PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Full-Sized Project
TYPE OF TRUST Fund: GEF Trust Fund

PART I: PROJECT IDENTIFICATION

Project Title:	Promoting energy efficiency in industrial heat systems and high energy-consuming (HEC) equipment		
Country(ies):	China	GEFSEC project- ID:	4866
GEF Agency/ies:	UNIDO	GEF Agency Project ID:	100282
Other executing parties	China Special Equipment Inspection and Research Institute (CSEI) / General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ)	Submission date: Resubmission date:	03/12/2012 04/10/2012
GEF Focal Area (s):	Climate Change	Project Duration (Months)	48
Name of parent program (if applicable): ➢ For SFM/REDD+	N/A	Agency fee ($):	537,500

A. FOCAL AREA STRATEGY FRAMEWORK

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Indicative Grant Amount ($)	Indicative cofinancing ($)
CCM-1	Enabling policy environment and mechanisms created for technology transfer	Innovative low-carbon technologies: systems optimization techniques (in 50 enterprises) and heat exchanger technologies (5 types) are demonstrated and deployed	GEFTF	525,000	2,000,000
CCM-2	Appropriate policy, legal and regulatory frameworks adopted and enforced	3 new technical standards will be drafted including the "*Energy Conservation Performance Appraisal Regulation for Industrial boilers', "Regulation for boiler system energy conservation management practices" and "Energy Efficiency Test and Evaluation Regulation for Heat Exchanger"*	GEFTF	600,000	3,500,000
CCM-2	Sustainable financing and delivery mechanisms established and operational	Energy savings achieved are estimated at 3.5 million tons of coal equivalent (Mtce) – equal to 28.5 Million MWh	GEFTF	4,000,000	33,000,000
		Sub-Total		5,125,000	38,500,000
		Project management cost		250,000	2,000,000
		Total project cost		5,375,000	40,500,000

B. PROJECT FRAMEWORK

Project objective: To promote energy efficiency in high energy consuming special equipment through a comprehensive approach, developing and revising technical regulations, providing training to national experts and establish a national HEC Special Equipment Energy Efficiency Testing Centre.						
Project Component	**Grant Type**	**Expected Outcomes**	**Expected Outputs**	**Trust Fund**	**Indicative Grant Amount($)**	**Indicative Cofinancing ($)**
Policy and market promotion Develop the policy tools required for enforcing energy efficiency measures in large heat transfer equipment	TA	Enhanced regulatory framework; a knowledge management tool is available to users and facilitating the implementation of systems optimization and efficient equipment by improving testing capabilities and EE awareness raising for financing mechanisms	1) National technical regulations on energy efficiency developed for HEC special equipment (boilers and heat exchangers) 2) An online information platform is developed for regulations, best practice and new technologies 3) Financing: guidelines for financial evaluation of industrial energy efficiency projects (the awareness of 10 banks is raised)	GEFTF	525,000	2,000,000
Capacity Building activities (government)	TA	The AQSIQ has the capacities required to enforce the technical regulations	1) To upgrade the national HEC Special Equipment Energy Efficiency Testing Centre 2) To upgrade 6 national testing laboratories to have the competencies to verify the new technical regulations	GEFTF	600,000	3,500,000

Capacity Building activities (enterprises)	TA	A cadre of highly specialized system optimization experts from the public and private sectors are available as a long-term technical resource to industry and the country. Enterprises awareness on measures and new technologies has been increased	1) Raise awareness on the concept of systems optimization for heat systems (heat exchangers and boilers) to 1000 enterprises 2) Train 50 experts to become national energy experts on heat systems 3) Conduct 75 energy assessments	GEFTF	1,750,000	9,000,000
Demonstration of energy efficient equipment implementation and operation	INV	New efficient technologies and efficiency measures are demonstrated	1) Systems optimization: 50 of the companies trained adopt measures to reduce their energy consumption 2) New technologies: 5 of the companies trained adopt measures and replace equipment with more efficient technologies	GEFTF	2,250,000	24,000,000
				Sub-Total	5,125,000	38,500,000
				Project management costs	250,000	2,000,000
				Total Project Costs	5,375,000	40,500,000

C. INDICATIVE CO-FINANCING FOR THE PROJECT BY NAME AND SOURCE IF AVAILABLE, ($)

Sources of Cofinancing	Name of Cofinancier	Type of Cofinancing	Amount ($)
National Government	AQSIQ/ China Special Equipment Inspection and Research Institute (CSEI)	Cash	2,500,000
National Government	AQSIQ/CSEI	In-kind	3,840,000
GEF Agency	UNIDO	Cash	100,000
GEF Agency	UNIDO	In-kind	60,000
Private sector	Unknown at this stage	Cash	3,175,000
Private sector	Unknown at this stage	In-kind	8,125,000
National Banks	Unknown at this stage	Cash	22,700,000
Total Cofinancing			40,500,000

D. GEF/LDCF/SCCF Resources Requested by Agency, Focal Area and Country[1]

The project consists of a single focal area, single country, single GEF Agency project, and single trust fund project, so no information is provided information for this table

PART II: PROJECT SUBSTANTIATION

A. Description of the consistency of the project with:

A.1.1 the GEF focal area/LDCF/SCCF strategies:

On the basis of the "GEF 5 Programming Document", dated May 12, 2010, the project is in compliance with the Climate Change Mitigation Results Framework Objective # 1 "Technology Transfer: Promote the demonstration, deployment, and transfer of innovative low-carbon technologies " and Objective #2 "Energy Efficiency: Promote market transformation for energy efficiency in industry and the building sector".

The GEF recognizes UNIDO's comparative advantage as an implementing agency, in the development of projects for the industrial sector in focusing on energy efficiency, as well as its knowledge of small and medium enterprises (SMEs) in both developing and transition economy countries.

A.1.2. For projects funded from LDCF/SCCF: the LDCF/SCCF eligibility criteria and priorities:

Not applicable

A.2. National Strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAs, NAPs, NBSAPs, national communications, TNAs, NIPs, PRSPs, NPFE, etc.:

Policy and programmes in China 11th Five-Year Plan (FYP) period (2006-2010),

During the 11th Five-Year Plan (FYP) period (2006-2010), China had ambitious energy efficiency targets for industry. On one hand, it has successfully implemented the 1000 enterprises programme. As part of this programme an efficiency benchmarking system has been developed for energy intensive large enterprises, in sub-sectors including power generation, iron and steel, cement and chemicals. On the other hand, China struggled to meet its energy intensity reduction target of 20 per cent. It reached 19.1 per cent by closing down as many as 2,000 small power plants, steel-makers, cement factories and paper mills at the end of 2010; following Premier Wen Jiabao's address months earlier on the tackling of energy efficiency with "iron hand". Several provinces across China had to take further direction action to meet targets by cutting power to industry, residential buildings, traffic lights, and in some instances, even hospitals.

The main relevant policies issued during this period included:

- Medium and Long-term Plan of Energy Conservation and its 10 Energy Conservation Programmes (2004), which for energy efficiency included: upgrading coal-burning industrial boiler and kilns; upgrading of electric motor systems, undertaking fuel switching and conservation activities; conversion of exhaust heat and pressure; optimizing energy systems in major industries, primarily metallurgical, petrochemicals and chemicals; monitoring and Technical Services at sub-sectors and provincial levels; and green lighting.
- Energy Conservation Law (2007) - which for industrial equipment defined that if consumes excessive quantities of energy shall be subject to examination and control for energy conservation as required by the State Council (article 16 provision). Certain types of industrial equipment were classified as high energy-

consuming (HEC) special equipment and were characterized by their safety aspects, consuming significant amounts of energy and having high potential for energy savings to be made. Three categories of HEC special equipment were defined including boilers, heat exchangers and elevators.

In the 11th FYP, Chinese policy for industrial energy efficiency was based on three tools:

- 1,000-enterprise programme for large industry
- Stringent energy intensity targets
- Forced closure of plants based on scale or technology criteria

While significant progress has been accomplished in industrial energy efficiency during the 11th Five Year Plan Period, China still faces challenges to the achievement of sustained energy efficiency measures.

The main industrial energy efficiency challenges include:

- maintaining the sustained growth in energy-intensive industries while addressing climate change and realizing commitments with the international community additional efforts are needed;
- meeting the national energy conservation targets, and
- promoting energy conservation and low carbon industrial development.

Policy and programmes in China 12th Five-Year Plan (FYP) period (2011-2015),

The 12th FYP (2011-2015) goes further than previous Plan on energy saving measures. It considers a policy to place an actual cap on total energy consumption to approximately 4 billion tons of coal equivalent (tce) per year by 20151. For the medium term (2011-2015) the FYP sets development plans for seven strategic emerging industries. These "pillar industries" were identified to promote economic growth while decarbonising the economy, and include: ICT (including smart grids); biotechnology industry; new and renewable energy; electric vehicles; energy-saving and environmental protection equipment/industry; new materials.

The main policy for industrial energy efficiency set by the 12the FYP include

- "Energy saving and Environmental Protection Industry Development Plan", which considers
    - Setting the energy intensity target to 16 per cent2 of the levels of 2010 by 2015.
    - Sectoral performance standard: for the cement sector (in terms of energy consumed per unit of coal) and for the oil and chemical industries a 10per cent intensity reduction compared to the levels of 2010 by 2015
    - Carbon dioxide emission per unit of GDP to be reduced by 17 percent of 2010 levels by 2015;
- New legislation that will require an energy efficiency assessment and proof of Best Available Technologies (BAT), before the government approves to any Greenfield investments in fixed assets.
- Scale-up the results of the "1,000 Enterprises" programme with a "10,000 Enterprises" programme.
- Endorsing market approaches like energy service companies (ESCOs) that help to finance energy efficiency.

[1] China used 3.25 billion tce in 2010, which is an increase of 5.9 per cent from 2009 figures. The target is equivalent to reducing 670 million tce.

[2] While this figure is lower than the target set for the previous FYP, the that GDP is anticipated to grow by 10 percent per year, hence, reaching this a 16 per cent reduction target would still be a serious challenge.

- Based on the Ten Energy Conservation Programmes in the 11 FYP period, implementation of the transformation for the boiler and furnace, energy conservation on electrical system, energy system optimization, residual heat and pressure recovering utilization, petroleum saving and replacement, energy conservation on construction, green lighting and other projects will continue
- The "12th Five-Year Plan for Industrial Energy Conservation" was issued on 27 February 2012 by the Ministry of Industry and Information Technology (MIIT). This Plan sets forth the key objectives and measures for industrial energy conservation. The energy consumption per unit of industrial value added output during this period has a target to decrease by 21per cent compared to the 11th Five Year period. The energy consumption of industrial value-added output of high energy consuming sector, including: iron and steel, non-ferrous metals, building materials, petrochemical and the power industry targets are to decrease by 18-20per cent. The plan includes nine key energy conservation projects for industrial boilers and kilns with a target to improve average operating efficiency by 5per cent by 2015 from 2010 levels.

In terms of the national climate change communications, China has undertaken the following national exercises:

- Initial National communication on Climate Change to the UNFCCC (2004) in the communication the government emphasized its efforts to mitigate climate change by adopting energy efficiency measures (as stated in the 10th Fiver Year Plan) amongst other initiatives. A full account o the undertaken and planed measures are provided[3]. The description includes a list of GEF funded projects implemented by the World Bank, namely such as "China End-Use Energy Efficiency Program" and the "Energy Conservation Promotion Project (please see section B.6).

- Technology Needs Assessment (GEF ID 4188): The project will closely monitor the exercise undertaken by the central government to identify its Technology Needs Assessment as defined by the international climate change agenda (UNFCCC), to complete a detailed assessment of the current situation of the technology development and potential technology needs in mitigation and adaptation, including implementation options (technical, institutional, policy, regulatory and capacity dimensions). The project is at early preparatory phase currently being undertaken by the World Bank.

Finally, China pledged in its communications under the Copenhagen Accords to reduce emissions intensity by 40-45per cent by 2020 compared to 2005 levels and increased the share of non-fossil fuels in primary energy consumption to 15per cent by 2020.

B. PROJECT OVERVIEW:

B.1. Describe the baseline project and the problem that it seeks to address:

The following section describes the current and projected[4] (baseline) status if the different issues that the project seeks to address, including testing of energy consumption, policy compliance and technical standards, energy saving measures in boiler and heat exchanger and technology transfer. The section also describes, for each aspect that the project will address, the main barriers which prevent improvement in the energy performance of HEC special equipment.

[3] Table 4-15 Relevant policies, rules and regulations adopted by the authorities of communications and transportation to improve the energy efficiency and energy saving (http://unfccc.int/resource/docs/natc/chnnc1e.pdf)

[4] The projected activities are those that would happen in the absence of the GEF project, and may also be denominated the baseline project

Policy implementation – testing standards

Baseline status (the current status)

Following the promulgation of the Energy Conservation laws in 2007, regulations on Energy Conservation Supervision were issued for HEC equipment management. The regulations envisaged that the supervision of energy conservation measures will be undertaken by the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) – an autonomous government body. AQSIQ is in charge of national quality, metrology, entry-exit commodity inspection, entry-exit health quarantine, entry-exit animal and plant quarantine, import-export food safety, certification and accreditation, standardization (China National Institute of Standardization is directly under AQSIQ), as well as administrative law-enforcement. It also administrates the Certification and Accreditation Administration of the P.R. China (CNCA) and the Standardization Administration of the P.R. China (SAC).

AQSIQ is also responsible for ensuring safety aspects, hence the integration of energy efficiency issues allows for greater coherency in implementation and enforcement of the regulations. As of 2010, AQSIQ is responsible for 3.03 million units of HEC special equipment. In 2010, there were 610,000 boilers and 768,000 heat exchangers in operations in China. The expected annual growth rate for such equipment, based on economic development is of 8per cent[5].

The technical regulations drafted to date include: "Supervision Administration Regulation on Energy Conservation Technology for Boiler" (TSG G0002-2010) and "Energy Efficiency Test and Evaluation Regulation for Industrial Boiler" (TSG G0003-2010). In 2010 a new standard has been drafted and its application piloted: "Boiler design file energy conservation review measures (Trial)". During the project implementation the main priority is to develop the following regulations and codes "Energy Conservation Performance Appraisal Regulation for Industrial boilers', "Regulation for boiler system energy conservation management practices" and "Energy Efficiency Test and Evaluation Regulation for Heat Exchanger",

There is an energy conservation target set by the MIIT in the Industrial Energy Conservation Plan to decrease kiln and boiler energy consumption by 70 Mtce, representing 10.4 per cent of the overall national target.

Barriers

- Capacities needed to implement and enforce HEC special equipment regulations. Technical regulations and testing guidelines have not been developed.
- Enforcement of energy efficiency targets has been piecemeal, and for HEC special equipment limited to macro-level energy reduction targets which lack the support of monitoring and enforcement mechanisms.
- Benchmarking techniques, standards and technical regulations regarding the energy efficiency of HEC special equipment either do not exist or are not comprehensive and in dire need of revision.
- Lack of capacities

The implementation of TSG G0002-2010 and TSG G0003-2010 began in 2011 with the following results:

- more than 10,000 boiler design files were reviewed and
- approx 1500 new boiler technology products tested.

To implement the standard, by conducting regular testing of industrial heat equipment, CSEI and the other national testing institutions should be able to test over 15,000 units yearly.

Baseline project (the projects status in the absence of a GEF intervention)

AQSIQ will undertake the drafting of technical standards, which will be made progressively, as well, as the development of technical guidelines. So far, such initiatives have been focused on boilers, and the drafts for some technical regulations have been prepared.

[5] 2015, there would be 896,290 boilers and 1,128,444 heat exchangers in operation. All figures provided by AQSIQ

The Energy Efficiency Promotion in Industry project (GEF ID 4109), currently being implemented, will support the development of national industrial energy efficiency polices, but it would not focus on technical standards or specific testing guidelines.

Policy implementation – laboratory capacities

Baseline status (the current status)

In 2009-2010, AQSIQ undertook research to determine the existing abilities in autonomous regions and municipalities and defined conditions for boiler testing. In 2011, they identified 82 boiler efficiency-testing agencies. In 2012, more agencies will be identified to facilitate boiler efficiency testing. The current capacities of CSEI include boilers and heat exchanger testing and evaluation. These facilities are mainly used for research, since the test centre has a regulatory rather than a compliance role. It generates the data, which is then used as the technical basis for the development of relevant regulations, standards and energy policies.

Barriers

- The Government's ability to monitor energy performance is limited as it is unable to independently test the equipment available on the market to ensure that is both safe and energy efficient.
- Testing facilities and inspectors have the abilities to enforce safety aspects of industrial equipment but have limited knowledge on heat transfer performance and international standards in the same field.

Baseline project (the projects status in the absence of a GEF intervention)

A new AQSIQ research and testing center will be built in the Shunyi District, Beijing area, and had final budget approval in 2010. The center will be opened in 2015 and will host new laboratories reference laboratories for energy efficiency testing of HEC. The training of staff and auditors will be pending.

Industrial boilers – systems optimization

Baseline status (the current status)

Industrial boilers in China's represent the most significant energy conversion equipment, and are mainly coal-fired. In 2010, the total coal yield in China reached 3.24 billion ton, and the use in boilers represented 70 per cent (about 2.24 billion ton). The average operational efficiency of an industrial boiler in China is only 65 per cent, which is 15-20 per cent less than that of boilers in developed countries. Energy savings generated by using more efficient equipment could represent 70 million tce. Moreover, in addition to the energy efficiency savings in individual system components, which markets and policymakers tend to focus on, if a systems optimization approach was used energy savings of 15–30 per cent could be realized. Various projects have addressed the efficiency issues related to industrial boilers in recent years, perhaps mostly importantly the GEF-WB China Efficient-Industrial Boilers Project (GEF ID 97). However, a considerable potential for energy savings remains to be realized.

Barriers

- Lack of familiarity with the range of energy efficiency technologies and processes, and energy conservation investment best practices as well as the under-appreciation of financial benefits from energy conservation investments are primarily responsible for the high-risk perception among industrial enterprises. There is hesitancy and misconception about the technical risk and the perception that these investments do not bring commensurate financial returns. In fact, heat systems can be optimized without asking for large investments.
- Energy efficiency is not part of the core business for most companies and company strategies tend to focus on output growth rather than cost management. Most enterprises have a budgetary disconnect between capital projects (equipment purchases) and operating expenses. Energy efficiency is not considered in the system design of petrochemical and chemical plants. Process design focuses on process safety factors, which lead to

a greatly increased cost of equipment and materials, resulting in an in increase of resistance heating elements, and reducing heat recovery efficiency. Moreover, the heat exchanger networks are not optimized.

- A components based approach to energy efficiency is taken as opposed to a systemic one, which would result in even greater energy savings.

Baseline project (the projects status in the absence of a GEF intervention)

The Energy Efficiency Promotion in Industry project (GEF ID 4109), currently being implemented, will support enterprises in adopting energy management systems. However, it will not address heat system optimization measures. Without the transfer of technical knowledge, the adoption of operational and maintenance measures to reduce energy consumption will remain to be limited.

Heat exchangers – systems optimization and technology transfer

Baseline status (the current status)

The heat exchanger technologies sector has globally benefited from the economic recession, which has prompted greater demand for energy saving equipment and in particular heat exchangers, as the latest models offer a 15 per cent improvement in energy efficiency; costs are also lower when compared to other alternatives. There are as a result many new types of more efficient heat exchangers on the market6. The global market for heat exchangers is estimated to reach $ 12.7 billion by 2015.

In the case of China, research by the Chinese Special Equipment Institute (CSEI-AQSIQ) shows that in the chemicals industry, expenditure on heat exchangers can comprise 30per cent of the total capital expenditure on new equipment and in oil refineries, approximately 40per cent. Improved heat transfer efficiency and the optimization of heat networks would significantly contribute to plants' overall energy efficiency.

The latest heat exchangers can achieve greater levels of thermal efficiency, can deal with larger loads and are also smaller in size. On average energy efficient heat exchangers comprised only 2-5 per cent of their heat exchange equipment needs and at the most only 10 per cent. Preliminary CSEI-AQSIQ research on more than 20 large Chinese petrochemical enterprises shows that they have gradually deployed new technologies. However, the uptake of more efficient heat exchangers, being developed at global level, was slow as companies selected models which met their manufacturing process requirements giving little consideration to the thermal efficiency. The most commonly used technologies were expansion bellow and plate heat types, while more efficient exchangers, such as helixchanger were the least used.

Barriers

- Enterprises have limited information on the equipment available on the market and can only go by the information provided by the manufacturers.
- Little macro-level data is available on energy performance of local manufactured heat exchangers.
- There is a disconnect between the upfront capital investment costs of heat equipment and the life cycle energy cost of its operation.
- Financing mechanism for more energy efficient, large-scale heat equipment is not in place.
- There are no energy efficiency indicators and energy efficiency evaluation methods on heat exchanger in China.

Baseline project (the projects status in the absence of a GEF intervention)

Without technology transfer promotion or regulatory measures to address energy efficiency of heat equipment, the uptake by enterprises would remain limited.

[6] which includes helixchanger, rod-baffled floating heat exchangers, self-supporting heat exchangers

B.2. Incremental / additional cost reasoning: describe the incremental (GEF Trust Fund) or additional (LDCF/SCCF) activities requested for GEF/LDCF/SCCF financing and the associated global environmental benefits (GEF Trust Fund) or associated adaptation benefits (LDCF/SCCF) to be delivered by the project:

The proposed project shall accelerate the deployment of energy efficient HEC by building national capacities on the selected technical fields and will address the barriers described in section B.1 by implementing the following measures:

Identified Barriers	How the proposed project addresses these barriers
Policy implementation – testing standards and market promotion	Enhance policy and market promotion by draft testing codes and standards regulations based on international and national standards. Guidelines and training for financial evaluation of industrial energy efficiency projects are provided to 10 local banks to facilitate investment in energy efficient equipment.
Policy implementation – laboratory capacities	The AQSIQ/CSEI has the capacities (equipment and staff) required to draft the technical regulations. The 6 selected national laboratories have the capacities (protocols and staff) required to enforce the regulations. A knowledge management tool is available to enterprises to raise their awareness on measures and new technologies.
Industrial boilers and systems optimization	A cadre of highly specialized heat system optimization experts (50) from the public and private sectors are available as a long-term technical resource to industry and the country.
Heat exchangers and technology transfer	Energy saving achieved by demonstrating the implementing systems optimization measures and new technologies.

The proposed project has 4 components, which have specific outcomes:

1) Policy development – testing standards and market promotion: draft testing codes and standards regulations and guidelines and training for financial evaluation of industrial energy efficiency projects. During the project implementation the main priority is to develop the following regulations and codes "Energy Conservation Performance Appraisal Regulation for Industrial boilers', "Regulation for boiler system energy conservation management practices" and "Energy Efficiency Test and Evaluation Regulation for Heat Exchanger".
2) Testing and policy enforcement –laboratory capacities: the AQSIQ/CSEI selected national laboratories have the necessary capacities to test and enforce energy efficiency standards.
3) Heat exchangers and technology transfer highly specialized heat system optimization experts from the public and private sectors are available. The heat system optimization experts will be trained, and they will conduct energy assessment as part of their practical training. The trained experts will disseminate their knowledge by raising the awareness of additional enterprises.
4) Industrial boilers and systems optimization: energy saving achieved by demonstrating the implementing systems optimization and new technologies. Heat systems optimization measures will be undertaken by 50 of

the 75 companies in which energy assessment were made. Additionally, 3 or 4 enterprises that have adopted heat systems optimization measures will also replace their heat exchangers for more efficient units.

The description of the planned activities required to achieve the project outputs is presented in the following table:

Outcomes	Expected Outputs	Detailed Activities
Policy and market promotion	1) National technical regulations on energy efficiency developed for HEC special equipment (boilers and heat exchangers)	draft regulations based on international and national standards
		to upgrade national testing laboratories to have the competencies to verify the new technical regulations (10 laboratories)
	2) Financing: guidelines for financial evaluation of industrial energy efficiency projects	guidelines for financial evaluation of industrial energy efficiency projects
Capacity Building activities (government)	1) To establish a national HEC Special Equipment Energy Efficiency Testing Centre	to procure the necessary equipment to make the CSEI a national reference centre for heat equipment testing
		to upgrade the competencies of the staff (define competencies and staff)
	2) To develop an online information platform for regulations, best practice and new technologies	IT platform development, case studies analyzed and presented as best practice and national information campaign on the benefits of efficient equipment
Capacity Building activities (enterprises)	1) Raise awareness on the concept of systems optimization for heat systems (heat exchangers and boilers) to 1000 enterprises	plant mangers receive SO awareness training
		plant engineers receive user training
		vendors & Associations, promoting systems message, participating in training
	2) Train 50 experts to become national energy experts on heat systems	plant engineers receive expert training
	3) Conduct 75 energy assessments	plant assessments, systems project development, case studies, plant training.
Demonstration of energy efficient equipment implementation and operation	1) Systems optimization: 40 of the companies trained adopt measures to reduce their energy consumption	investments in energy efficiency systems optimization projects over 3 years
	2) New technologies: 5 of the companies trained adopt measures and replace equipment with more efficient technologies	bankable business plan and project preparation

Global environmental benefits: direct emission reductions

The energy saving target set by the government in the 12th FYP is of 670 Mtce. The target set by the MIIT in the Industrial Energy Conservation is to decrease kiln and boiler energy consumption, of 70 Mtce, representing 10.4 per cent of the overall national target. This target is set for measures ranging from: the selection of high-quality coal; the renovation of medium-sized and small boilers and kilns with advanced technologies such as circulating fluidized bed (CFB) and pulverized coal firing; and the establishment energy efficient management and operation system.

A “back of the envelope calculation” is to consider the Industrial Energy Conservation target of the 12 FYP, to decrease kiln and boiler energy consumption, of 70 Mtce. Assuming that 5per cent of the target could be attributed to the measures adopted by this project; the savings would be of 3.5 Mtce. Considering an average emission factor of 2.42 tons of CO2 eq per tce (LBNL, 2010), this is equivalent to 8.47 MtCO2eq saved.

A detailed baseline study of the energy savings and associated emission reductions should be performed during the project preparatory phase, contemplating fuel types, efficiency rates and selected efficient technologies. The same

study should allow to identify potential beneficiaries and to narrow down the selection of heat exchanger technologies.

B3. Describe the socio-economic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF). As a background information, read Mainstreaming Gender at the GEF:

The direct beneficiaries for the project are the chemical and petrochemical industrial enterprises, who will be able to reduce energy consumption in heating systems. The enterprises will gain the ability to adopt system optimization measures and become aware of new technologies. Energy conservation effect could be found through the introduction of new technologies' application and demonstration and which will be continuing role in the country after project for long time. Energy savings practices have direct linkages to cost reduction, increased productivity, environmental compliance and global competitiveness.

The primary beneficiaries are the staff of the CSEI and the 6 national testing laboratories; including site inspectors, who will acquire the necessary skills to design, test, regulate and enforce the use of energy efficient heat transfer equipment.

In terms of gender equality, the project shall facilitating the access to training facilities and promoting female participation both at the national testing laboratories, as system optimization experts and system optimization awareness.

B.4. Indicate risks, including climate change risks that might prevent the project objectives from being achieved, and if possible, propose measures that address these risks to be further developed during the project design:

The main risks to the effective implementation of the proposed GEF project are described in the following table:

Risk	Rating*	Mitigation
Lack of effective coordination between various partners involved and with other EE programmes	L	Proper coordination will be sought through the Project Steering Committee and ad-hoc working groups per sector or theme can be set up as needed, bringing in other partners and beneficiaries
Stringency of policy to promote the desired results	L	The technical standards will be drafted with the aim of ensuring that all new equipment complies with the targets of reducing energy consumption.
Limited number of candidates interested in training	L	Awareness raising and stakeholder engagement during the preparatory phase shall build a project "constituency"
No immediate demand of services for trained	M	The integrated approach adopted by the project is expected to mitigate this risk by combining expert training with factory training designed to create

Risk	Rating*	Mitigation
experts		interest in the services that the new national experts will provide.
Demonstration projects are delayed, limiting the opportunity to disseminate success stories and develop case studies	L	The enterprises selected as demonstration sites for the expert-level training will be carefully screened for management support for implementation of the resulting recommendations. These factories are anticipated to provide the initial case studies and thus serve as examples for other factories.
Incentive and financial support systems are insufficient, especially for technology transfer	L	Financial institutions will be encouraged to learn more about industrial energy efficiency savings potential; and companies will be made aware of the financing opportunities

* L = low risk; M = medium risk; H = high risk

B.5. Identify key stakeholders involved in the project including the private sector, civil society organizations, local and indigenous communities, and their respective roles, as applicable:

The main project stakeholders are listed in the table below

Stakeholder	Role
AQSIQ	Main counterpart who has a normative and testing responsibility at national level. It includes the supervision of energy conservation, monitoring of the design, manufacture, installation, use, and testing and other aspects for design
The China Special Equipment Inspection and Research Institute (CSEI)	The sole national technical organization responsible for the inspection and R&D of Special Equipment in China, and will be the national reference center for energy efficiency testing of heat HEC equipment
The China Association of Special Equipment Inspection (CASEI)	Responsible for inspection including the appraisal and audit of pressure vessel manufacturers, special inspection agencies, and other organizations. CASEI is also responsible for the qualification and examination of inspectors in special equipment industries including the oil, gas, and power industries. CASEI is governed by AQSIQ
National laboratories	Responsible for testing and inspection of enterprises
Private sector (associations)	Represent direct beneficiaries, having a normative support role and the ability to disseminate knowledge amongst its member enterprises
Private sector (enterprises)	Direct beneficiaries that will adopt measures
National experts (individuals)	Direct beneficiaries who will be trained by the UNIDO international experts
National financing institutions	May provide financing to industrial beneficiaries who adopt measures, and will received training to evaluate energy efficiency projects
Globally recognized international laboratories and experts	May support the project execution providing the expert assistance to AQSIQ to transfer best knowledge and practices[7]

[7] The Lawrence Berkeley National Laboratory from the US DOE has been considered and involved in the PIF preparation process

Implementation and execution arrangements

The project will be managed by a steering committee formed by parties designated by AQSIQ and UNIDO and a project management office appointed for the execution. The management structure and implementation plan for the main project phase will be prepared and agreed during the project preparatory phase.

B.6. Outline the coordination with other related initiatives:

China - Efficient Industrial Boilers project

This GEF/World Bank/ Ministry of Machinery Industry project[8] (GEF ID97, 1996-2004) involved the upgrading of existing boiler models and adoption of new boiler models as well as technical assistance and training. In total, nine international boiler technology transfer packages were piloted by nine domestic boiler manufacturers and auxiliary equipment makers. The technology transfers were considered successful in themselves, with new designs giving energy savings of up to 5 per cent. However, changes in Government policy and the market itself prevented the project from having a broader impact:

1. Of the larger boiler types, the circulating fluidized bed combustion (CFBC) boiler manufacturers used a design that had a longer record in the local market than the GEF-supported design, which had an impact on sales;

2. The Government banned coal-fired boilers with a capacity of less than 10 t/h in medium and large cities, resulting in lower sales of GEF-supported designs for smaller boilers than originally anticipated;

3. The piloting proved to be ineffective as the pilot cities of Shanghai and Jinan promulgated policies, which restricted the use of coal-fired boilers and thus withdrew from the project.

As a result, in 2004 annual sales of total boiler capacity of just 9,230t/h were reached at the end of the project, or 51 per cent of the original target. Attainment of the 27,000t/h target by 2006 also seemed unlikely at the time the terminal report was drafted in 2004.

CEPB also supported the drafting of one national and four sector standards and the revising of two national standards and two sector standards. However, no technical regulations were formulated under the project framework.

Efficiency Upgrade for Coal-burning Industrial Boilers and Kilns

As part of the Medium and Long-term Plan of Energy Conservation, in 2006, the NDRC announced three measures to reduce the nation's kiln and boiler consumption of coal by 70 million tons:

- selection of high-quality coal, lump coal, and sulphur-fixed coal;

- renovation of medium-sized and small boilers and kilns with advanced techniques such as circulating fluidized bed (CFB) and pulverized coal firing;

- establishment of a scientific management and operation system.

Within the 11th Five-Year Plan (2006 - 2010), these measures are expected to raise the efficiency coal-burning boilers and kilns by five and two percentage points, saving 25 million and 10 million tons of coal. China now uses 500, 000 medium-sized and small boilers, with an average capacity of only 2.5 ton per hour, a designed efficiency of 72 to 80 percent and an actual efficiency around 65 percent. 90 percent of them are coal-burning, consuming 350 to

[8] http://gefonline.org/projectDetailsSQL.cfm?projID=97

400 million tons each year, of which 70 million tons can be saved. In addition, the appropriate incentives for energy conservation projects and the strict elimination system for outdated plant and equipment also exist.

The Energy Efficiency Promotion in Industry project

This ongoing GEF/World Bank project (GEF ID 4109, 2011-2015) aims to improve the technical and managerial capacities required to promote a rational use of energy in the key industrial sectors and has four main components: supporting policy development (but not focused on technical standards), capacity building for energy managers (focuses on energy managers but not on system optimization), demonstration of energy management measure and dissemination of knowledge.

National Communications to the UNFCCC

These two project aim to enable China to prepare its National Communication to UNFCCC

1) The second national communication project, which is currently being implemented by the National Development and Reform commission (NDRC) and UNDP (GEF ID 3100, 2007-2013) will establish a preliminary national GHG inventory database management system, and will develop an approach for projecting GHG emissions.

2) The third national communication project, which is at early stage of development (GEF ID 5032, PIF submitted in 2012) aims to update the inventory and develop modeling systems to estimate GHG projections.

   The proposed project will aim to use the national GHG reporting systems to be created as a source of information and the methodologies developed as a system for monitoring GHG in the beneficiary enterprises.

Technology Needs Assessment (TNA) project

This project (GEF ID 4188, expected to be implemented in the period 2012-2014), managed by the Ministry of Finance and the World Bank, will undertake a detailed assessment of the current situation of the technology development and potential technology needs in mitigation and adaptation. The project is at the preparatory phase. Consultations will be made during the PPG phase to ensure that the selected heat systems technologies are considered in the TNA.

C. DESCRIBE THE GEF AGENCY'S COMPARATIVE ADVANTAGE TO IMPLEMENT THIS PROJECT:

C.1 Indicate the co-financing amount the GEF agency is bringing to the project:

The UNIDO co-financing will be $ 160,000 in cash and in-kind to support monitoring and evaluation costs related to project implementation.

C.2 How does the project fit into the GEF agency's program (reflected in documents such as UNDAF, CAS, etc.) and staff capacity in the country to follow up project implementation:

The project is fully in line with China's UNDAF Outcome 1, "Government and other stakeholders ensure environmental sustainability, address climate change, and promote a green, low carbon economy", and more particularly with the operational Outcome 1.1 "Policies and regulations are strengthened to create a green economy", which has as an output "Enhanced Government capacity to promote a low carbon economy through energy efficiency, renewable energy, and technological innovation". It is also in line with UNIDO's Country Programme for China, which details as one of UNIDO's services in the country the support to the Government in the transfer and uptake of energy-efficient and low-carbon technologies.

GEF council document EF/C.31/rev.1 illustrates the comparative advantage of UNIDO in capacity building and technical assistance. UNIDO has significant experience in formulating and implementing industrial energy efficiency projects.

UNIDO has successfully completed the following energy efficiency projects in China:

- Application of Waste Heat Recovery Power Generation in the Coal Gangue Brick Sector (12,000 t CO_2 reduction in two pilot plants; potential for considerable replication)
- Township and Village Enterprise programme (4.5 Mt CO_2 reduction / 2 M tons tce savings) and
- Motor systems programme (40kt CO_2 reduction / 40 GWh savings).
- The Task Force on Low Carbon Industrialization (LCI) for the China Council for International Cooperation on Environment and Development (CCICED) in which UNIDO was part of an international expert team that made policy recommendations on new measures for selected industrial sectors.

UNIDO is currently implementing the following related initiatives in the field of energy efficiency in China

- assisting the Ministry of Industry and Information Technology (MIIT) in implementing a Development Plan for the Chinese Automotive Industry to develop Fuel Efficiency Strategies in collaboration with the society of Automotive Engineers
- supporting the Taiyuan City Government in the development of an industrial GHG emission database recommendations on greenhouse gas mitigation policies (undergoing the preparatory phase)

UNIDO has a regional office in China with 8 staff: 4 professional staff with extensive project management experience. One of professional staff is managing administering technical cooperation projects.

The UNIDO Investment and Technology Promotion Office (ITPO) and the UNIDO/UNEP China National Cleaner Production Center (NCPC) also enhance the local capacities. The ITPO office role is to establish alliances in industrial investment and technology commercialization in and from developing countries and economies in transition. The NCPC in China was established in 1994 as part of a global network of cleaner production centers aimed at promoting resources efficiency and the reduction of environmental degradation.

PART III: APPROVAL /ENDORSEMENT BY THE GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. **Record of Endorsement of GEF Operational Focal Point(s) on Behalf of the Government(s):** (Please attach the Operational Focal Point endorsement letter(s) with this template. For SGP, use this OFP endorsement letter).

NAME	POSITION	MINISTRY	DATE
Ms. Jiandi YE	Director of IFI Division III International Department	Ministry of Finance	02/21/2012

B. **GEF Agency/ies Certification**

This request has been prepared in accordance with GEF/LDCF/SCCF policies and procedures and meets the GEF/LDCF/SCCF criteria for project identification and preparation.

AGENCY COORDINATOR, AGENCY NAME	SIGNATURE	DATE	PROJECT CONTACT PERSON	TELEPHONE	EMAIL ADDRESS
Mr. Dmitry Piskunov UNIDO PTC Managing Director / UNIDO GEF Focal Point		March 13, 2012	Ms. Bettina Schreck Industrial Energy Efficiency Unit Mr. Edward Clarence-Smith Director of the Regional Office China	+43 126026-3032 +86 10 65323440	B.SCHRECK@UNIDO.ORG E.CLARENCE-SMITH@UNIDO.ORG