Pilot Investment and TA (GEF US$4,013,000/ Pilot Investment US$3,663,000 and TA US$350,000)

Pilot Green Buildings: This component consists of two pilot green buildings: a public housing for low income segment of SSTEC households (a total floor area of 37,000 m² for 569 apartments with US$26 million investment cost) and a high school (a total floor area of 35,000 m², hosting 1,620 students with US$24 million investment costs). GEF will finance incremental costs for energy efficiency and renewable energy use, which will exceed GBES of SSTEC green building requirement (base lines: 65% energy efficiency and 5% of renewable energy use for housing; and 50% energy efficiency and 5% renewable energy use for school building). The remaining costs for pilot buildings (base line investment) will be financed by the

TA: This subcomponent will focus on;

• monitoring and evaluation of the pilot building operations;
• piloting energy commissioning process in the two pilot buildings;
• reviewing SSTEC GBES and comparing it with the current best practices in building design and development in Tianjin and China as well as global best practices, for its improvement;
• developing various detailed guidelines and/or outreach materials to inform and guide designers, developers/builders, inspectors/evaluators, and consumers for the implementation of GBES;
• developing the regulatory, institutional, incentive and awareness campaign measures to promote replication of new technologies adopted in the pilot investments
• disseminating the new technologies adopted to the pilot buildings for replication

4. Safeguard policies that might apply
Environmental Assessment (OP/BP 4.01)

5. Tentative financing
Source: ($m.)
BORROWER/RECIPIENT 24.54
Global Environment Facility (GEF) 6.16
Total 30.70
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