



REQUEST FOR CEO APPROVAL¹

PROJECT TYPE: Medium-sized Project

TYPE OF TRUST FUND: GEF Trust Fund

PART I: PROJECT INFORMATION

Project Title: Reduction of mercury emissions and promotion of sound chemical management in zinc smelting operations			
Country(ies):	China	GEF Project ID: ²	
GEF Agency(ies):	UNIDO (select) (select)	GEF Agency Project ID:	
Other Executing Partner(s):	Ministry of Environment, Foreign Economic Cooperation Office (FECO)	Submission Date:	
GEF Focal Area (s):	Persistent Organic Pollutants	Project Duration(Months)	24
Name of Parent Program (if applicable):		Agency Fee (\$):	99,000
For SFM/REDD+ <input type="checkbox"/>			

A. FOCAL AREA STRATEGY FRAMEWORK³

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount (\$)	Cofinancing (\$)
(select) CHEM-3	Outcome 3.1 Country capacity built to effectively manage mercury in priority sectors.	Output 3.1 Countries receiving GEF support for mercury management and reduction, on a pilot basis.	GEF TF	900,000	3,640,000
(select) (select)			(select)		
(select) (select)			(select)		
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(select) (select)			(select)		
(select) (select)			(select)		
(select) (select)			(select)		
(select) (select)			(select)		
(select) (select)	Others		(select)		
Subtotal				900,000	3,640,000
Project management cost ⁴			GEF TF	90,000	360,000
Total project costs				990,000	4,000,000

B. PROJECT FRAMEWORK

Project Objective: Reduce the impacts of mercury on human health and the environment from zinc smelting operations through sound chemical management						
Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount (\$)	Confirmed Cofinancing (\$)
1. Characterization of Mercury Emissions from the	TA	FECO created a coordination and monitoring system	1. Scope of the zinc smelting operations in China evaluated and	GEFTF	300,000	900,000

¹ It is important to consult the GEF Preparation Guidelines when completing this template

² Project ID number will be assigned by GEFSEC.

³ Refer to the Focal Area/LDCF/SCCF Results Framework when filling up the table in item A.

⁴ This is the cost associated with the unit executing the project on the ground and could be financed out of trust fund or cofinancing sources.

Zinc Smelting Operations in China		for mercury management focusing the zinc smelting sector	<p>better understood (data on emissions, exposure, health related)</p> <p>2. Gap analysis, including comparative analysis against other countries, on institution capacity focusing on zinc industry completed (data on current systems, policies, capacity in China and abroad)</p> <p>3. Inception workshop is conducted and inception reports are developed (including the identification of indicators); annual project reports and project implementation reports are developed; annual review meetings are conducted</p> <p>4. FECO is able to successfully monitor mercury emissions and their impact on human health and the environment in the zinc sector</p>			
2. Demonstrate BAT/BEP in two pilot plants and evaluate cost effectiveness. Organize Public Outreach Events and Share Lessons Learned with the Zinc Industry	Inv	BATs/BEPs adopted for cleaner zinc production	<p>1. Two pilot project demonstrations fully implemented</p> <p>2. Lessons learned are disseminated at workshops for future replication (workshops involve private industry, national, regional, and local stakeholders)</p> <p>3. Awareness-raised and capacity increased among zinc smelting operators</p>	GEFTF	450,000	2,490,000
3. Develop and promote policy reform to reduce mercury emissions from the zinc smelting industry	TA	FECO developed mercury management policy to facilitate the uptake of BATs/BEPs	1. Assessment of national and local mechanisms, including needs and investment opportunities, to support uptake of BATs/BEPs completed	GEFTF	150,000	250,000

			2. Guidelines, trainings, and briefs for BATs/BEPs developed and promoted in relevant national and local decision-making processes 3. A national policy plan indicating the required policy reforms is submitted to national authorities for consideration and eventual adoption.			
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
Subtotal					900,000	3,640,000
Project management Cost ⁵				GEFTF	90,000	360,000
Total project costs					990000	4000000

C. SOURCES OF CONFIRMED COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME (\$)

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Cofinancing Amount (\$)
National Government	FECO	In-kind	250,000
Private Sector	Zinc enterprises (Zhuzhou)	In-Kind	1,000,000
Local Government	Hunan province	In-Kind	300,000
Bilateral Aid Agency (ies)	Sino-Norwegian projects	Grant	500,000
GEF Agency	UNIDO	Grant	50,000
Local Government	Shanxi	In-Kind	300,000
Local Government	Guizhou	In-Kind	200,000
Private Sector	Shuikoushan	In-Kind	700,000
Private Sector	Shangluo	In-Kind	700,000
(select)		(select)	
Total Co-financing			4,000,000

D. GEF/LDCF/SCCF RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY¹

GEF Agency	Type of Trust Fund	Focal Area	Country Name/ Global	(in \$)		
				Grant Amount (a)	Agency Fee (b) ²	Total c=a+b
UNIDO	GEF TF	Persistent Organic Pollutants	China	990,000	99,000	1,089,000
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0

⁵ Same as footnote #3.

(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
Total Grant Resources				990,000	99,000	1,089,000

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	Estimated Person Weeks	Grant Amount (\$)	Cofinancing (\$)	Project Total (\$)
Local consultants*	96.00	48,000	100,000	148,000
International consultants*	10.00	25,000	25,000	50,000
Total		73,000	125,000	198,000

* Details to be provided in Annex C.

F. PROJECT MANAGEMENT COST

Cost Items	Total Estimated Person Weeks/Months	Grant Amount (\$)	Co-financing (\$)	Project Total (\$)
Local consultants*	300.00	25,000	100,000	125,000
International consultants*			0	0
Office facilities, equipment, vehicles and communications*		1,000	200,000	201,000
Travel*		24,000	60,000	84,000
Others**	Evaluation	40,000		40,000
	Specify "Others" (2)			0
Total		90,000	360,000	450,000

* Details to be provided in Annex C.

** For others, to be clearly specified by overwriting fields *(1) and *(2).

G. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? No

(If non-grant instruments are used, provide in Annex E an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF Trust Fund).

H. DESCRIBE THE BUDGETED M & E PLAN:

Overall M&E: UNIDO will be responsible for overall project monitoring and evaluation, and reporting progress to the donor. UNIDO will conduct yearly monitoring and evaluation visits to China, and submit programmatic and financial interim reports within 30 days of the end of every six-month period. The final programmatic and financial reports will be submitted to the donor within 90 days of project end. UNIDO and FECO, as the main executing partner, will meet bi-annually to 1) review and approve annual work plans; 2) assess progress against M&E targets as indicated in the Project Results Framework; 3) approve of interim and final reports; and 4) assess any gaps or weaknesses, and make appropriate adaptive management decisions based on progress and achievements. Work plans for years two will be based upon results achieved in the previous year, agreed priorities and any changes identified via adaptive management

decisions (including associated budget allocations).

Programmatic M&E: FECO will act as the main Project Executive and be responsible for day-to-day management of the project and monthly reporting from the field, and quarterly reporting to UNIDO. The small Project Management Unit (PMU) consisted of a Project Manager (PM) and a Project Assistant (PA) will be assigned by the Division at FECO. The PM will report regularly on project management matters to the Project Executive which will in turn report to a Project Executive Board (PEB). This is the highest policy-level body of the parties in FECO directly involved in the implementation projects.

FECO, as the main executing partner, will conduct two monitoring and evaluation visits in country each year to review and assess project progress, ensure management decisions are implemented, review strategies and adapt project implementation plans accordingly. In addition, FECO will monitor project activities on a weekly basis. Email, chat, video chat or telephone communications with UNIDO and other partners allow for real time, close coordination and feedback between central management, technical specialists, field project staff and partners. In summary, FECO/other partners will be responsible for implementing day-to-day technical assistance activities and reporting progress and any challenges back to UNIDO.

Technical advice and expertise will be coordinated by UNIDO and FECO. The technical experts will be an important part of the monitoring and evaluation process, as they will provide specific technical project advice, assist with troubleshooting as needed, and ensure quality control and adherence to international environmental and chemical safety standards. Progress of activities and outputs against the targets and desired outcomes will be assessed bi-annually using the means of verification and indicators for measurement explained in the Project Results Framework. Standard statistical methods will be used to analyze and report trends where applicable; qualitative indicators will be monitored when quantitative indicators are not feasible or useful. Performance measures will occur at three levels: activity, annual work plans and overall project, and reported upon as explained above. Quarterly reports and bi-annual reports will aggregate, summarize and convert project data/results into more general language indicating project progress towards objectives. This way, reporting will link monitoring and evaluation aspects. Following completion of annual project reports, UNIDO, FECO and project partners will meet to review in-country progress and make needed adjustments to the project plan. Working with project partners, local/national governments, NGO's and other stakeholders, FECO and UNIDO will adapt annual work plans as necessary.

Financial Monitoring: All project costs must be accounted for and documented. Financial reports will be required on a monthly basis from the field to FECO, according to internal accounting procedures. Interim financial reports will be provided to the donor by UNIDO every six months, and a final financial report will be provided within 90 days of project end.

Project Inception Workshop

A Project Inception Workshop (IW) will be conducted with participation of the project team and key stakeholders. The fundamental objective of IW is to assist the project team and key stakeholders to understand the project's goals and objectives. The IW participants will also review and modify the logframe matrix (indicators, means of verification, assumptions). At the IW, the Project Executive, with support from the PM, UNIDO, and in consultation with the full project team, will fine-tune the progress and performance/impact indicators of the project. Specific targets for the first year implementation progress indicators together with their means of verification will be agreed. Schedules for measuring the impact indicators related to global benefits will be defined.

Additionally, the purpose of the IW will be to:

- (i) introduce key members of the Project Executive and project team;
- (ii) detail roles, support services, and complementary responsibilities of UNIDO and other project team members such as the PM;
- (iii) provide a detailed overview of UNIDO-GEF reporting and M&E requirements.

The IW will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms.

Annual Work Plan

Following the IW, the Project Executive with support from the PM, will finalize and submit to the stakeholders an initial Annual Work Plan (AWP) and the Project Inception Report. The AWP will include a detailed first year schedule

and budget detailing the activities and progress indicators that will guide implementation.

Monitoring responsibilities and events

A detailed schedule of PEB meetings to review project progress will be developed by the PM in consultation with the rest of the project team and incorporated in the AWP. Such a schedule will include: (i) tentative time frames for PEB meetings and (ii) project related M&E activities.

Independent Evaluation

The project will undergo an independent external evaluation. An independent Final Evaluation will take place 3 months prior to the final project review by the PEB and the evaluation will focus on impact and sustainability of outcomes and results. The Final Evaluation should also provide recommendations for follow-up activities. The TOR for this evaluation will be prepared by UNIDO based on guidance from GEF and following UNIDO evaluation policy.

PART II: PROJECT JUSTIFICATION

A. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

A.1 The GEF focal area /LDCF/SCCF strategies:

The proposed project is directly in line with the GEF 5 focal area strategy for chemicals: “to promote the sound management of chemicals throughout their lifecycle in ways that lead to the minimization of significant adverse effects on human health and the environment”, in particular Objective 3 to “pilot sound chemicals management and mercury reduction”. It also aligns with Outcome 3.1: “country capacity built to effectively manage mercury in priority sectors” and Outcome 3.2 to “contribute to the overall objective of the SAICM of achieving the sound management of chemicals throughout their lifecycle in ways that lead to the minimization of significant adverse effects on human health and the environment”.

GEF 5 mercury resources are intended to support assessment and pilot activities that will advance the development of the global mercury instrument and improve countries’ abilities to implement its provisions when the instrument enters into force. The strategy calls for a facilitative approach to address key issue areas and knowledge gaps through projects which can be deployed quickly and show results within the Intergovernmental Negotiating Committee (INC) process timeframe. Building synergies within GEF focal area activities and leveraging larger investment and financing projects are key elements of the strategy. This project will support the GEF Chemicals Strategy by strengthening local and national capacity to effectively manage and reduce mercury emissions and exposure in zinc smelting operations in China. Specifically, it will build the capacity of local and national stakeholders to implement successful mercury reduction projects, and assist the Chinese governments in developing a national action plan for sound mercury management in the non-ferrous metal sector, in preparation for an international mercury treaty.

Consistent with prior GEF approaches to chemicals programs and in line with GEF’s Strategy for Mercury Programming, the proposed project will build upon and contribute to strengthening a country’s foundational capacities for sound chemical management, promote pollution prevention approaches, and use a lifecycle approach to minimize adverse effects on human health and the global environment.

Finally, the proposed project will support GEF’s emphasis on innovation and its favor for demonstrations of innovative, appropriate, and/or new technologies and approaches. In line with the catalytic role of the GEF and its strength in piloting new approaches, the proposed project will support the development of guidance documents, using harmonized methodologies for data collection and monitoring, and disseminating results broadly through multiple media pathways.

A.2. LDCF/SCCF eligibility criteria and priorities

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

Not Applicable

A.3. National strategies and plans

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.:

Emissions of pollutants from lead-zinc smelting and mining in China should conform to “Integrated Emission Standard of Air Pollutants” (GB16297-1996), “Integrated Wastewater Discharge Standard” (GB8978-1996), and other laws on the prevention and control of environmental pollution by solid wastes and hazardous materials. “Emission standard of pollutants for lead and zinc Industry” (GB20445-2010) was proposed to give mercury emission limits ($<0.03\text{mg/L}$) for the discharge of the lead-zinc industry waters.

China’s Ministry of Environmental Protection (MEP) has concluded that the prevention and control of mercury pollution require an investigation on national emission sources of mercury pollution. Mercury pollution sources in typical regions and major industries should be monitored and evaluated, and pilot programs of air mercury pollution control in coal-burning power plants should be conducted.

On Feb. 18th 2011, the State Council officially approved the “Twelfth Five-Year Plan on Prevention and Control of Heavy Metal Pollution”. The plan listed lead, mercury, cadmium, chromium and arsenic as five key elements for prevention and control, and the non-ferrous metal smelting industry as one of five key industries to be targeted for prevention and control. The plan required that in key regions, the emission of heavy metals should be decreased by 15% by 2015 as compared to 2007 levels; in non-key regions, the emissions should be no higher than 2007. The plan also indicated that the necessary technical standards, policies, management regulation and product lists related to mercury need to be established; and three relevant monitoring systems need to be refined: the mercury pollution prevention and control system, the accident emergency system and the environmental and health risk assessment system.

The control of heavy metal pollution required by the Plan have already been established or been approved in some regions. In March 2011, the State Council approved the “Executive Program of Heavy Metal Pollution Control in Xiangjiang River Basin”, the first such pilot program to be approved by the State Council. The program clearly defined some industrial areas located along the river basin, like Zhuzhou, Qingshuitang, etc., as core regions for remediation activities. Specifically, emissions in 2015 should be decreased by 70% compared to emission levels in 2008 and heavy metal pollution in the Xiangjiang River Basin should be under control in the next 5-10 years.

B. PROJECT OVERVIEW:

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

Background

Mercury (Hg) is one of the most harmful environmental pollutants due to its toxicity, long distance mobility, persistence, and bioaccumulation in the environment. Mercury can cause permanent damage to the brain, kidneys and the development of fetuses, and cause miscarriages, developmental problems in children, psychotic reactions, respiratory failure, cardiovascular disease, neurological damage and death. It is a naturally occurring element and can be released into air and water. Among anthropogenic sources, it is estimated that 2,320 t of Hg are released annually to the global atmosphere (Wang et al, 2010). Globally, 800t originate from fossil-fuel power plants combustion (UNEP report on paragraph 29), while artisanal and small scale gold mining accounts for 1,400t (mercury watch, UNEP Global Mercury Partnership) and non-ferrous metal production 310t (Pirrone et al, 2010) making this sector one of the major emitter. China is regarded as the largest anthropogenic Hg emission source. It is estimated that the annual Hg emission from China reached 800 tons in 2005, which would have contributed about 30% to the global emissions of Hg (Global Mercury Assessment, 2008). The second and third largest emitters are India and the USA with less than 200t each. Streets (2005) estimated that the total emission of Hg from Zinc Smelter is about 147 tons per year and great uncertainty exists.

Mercury appears as an impurity of copper, zinc, lead and nickel ores as well as in gold ores. Smelting processes to

obtain these metals are known to be large sources of mercury released to the atmosphere, especially in developing countries (UNEP, 2002; Telmer and Veiga, 2009). In China, it is estimated that non-ferrous metal smelting is the largest industrial mercury emission source. Researchers believe that Hg emissions from smelters increased from 230 t in 1995 to 321 t in 2003, equivalent to an average annual increase of 4.2% (Wu et al, 2006). Combustion temperature, in boilers, furnaces and roasters, are key parameters affecting the amount of mercury released into the atmosphere, although the chemical form and particle size distribution, as well as the emission control technologies in place, also play an important role (Pirrone et al., 1996, 2001b). The mercury released to the air is then directly inhaled by workers and the surrounding communities. It is particularly threatening to children, pregnant women, and women of childbearing age. Mercury not released into the air could end up in wastes, as fly or bottom ash, and go to landfills where they have the potential to release mercury air emissions or leach into surrounding soil and water systems. The emissions from smelting processes can also travel long distances around the globe, contributing to global mercury pollution. Particularly critical is the contamination of the world's fisheries. Under certain conditions in sediments, bacteria can transform elemental mercury into methyl-mercury, a far more absorbable form, which bioaccumulates in the food chain. In particular, methyl mercury bio-accumulates in the fatty tissues of fish, a major high quality protein source for poor communities, and many people around the world.

Zinc in China

With respect specifically to zinc, China is the world's largest miner, smelter, and consumer of this metal. In the past ten years from 1999 to 2009, China's zinc production increased at an average annual rate of 10%, from 1.67 million tons in 1999 to 4.42 million tons in 2009⁶. Made up of many scattered medium to small-sized businesses, China's zinc smelting industry is rather decentralized. There are approximately 70 zinc smelters (22 state-owned, 11 private enterprises, 27 joint-stock enterprises, and 10 others) spreading throughout 27 provinces. After 50 years of development, China's zinc resource development gradually transferred from the northeast and central China to the western part of the country and Inner Mongolia. In addition to the remaining enterprises in Guangdong, Liaoning, Guangxi, the zinc resource development and mine production mainly focalize in Yunnan, Gansu, Sichuan, Qinghai and Inner Mongolia. In 2003 Zinc mine production in Yunnan and lead mine output in Gansu ranked first in China respectively.

In the 1990's, China's zinc enterprises began to enter the international market, concentrating on metal exports. Currently, China has registered 9 lead trademarks and 6 zinc trademarks in LME (see Table 1). The industry is highly competitive, and its self-regulatory capacity is weak.

Table 1. China's registered zinc trademarks and brand companies in LME (2002)

Name	registered product	trademark
Zhuzhou Smelter	zinc	TORCH
Shaoguan Smelter	zinc	NH
Huludao Zinc Smelter	zinc	HX
Silver Nonferrous Metals Company	zinc	IBIS
Dragon Chemical Plant	zinc	YINLI
Yunnan Chihong Zinc and Germanium Co., Ltd.	zinc	YX

As widely recognized by much of the scientific research and literature, mercury emission estimates are subject to significant uncertainty. An uncertainty of $\pm 30\%$ for major industrial sources of mercury is widely accepted (Pacyna et al., 2010). In China, due to lack of measured emission factors for the various smelting processes, large uncertainties are associated with the current emissions inventory.

According to China's 1999 inventory data, the national emission of total Hg was 535.8 t with 45.2% coming from non-ferrous metals smelting (27.5% of which from zinc smelting). In 1999, the highest Hg emitting provinces from non ferrous metal smelting were Liaoning and Guangdong. Table 2 below summarizes the total Hg emissions by

type and by province in 1999.

Table 2. Summary of Hg emission estimates (t) by province in 1999

Province	Coal combustion	Non-ferrous metals smelting	Other sources	Total Hg	Hg ⁰	Hg ²⁺	Hg ^p
Anhui	10.01	1.39	3.15	14.56	5.49	7.29	1.78
Beijing	5.11	2.02	1.70	8.83	3.80	3.12	1.92
Fujian	1.88	0.02	1.76	3.66	1.73	1.56	0.37
Gansu	1.25	26.06	1.49	28.80	22.17	4.80	1.83
Guangdong	7.42	31.10	5.72	44.24	30.82	10.94	2.48
Guangxi	5.37	22.18	2.54	30.09	20.80	7.13	2.16
Guizhou	19.24	9.57	10.20	39.00	18.39	11.08	9.53
Hainan	0.24	0.00	0.56	0.79	0.51	0.23	0.06
Hebei	13.29	4.66	4.51	22.46	9.40	9.35	3.71
Heilongjiang	4.49	1.40	3.35	9.24	4.82	3.62	0.80
Henan	14.03	16.09	4.67	34.80	18.88	11.64	4.27
Hong Kong	0.81	0.00	1.28	2.08	0.97	1.00	0.12
Hubei	8.76	3.74	3.45	15.95	7.29	6.46	2.20
Hunan	3.64	25.49	3.21	32.34	23.63	6.43	2.27
Jiangsu	11.78	3.16	4.52	19.46	8.35	9.37	1.74
Jiangxi	3.90	3.64	2.10	9.64	5.31	3.32	1.00
Jilin	5.73	1.79	1.71	9.23	3.70	3.85	1.67
Liaoning	10.28	40.66	3.12	54.06	36.45	12.76	4.85
Macao	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Nei Mongol	8.56	4.06	3.69	16.31	7.42	5.99	2.90
Ningxia	1.41	0.00	0.57	1.98	0.52	0.93	0.53
Qinghai	0.21	0.99	0.85	2.06	1.58	0.29	0.19
Shaanxi	2.52	9.75	1.69	13.96	9.46	3.17	1.33
Shandong	13.03	1.02	6.07	20.12	7.75	9.44	2.92
Shanghai	6.14	1.07	1.38	8.60	2.91	4.67	1.01
Shanxi	15.32	0.64	1.83	17.79	3.68	9.31	4.81
Sichuan	9.40	6.06	6.10	21.56	11.51	7.51	2.53
Tianjin	3.33	0.24	0.82	4.40	1.34	2.13	0.93
Xinjiang	0.44	4.89	1.91	7.24	5.52	1.11	0.61
Xizang	0.00	0.00	1.20	1.20	1.14	0.01	0.05
Yunnan	6.79	17.91	2.60	27.30	17.50	6.73	3.06
Zhejiang	8.00	2.73	3.38	14.10	6.38	6.70	1.02
Total	202.36	242.35	91.13	535.84	299.24	171.92	64.68

Zinc Smelting Process

The zinc smelting process is divided into two major categories: zinc hydrometallurgy and zinc pyrometallurgy. The zinc pyrometallurgy includes roasting, reduction, distillation and refining. Zinc hydrometallurgy includes traditional zinc metallurgy and zinc full-hydrometallurgy. Zinc hydrometallurgy is the mainstream of zinc smelting due to comprehensive utilization of resources, relatively low energy consumption and environmentally friendly feature. Up to the early 20th century, its output accounts for about 80% of zinc production in the world.

The traditional zinc metallurgy is in fact the mix of hydrometallurgy and pyrometallurgy, including five main processes of roasting, leaching, purification, electrowinning and casting. Generally, most of the new zinc smelters

use zinc hydrometallurgy. The main advantages are: conducive to working conditions, reduce environmental pollution, continuous production, automated, large-scale and comprehensive utilization of raw materials, improve product quality, reduce overall energy consumption, and increase economic benefits. The zinc fill-hydrometallurgy is based on the technology of the direct pressure leaching of zinc sulfide concentrates, and the sulfur is treated as the form of sulfur element concentrating in the leaching residue.

The processes of zinc pyrometallurgy and traditional zinc hydrometallurgy are shown below:

Fig. 1. The processes of zinc pyrometallurgy

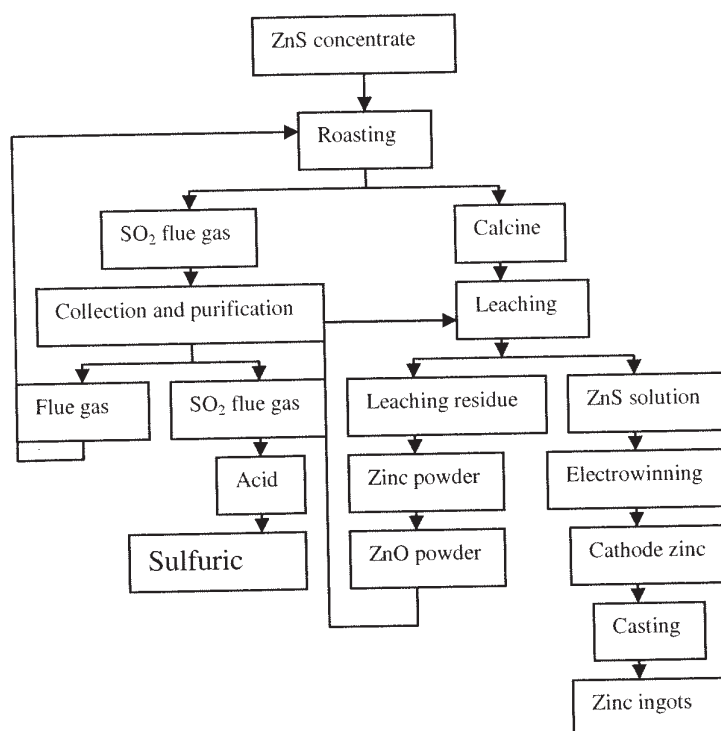
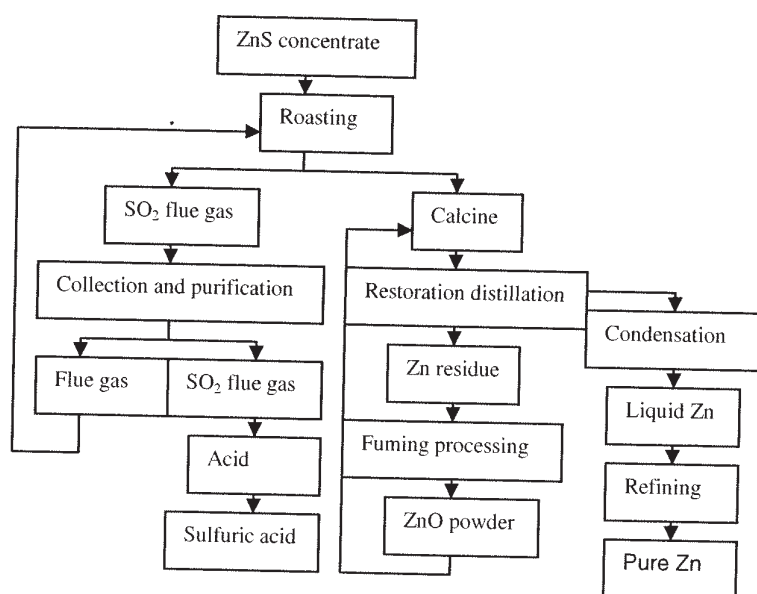


Fig. 2. The processes of zinc hydrometallurgy



Reference: Gao Bao-Jun, "The discussion of the status and development on zinc smelting technologies", China Non-Ferrous Metallurgy, 2008

At the roasting stage, the zinc sulfide (ZnS) concentrate is roasted to zinc oxide (ZnO, or zinc calcine) with the presence of oxygen. At the same time, the sulfur and Hg in the concentrate are respectively converted into sulfur dioxide (SO₂) and Hg⁰. Then the zinc calcine will be leached with sulfuric acid, which is called the leaching process. Finally the leach liquor from the leaching process will be electrolyzed to obtain zinc ingot metal, which is called the electrolyzing process.

The flue gas from the roasting furnace goes through a waste heat boiler, a cyclone, and an electrostatic precipitator (ESP) to remove particulate matter in the gas. The temperature at the inlet of WHB and outlet of ESP are 850 degree C and 310 degree C, respectively. A web scrubber then uses recycled dilute sulfuric acid to clean the flue gas, which is called flue gas cleaning. After the flue gas cleaning, the temperature of the flue gas drops to 40 degree C; and electrostatic demister is used to remove water vapor from the gas stream. The Hg in the flue gas is then reclaimed using the Bolidene-Norzink technology before it enters an acid plant (Hylander and Herbert, 2008)⁷. The BolideneNorzink process is based on the oxidation of Hg vapor by mercuric chloride to form mercurous chloride. Mercurous chloride is insoluble and precipitates as calomel.

In the acid plant, sulfur dioxide is oxidized to sulfur trioxide (SO₃) which is dissolved in strong sulfuric acid. Sulfuric acid is a major by-product of zinc smelting, and up to 2 t of sulfuric acid are produced for each ton of zinc produced at this smelter. The exhaust gas is emitted to the atmosphere from the acid plant.

Baseline Project -International Zinc Projects in China

In 2007, the United States Environmental Protection Agency (USEPA) partnered with Tsinghua University on a \$90,000 study to develop improved information on zinc smelter emissions as an initial step for further policymaking. The intentions of the study were also to upgrade China's Hg emissions inventory by improving methods and approaches for estimating mercury emissions, to improve the UNEP evaluation of global mercury emissions, and to support the broad international capacity building objectives in China. A technical paper, *Estimating mercury emissions from a zinc smelter in relation to China's mercury control policies*, was published in July 2010 (<http://www.ncbi.nlm.nih.gov/pubmed/20716469>). If future funding is available, USEPA plans to fill in

some information gaps that continue to exist and to extend the work to other non-ferrous metals industries in China.

In November 2010, the China Council for International Cooperation on Environment and Development (CCICED), a high-level non-profit international advisory board to the State Council of the Chinese Government, initiated a Special Policy Study (SPS) on China's Policy on Mercury Management, involving experts from Canada, Germany, the Netherlands, Norway, and the U.S., as well as various international organizations. The SPS has identified a list of significant intentional and unintentional mercury emission sources that the expert team will investigate. In addition, the team will consider the following specific topics: analysis on the current status of mercury pollution in China and the world; comparison of mercury management system in China with that of developed countries; strengthening of China's capacity in prevention and control of mercury pollution including improvement of technical level and public awareness with relevant policy recommendations. The team intends to complete its research by the end of September 2011 and present the results at the next CCICED Annual General Meeting. If timely, the findings and results of the SPS will serve as the foundation for the proposed project.

The SINOMER project (Capacity Building for Reducing Mercury Pollution in China - Case Study in Guizhou Province) was completed in 2009. The SINOMER project is the first international cooperation project on mercury for the Chinese Government. The project plays an important role in building capacity and interest regarding mercury pollution in China. An important success factor of SINOMER has been the way the project has acted as a common platform in bringing together people from different sectors to cooperate on mercury issues. The continuation of the project will confirm this role, partly through continuing dissemination and capacity building among experts and between experts and policy makers. The second phase of SINOMER kicked off in 2010, it will focus on concrete measures to reduce the mercury pollution problems through a series of technology assessment and demonstration in combination with support for policy development. Four major sectors regarding mercury pollution are proposed: coal combustion, zinc smelting, mercury mining, and industrial use of mercury.

B.2. Incremental cost reasoning:

Describe the incremental activities requested for GEF financing and the associated global environmental benefits to be delivered by the project:

The request of financial support from GEF's Chemicals focal area is justified by the relatively large volume of mercury emissions resulting from zinc smelting activities in China, the economic driver behind non-ferrous metal production, the severity and global reach of the environmental and health impacts of mercury and the number of people potentially affected.

At the present, only outdated and relatively limited inventory data is available for the zinc smelting operations in China. And there are no prospects of identifying and applying BAT/BEP for the industry. Compared with developed countries, there is still greater disparity in the relevant policy system, thus, it is very difficult to move forward mercury pollution control action plans. With the support of GEF, the pollution sources of zinc smelter can be identified systematically. Based on the pilot projects, best available techniques will be demonstrated and common BAT/BEP technology system for zinc smelting sector in China will be established. Moreover, monitoring, early-warning technology and evaluation of emission reduction measures will be improved along with capacity building; application of feasible technologies will be promoted.

GEF co-funding will assist the government of China and the non-ferrous industry in their detailed understanding of the zinc smelting sector operations, mercury emission inventory, exposure, and BAT/BEP options for the industry. Furthermore, the project will result in a strategy with recommendations to the Central Government to control mercury emissions from the zinc industry.

GEF resources would also be used to broadly disseminate project achievements regionally and globally to promote replication and expansion. The results of the proposed project will be beneficial to UNEP's forthcoming proposal

on the development and application of BAT/BEP to achieve emission reduction of unintentional POPs, GHG, and heavy metals in key economic sectors, including mercury as a pollutant and China as one of the targeted countries. Furthermore, GEF support will help garner international support and leverage future investments for additional projects in the focal area. Finally, the GEF support in this project will contribute to reduce mercury emissions from Zinc Smelters in China, one of the major sources of anthropogenic emissions of mercury to the global environment.

Project Overview

Despite existing political will, the government of China has neither the full resources nor the capacity to address the problem of the country's Hg emissions effectively, nor does it fully understand the scope of the problem in the country. In particular, more information is needed to better understand the extent of mercury contamination from zinc smelting operations, the best available techniques/best environmental practices for mercury control most suitable for the industry, and the cost effectiveness of the control technologies. Sites must be examined and prioritized for intervention. Techniques and technologies successful in other regions of the world, such as in the U.S. and Europe, need to be assessed and if found to be appropriate for China replicated there. Both the national government and local governments need to be able to address these issues in a coherent, strategic manner, with action plans that outline the scope of the issue and define strategic next steps and an implementation schedule.

Overall, the proposed project will promote the sound management of mercury in China's zinc smelting operations and develop a strategy for cleaner operations in this sector, so as to minimize the significant adverse effects of mercury on human health and the environment. Specifically, the project will strengthen national and local capacity to effectively manage and reduce mercury emissions from zinc smelting operations, with a focus on cleaner production methods, and so reduce exposure to mercury emissions in neighboring communities. It will do so by implementing the following project components and activities:

1. *Create a monitoring and coordination system for mercury management focusing on the zinc smelting sector:* In cooperation with co-financing partners, survey and estimate mercury releases in the whole process of zinc smelting, including mining, smelting and waste disposal, through material flow analysis. Evaluate the current status and control technologies of Hg pollution in zinc smelting operations; analyze and characterize ore types; selection of at least two pilot plants for case studies. Due to the uncertainty in the extent of mercury releases and the current control technologies used at zinc enterprises in China, the expected number of zinc enterprises that the project will work with and calculation of estimated emission reductions are not possible at project initiation. In addition, review current status of policy, regulations, and enforcement for mercury emissions from zinc smelting industry in China; develop a gap analysis, including a comparative analysis against other countries, on institutional capacity towards mercury management; the gap analysis will also include study tours abroad to examine possible alternative technologies. Through the inception workshop and annual meetings, the collection of data, analysis of results, production of technical reports, and synthesis for policy recommendations will be performed. The goal of this component is to enable FECCO to successfully monitor mercury emissions and evaluate their impact on human health and the environment from the zinc sector.
2. *Demonstrate BAT/BEP in two pilot plants and calculate cost effectiveness AND Outreach and capacity building:* compare and analyze current application of Hg pollution control technologies in zinc smelting at home and abroad. Evaluate engineering investment, consumption of energy, water and other resources and operability for different kinds of pollution control method. Establish a database for Hg pollution treatment technologies, cleaner production, end-of-treatment and resource recycling in zinc smelting. Identify and analyze BAT/BEP, including alternative production techniques and control mechanisms for the zinc smelting sector; with two pilot plants, select BAT/BEP to establish technically feasible pilot project to achieve Hg removal and innocuous treatment from material, smoke pollutants, Hg-containing acidic wastewater and waste solid in zinc smelting process; evaluate the feasibility of options; identify the best combination of measures through incremental cost analysis and develop the best approach for other zinc smelting plants in China. Lessons learned from pilot and case studies are used in awareness raising workshops targeting zinc smelting operators. The goal of this component is to increase technical capacity for cleaner zinc production.

3. *Analyze mercury management policy and pollution control technologies in the zinc industry:* Assess national and local mechanisms, including financial incentives, to support the uptake of BATs/BEPs for mercury control. Draft a mercury management policy to reduce mercury release from the zinc industry by adoption of BAT/BEP, including socio-economic implications of incremental costs; present to government agencies and policy makers; use the recommendations to inform and influence national policy reform.

B.3. Socioeconomic benefits

Describe the socioeconomic 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.](#):

Zinc has an annual world production of approximately 10 million tons. About 70% of the world's zinc originates from mining, while the remaining 30% comes from recycling secondary zinc. China ranks as the world's top zinc output country with an annual production of 4.8 million tons in 2010. China's zinc production employs an estimated number of more than 150,000 processing workers, out of which 30% are women. Many zinc smelting plants are based in areas where little alternatives for income exist. Zinc smelting operations' potential to contribute to development in China is relatively high.

However, current zinc smelting practices result in significant mercury release, which causes toxic pollution, reduces quality of life, and comes at significant cost to public health. Environmental degradation aggravates poverty, hinders development effectiveness and makes growth unsustainable. People affected by pollution are much more likely to get sick from other diseases, be chronically ill, and have physical and mental disabilities and a shortened lifespan. Because zinc smelting is one of the widely practiced livelihood activity, reducing mercury emissions is key to minimizing zinc smelting environmental and human health impacts. Healthy workers are more productive, thus mercury reduction is the key to capture zinc smelting operation development potential and economic benefits. The project's focus on reducing exposure risks during production processes naturally places specific emphasis on raising awareness of women workers. Furthermore, cleaner control technologies provide additional benefits - improved efficiency and cost savings. New technology enables faster and more efficient processing. These powerful incentives promote adoption and use of control technologies, as well as its replication to the rest of China and other regions of the world.

B.4 Indicate risks

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:

UNIDO has already established a solid working relationship with FECO through cooperation in the area of POPs management. In addition, given the nature of the project, which is focused on pilot testing, capacity building, awareness raising, health risks to local communities reduction and policy development, climate change will have limited impact on achievement of the project's objectives. However, the following possible risks still exist and could prevent the achievement of project objectives:

Risk	Level	Mitigation measure
Estimation of national mercury emissions from zinc smelting sector is not readily available and cannot be measured	Low	Given the extent of the 1999 data, collection of China's national mercury emissions from the zinc sector should not encounter significant problems
National, regional, local governments, and zinc smelting communities do not stay engaged, provide support, nor	Medium	The project will rely on MEP, local municipalities, national and local experts to engage the remaining relevant stakeholders of

remain interested in promoting sound management of mercury		the project. Given previous experience with POPs projects, we do not foresee major problems
National, regional, and local stakeholders are not receptive to awareness training and unwilling to adopt new technologies that reduce mercury emissions and health risks, and are economically viable	Medium	Through the INC process, China is expected to serve as a leader for the participating countries facing similar issues. The project team will continue to publicize the project at the national and global level, therefore unwillingness to adopt changes and new technologies is unlikely to occur.
No alternative or appropriate mercury control technologies for the zinc production process in China	Medium	Though the status of zinc production process in China is very complex, the appropriate technologies may be developed through pilot demonstration, furthermore, the new technologies also could be introduced from developed countries by this project

B.5. Identify key stakeholders

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

Key partners for this project include:

UNIDO will be responsible for overall project implementation, monitoring and reporting. UNIDO will provide a key coordinating role between ongoing mercury initiatives with UNEP, SAICM, the Basel Convention and other ASGM projects in the region and globally (including those funded by US Department of State and US Environmental Protection Agency). UNIDO is the lead agency of the UN system for ASGM issues. UNIDO co-leads the UNEP global mercury partnership on ASGM and, together with its partners, is assisting its member states in addressing the issue. The experience of UNIDO comes from almost 20 years of working in the sector.

FECO will be the main executing partner agency. FECO and UNIDO will jointly be responsible for overall project implementation, coordination of stakeholders and management of pilot projects. They will also coordinate provision of technical expertise and guidance.

Tsinghua University (Department of Environmental Science and Engineering) and Chinese Academy of Sciences (Research Center for Eco-Environmental Sciences) will provide technical expertise and guidance in country regarding the literature research, pilot projects, and development of industry outreach programs and the strategy to the central government on mercury control.

US Environmental Protection Agency (USEPA) and United Nations Environment Program (UNEP) will participate in project activities as needed to provide expertise and guidance.

The **Ministry of Environmental Protection (MEP)** will be involved throughout the project, especially regarding the development of recommendations to the central government for national action plan for zinc smelting operations and sound management of mercury, and raising awareness regarding the health risks of mercury. Other relevant Ministries will be involved as appropriate through coordination by MEP.

Non-Ferrous Metal Society of China, China National Nonferrous Metals Corporation will be involved as industry and market research experts. Their involvement will also ensure that the information for outreach and lessons learned on the health risks of mercury, control technologies, and the potential of a national action planning and international mercury treaty is distributed to all relevant parties involved in China.

Norwegian Institute of Water Research (NIVA) is an independent foundation that performs Research and Development studies in both fresh- and marine waters, monitoring, water resources management and feasibility studies. NIVA has long experience from cooperation with China through a range of projects. Partners in China are applied and basic research institutes, universities and government organizations. Projects have been carried out at national, regional and local level.

Base on the selection and planning for pilot sites and outreach activities, representatives from the zinc smelting community (process workers, teachers, doctors, business owners, or others), local government (local mayor's office, provincial Ministry for Health/Environment, local environment management authority), local universities, and local NGOs will be involved.

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

Awareness about the toxicity of mercury has significantly grown in the past several years. The United Nations Environment Program (UNEP) is leading the international community in developing a legally binding instrument to control this toxic substance. The project will closely follow the development of the negotiating process for the legally binding agreement on mercury particularly on the development and finalization of national strategy action plans. UNEP also formed the Global Mercury Partnership (GMP), formalized in 2008, to address issues holistically and share experience on past and current projects in order to eliminate duplication of effort and improve efficiency. Currently, the partnership operates with 7 partnership areas and non-ferrous metals production is being proposed as one of the new potential areas for cooperation. This project will fully benefit from the partnership, and vice versa, through information sharing and experience, especially of projects conducted in China. UNIDO will also keep an ongoing dialogue with US EPA regarding their continued work in the non-ferrous sector in China. Since FECO is main coordinator for CCICED, FECO and UNIDO will both ensure that the research results from the SPS are communicated and evaluated for use as the baseline for the proposed project.

C. GEF AGENCY INFORMATION:

C.1 Confirm the co-financing amount the GEF agency brings to the project:

UNIDO will contribute \$50,000 in cash to manage the project

C.2 How does the project fit into the GEF agency's program

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:

UNIDO's mandate is to promote the eradication of poverty through the promotion of sustainable productive activities. The organization is committed to introducing technological solutions in an integrated manner to issues that adversely affect human health and the environment. UNIDO has experience in mercury reduction projects in different regions of the world. UNIDO has a field office in China, which can assist in facilitation and interaction with the Chinese counterparts on both the national and local level. Through this experience a strong rapport has been established with international, national, and local stakeholders. This will in turn facilitate the implementation of the proposed project. Since its inception, UNIDO has been an active partner of the Global Mercury Partnership, taking the lead in the Artisanal and Small-Scale Gold Mining area and joining as an active partner in the mercury in product, mercury in waste and Chlor-alkali areas. In these various areas, UNIDO's role is to provide technical guidance based on its experience of the industrial sectors. Contributing to this global endeavor, UNIDO is currently implementing and developing a number of projects in the area of mercury pollution control including addressing the issue of mercury use in Artisanal and Small-Scale Gold Mining together with GEF and other partners, managing mercury content in compact fluorescent lamps with the Quick Start Initiative of SAICM.

The proposed project is relevant and contributes to all three outcomes of the United Nations Development Assistance Framework (UNDAF) for China from 2011 to 2015. UNIDO will provide the following through the proposed project:

- Advice to relevant government bodies on the strengthening of sustainable development policy and regulations;
- Training and capacity building to enterprises and government as well as demonstrating best-practice and new technologies;
- Capacity building to support government and micro and small enterprises to promote responsible economic development; and
- Support relevant government bodies prior to the negotiation of international treaties and conventions

Recently, the Chinese Government's RMB 4 trillion (\$586 billion) stimulus package has provided new opportunities in supporting the green economy with \$30 billion set aside by Government for green projects and plans to boost investments in alternative green industry, renewable energy and environmental protection measures, and an increase in relevant R&D investment to encourage emerging green industries. Building on the experience of the last three decades, China aims to move its social development agenda forward at an even greater speed, pursuing ever more ambitious goals befitting an advancing middle-income society and the world's second largest economy. Transition to a green, low carbon economy will require the introduction of more environmentally sustainable work practices, and enterprises will need support during this transition to ensure it is equitable and efficient, including in re-training workforces and creating green jobs. UNIDO is well placed to contribute to smoothing this transition. It can provide expert advice to governments and enterprises, as they adapt to the new requirements resulting from environmentally sustainable development.

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. INSTITUTIONAL ARRANGEMENT:

This project will be implemented by only one GEF agency, UNIDO. However, UNIDO will coordinate closely with China Council for International Cooperation on Environment and Development (CCICED) Special Policy Study on "China's Policy on Mercury Management" in regards to the development of a national strategy action plan, and with UNEP's forthcoming proposal on the development and application of BAT/BEP to achieve emission reduction of unintentional POPs, GHG, and heavy metals in key economic sectors, including mercury as a pollutant and China as one of the targeted countries. UNIDO is an active participant and contributor to the UNEP Global Mercury Partnership and therefore, the results of this project will be fully available to UNEP in their future activities in the wider non-ferrous metals activities.

B. PROJECT IMPLEMENTATION ARRANGEMENT:

For this project, UNIDO will be the GEF implementing agency, and the Foreign Economic Cooperation Office (FECO) of Ministry of Environment Protection in China, will be the main executing partner agency. FECO and UNIDO have been successfully cooperating previously and currently on POPs management as well as Montreal Protocol projects.

UNIDO will be playing a key coordinating role and responsible for overall project implementation, monitoring and reporting. FECO and UNIDO will jointly be responsible for project implementation, coordination of stakeholders and management of pilot projects. They will also coordinate the provision of technical expertise and guidance. FECO will be responsible for day-to-day activities in country. All project components will be implemented in collaboration with a variety of local and national stakeholders, including Chinese Academy of Sciences, Non-Ferrous Metal Society of China, China National Nonferrous Metals Corporation, and Tsinghua University.

PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF

Not Applicable



PART V: APPROVAL/ENDORSEMENT BY 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 (MM/dd/yyyy)
Jiandi Ye	Division Director	MINISTRY OF FINANCE	01/20/2012

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 CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Dmitri Piskunov, Managing Director, Programme Development and Technical Cooperation Division GEF Focal Point			Ludovic Bernaudat, Environmental Management Branch 	+43 126026 3648	L.Bernaudat@unido.org

ANNEX A: PROJECT RESULTS FRAMEWORK

HIERARCHY OF OBJECTIVES		Indicators	Baseline	Target	Sources of verification	Assumptions
Project Development Objective: Reduce the impacts of mercury on human health and the environment from zinc smelting operations through sound chemical management		Policy-makers and trained technical experts promote replication throughout China	Some but very limited capacity exist in China to fully characterize and control the current mercury emissions from the zinc sector	Local and national stakeholders in China have a good understanding of mercury emissions and its associated risks from the zinc industry. BAT/BEP are fully implemented and with significant mercury reductions at pilot sites. Policy-makers consider new regulations for mercury management in China	Project and monitoring reports, field survey data and reports	
Outcome 1. FECO created a coordination and monitoring system for mercury management focusing the zinc smelting sector		Comprehensive data and reports developed for policy development	Existing inventory data (1999) from the zinc sector in China is outdated	Complete characterization of mercury emissions, exposure, and control technologies in China	Survey data, research reports	Data exist from zinc production plants around China. Zinc operators cooperate and willing to share site specific data with proposed project
Output 1.1 Scope of the zinc smelting operations in China evaluated and better understood (data on emissions, exposure, health related)		Number of zinc production sites in inventory, with estimates of mercury emissions and population at risk.	Understanding of scope of zinc production in China is poor. Current and comprehensive data does not exist	Inventory expanded and updated to include all major zinc production plants in China. Scope of mercury emission and control technologies from the zinc sector better understood	Project progress and monitoring reports. Inventory reports	Government and zinc production communities provide continuous support for project activities
Output 1.2 Gap analysis, including comparative analysis against other countries, on institution capacity focusing on zinc industry completed (data on current systems, policies, capacity in China and abroad)		Number of plants visited on study tours; number of studies researched	No information on other countries situation is currently available	Full comparison to assess best practices	Report on gap analysis	Information is available and private zinc enterprises are willing and able to share and discuss their operational procedures and mercury control technologies
Output 1.3 Inception workshop is		Project	No workshops	Detailed reporting of the	Corresponding	Inception and annual

conducted and inception reports are developed (including the identification of indicators); annual project reports and project implementation reports are developed; annual review meetings are conducted	management is functional	have been conducted previously	project activities	reports	meetings on the project are successful
Output 1.4 FECO is able to successfully monitor mercury emissions and their impact on human health and the environment in the zinc sector	Mercury emissions from the zinc smelting sector and their impacts on human health are regularly monitored	FECO is currently unable to monitor mercury emissions from the zinc sector effectively	Effective and efficient monitoring systems are in place	Mercury emissions reports, monitoring data	FECO is able to adapt and learn new procedures and/or technologies to collect and monitor mercury emissions from the zinc smelting industry
Outcome 2. BATs/BEPs adopted for cleaner zinc production	Behavior changed and proper management of mercury and adoption of control technologies at zinc production sites executed. Number of sites willing to adopt new technologies and reduce mercury emissions and exposure	No pilot projects and technology training have been conducted in China.	Successfully conducted at least 2 pilot projects in China and raise awareness over risks and the importance of appropriate control technologies. Changes in mercury emission and exposure	Progress and monitoring reports, hospital visits, number of death and/or illnesses due to mercury poisoning	Technical staff and other stakeholders willing to learn and adopt new behavior and technologies for mercury management. Technologies introduced result in measurable changes in mercury emission and exposure. Technical expertise is available to measure accurately
Output 2.1 Two pilot project demonstrations fully implemented	Number of pilot projects implemented. Number of stakeholder meetings.	No pilot and mercury reduction projects have been conducted	At least 2 pilot projects successfully implemented by local and national stakeholders in China. The amount of mercury emissions from pilot sites	Progress and monitoring reports. Stakeholder group meeting minutes.	Local and national stakeholders are receptive to technology training programs. Local communities willing to adopt new technologies that

	Number of workers trained. Number of workshop conducted. A series of Hg samples are analyzed to assess the Hg pollution in the pilot enterprises	are reduced through adoption of new control technologies	Training attendance.	reduce mercury emissions and health risks, and are economically viable
Output 2.2 Lessons learned are disseminated at workshops for future replication (workshops involve private industry, national, regional, and local stakeholders)	Number of zinc smelting plant operators attended the workshop; number of operators plan for BAT/BEP replication	No formal outreach has been conducted to the zinc smelting industry in China	Pilot projects result in interesting and valuable lessons learned which are documented and presented to various stakeholders for replication	Pilot projects results are significant, successful and of interest to involved stakeholders in the zinc industry
Output 2.3 Awareness-raised and capacity increased among zinc smelting operators	List of lessons learned, number of recommendations resulting from pilot projects	No awareness activities among zinc smelting operators were organized and conducted previously	Lessons learned are well taken by the zinc operators and plan for BAT/BEP replication are underway	Zinc operators are willing to be involved and take proactive measures
Outcome 3. FECO developed mercury management policy to facilitate the uptake of BATs/BEPs	National mercury management policy plan is developed	No national policies in place to effectively manage mercury; no system in place to facilitate the uptake of BATs/BEPs	Policy reform will facilitate the uptake of BATs/BEPs in the zinc smelting sector	Information is readily available, comprehensive, interpretable, and easy to understand. Policy makers and other stakeholders are cooperative and willing to work together to promote and adopt new technologies and regulations for mercury management
Output 3.1 Assessment of national and local mechanisms, including	Number of investment	No assessment has been	National and local mechanisms are identified	Information is readily available, comprehensive,

needs and investment opportunities, to support uptake of BATs/BEPs completed	opportunities, number of needed national and local mechanisms to support uptake of BATs/BEPs	performed previously	and assessed for uptake of BATs/BEPs	includes recommendations	interpretable, and easy to understand
Output 3.2 Guidelines, trainings, and briefs for BATs/BEPs developed and promoted in relevant national and local decision-making processes	Number of presentations and documents generated and presented for mercury management in the zinc sector	Limited guidelines, trainings, and briefs have been prepared and presented previously for the zinc sector	Guidelines and briefs are sufficient, effective, and useful for all stakeholders and well taken by policy-makers	Guidelines, training materials, and briefs	Policy makers and other stakeholders are cooperative and willing to work together to promote and adopt new technologies and regulations for mercury management
Output 3.3 A national policy plan indicating the required policy reforms is submitted to national authorities for consideration and eventual adoption.	Number of new regulations passed and enforcement cases of new regulations focusing on zinc smelting operations	No national policy document has been prepared previously	Policy makers consider new regulations for mercury management in China	National policy plan; new regulations	Policy makers and other stakeholders are cooperative and willing to work together to promote and adopt new technologies and regulations for mercury management
ACTIVITIES FOR OUTCOME 1					
1.1 Survey and estimate mercury releases from the entire process of zinc smelting, including exposure and risk levels and health impacts	Number of surveys and assessments performed	No comprehensive surveys and assessments have been conducted	Amount of mercury releases, exposure and risk levels, and health impacts from the entire process of zinc smelting is known	Survey results, assessment and compilation reports	Data is readily available; survey and estimation are easy to perform and compile
1.2 Produce comparative analysis of current Chinese policy and regulations on mercury emissions from zinc smelting sector and those of other countries	Number of plants visited on study tour; number of studies researched	No comparative analysis has been performed previously	A better understanding of control technologies in China as compared to other countries	Survey, research, and evaluation results; interviews, site visits, and literature reviews	Information is readily available; zinc plants in China and abroad are willing to provide, share, and discuss such information
1.3 Conduct Inception workshop and develop inception reports;	Number of presentations	No workshop and annual	Presentations and technical reports are	Inception report and technical	Inception and annual meetings are well attended

conduct annual review meetings and develop technical project implementation reports	and technical reports generated and presented	meetings have been organized previously	comprehensive, easy to understand, and useful for dissemination	annual reports	and successfully conducted
ACTIVITIES FOR OUTCOME 2	Indicators	Baseline	Target	Sources of verification	Assumptions
<u>2.1</u> Execute two pilot demonstration projects	Number of pilot projects implemented; number of personnel trained; number of meetings	No pilot BAT/BEP projects for mercury control have been conducted previously	BAT/BEP successfully implemented at the two pilot plants; local and national stakeholders have technical knowledge and hands-on experience in conducting mercury emission reduction projects	Progress and monitoring reports, stakeholder meetings and reports	Zinc enterprises in China are willing to adopt new technologies that reduce mercury emissions and are economically viable
<u>2.2</u> Raise awareness among zinc smelting operators, share lessons learned from pilot and case studies	Number of workshops and outreach events conducted	No formal outreach have been conducted	Lessons learned and project results are shared with zinc smelting industry	List of lessons learned, successful approaches, challenges; list of zinc enterprises attended	Lessons learned are of interest and value to zinc enterprises
ACTIVITIES FOR OUTCOME 3	Indicators	Baseline	Target	Sources of verification	Assumptions
<u>3.1</u> Identify and assess national and local mechanisms to support uptake of BATs/BEPs	Number of areas, including economic incentives, identified for policy reform	No reviews and/or assessments have been performed	Mechanisms, including economic incentives, exist to support the uptake of BAT/BEP for the zinc industry	Assessment reports and recommendations	Information is readily available and accurate
<u>3.2</u> Develop and promote guidelines/briefs, and conduct trainings for policy reform in relevant national and local decision-making processes	Meetings and presentations to government agencies/policy-makers	No guidelines and/or briefs have been drafted or prepared	The guidelines/trainings/briefs, helps inform and guide national strategy action plans/framework on mercury management in the zinc smelting sector	The guidelines/briefs; number of presentations made; list and number of government agencies/policy-makers reached	Guideline to reduce mercury release from the zinc industry are valuable and of interests to policy-makers in preparation of national action planning

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

Not Applicable

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT USING GEF/LDCF/SCCF RESOURCES

<i>Position Titles</i>	<i>\$/ Person Week*</i>	<i>Estimated Person Weeks**</i>	<i>Tasks To Be Performed</i>
For Project Management			
Local			
Project Manager	500	100	The Project Manager will be responsible for day-to-day management of the project, monthly reporting from the field, and quarterly reporting to UNIDO, as well as bi-annual monitoring/evaluation in the field (part time)
Communications Manager	250	100	The Communications Manager will be responsible to facilitate dialogues between project personnel and other stakeholders, including local municipalities and private sector. He/she will also be responsible for outreach to the zinc industry (part time)
Local team leader	500	100	The local team leader of the project will be responsible for the implementation and management of the project in China (part time)
International			
Independent evaluator	1,000	40	The project will undergo an independent evaluation in order to learn from the implementation for future initiatives
Justification for travel, if any:			
For Technical Assistance			
Local			
Consultant for mercury emissions management - mercury emission and regulations expert	500	148	The consultant will participate in study tours and conduct research on mercury emission and regulations in the zinc sector. He/she will evaluate the mercury emission and regulations, present recommendations for national action planning and regulations. The consultant will also collaborate with BAT/BEP expert to develop a strategy to reduce mercury release in the zinc sector.
Consultant for mercury emissions management - Zinc production process and BAT/BEP expert	500	148	The consultant will focus on the Gap Analysis Report by collecting and integrating survey data, research on detailed production processes, raw material inputs and mercury emission outputs, research on BAT/BEP for mercury management in the zinc sector. The

			consultant will also collaborate with emission expert to develop a strategy to reduce mercury release in the zinc sector.
International			
Consultant for mercury management - Assessment Expert	4,000	6	The consultant will provide technical assistance during the characterization of mercury emissions phase, including review of technical data and/or survey results, provide assistance on compilation and evaluation of various data sources and documents regarding mercury emissions
Consultant for zinc smelting process - Industry and Policy Expert	4,000	6.5	The consultant will work with BAT/BEP and Regulations experts to jointly propose zinc process modifications for various plants in China. The consultant will provide technical guidance to FECO and involve in industry meetings, and formulation of national action planning recommendations toward mercury management
Justification for travel, if any: The weekly fee for the international consultants is US\$ 3,500, or \$700/person/day. Additional provision for travel and DSA is expected to cover 5 days of stay and US\$ 1,000 provision for travel for each consultant: total estimated additional costs for travel would represent US\$ 5,800 for three international consultants.			

* Provide dollar rate per person week. ** Total person weeks needed to carry out the tasks.

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

NOT APPLICABLE

B. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY:

NOT APPLICABLE

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMENTATION STATUS IN THE TABLE BELOW:

<i>Project Preparation Activities Approved</i>	<i>Implementation Status</i>	<i>GEF/LDCF/SCCF Amount (\$)</i>				<i>Cofinancing (\$)</i>
		<i>Amount Approved</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>	<i>Uncommitted Amount*</i>	
	(Select)					
	(Select)					
	(Select)					
	(Select)					
	(Select)					
	(Select)					
	(Select)					
	(Select)					
Total		0	0	0	0	0

* Any uncommitted amounts should be returned to the GEF Trust Fund. This is not a physical transfer of money, but achieved through reporting and netting out from disbursement request to Trustee. Please indicate expected date of refund transaction to Trustee.

ANNEX E: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF Trust Fund or to your Agency (and/or revolving fund that will be set up)
N/A

ANNEX F: TIMELINE OF PROJECT OUTPUTS

Timeline of the outputs

Output	Year 1				Year 2			
Output 1.1 Scope of the zinc smelting operations in China evaluated and better understood (data on emissions, exposure, health related)								
Output 1.2 Gap analysis, including comparative analysis against other countries, on institution capacity focusing on zinc industry completed (data on current systems, policies, capacity in China and abroad)								
Output 1.3 Inception workshop is conducted and inception reports are developed (including the identification of indicators); annual project reports and project implementation reports are developed; annual review meetings are conducted								
Output 1.4 FECO is able to successfully monitor mercury emissions and their impact on human health and the environment in the zinc sector								
Output 2.1 Two pilot project demonstrations fully implemented								
Output 2.2 Lessons learned are disseminated at workshops for future replication (workshops involve private industry, national, regional, and local stakeholders)								
Output 2.3 Awareness-raised and capacity increased among zinc smelting operators								
Output 3.1 Assessment of national and local mechanisms, including needs and investment opportunities, to support uptake of BATs/BEPs completed								
Output 3.2 Guidelines, trainings, and briefs for BATs/BEPs developed and promoted in relevant national and local decision-making processes								
Output 3.3 A national policy plan indicating the required policy reforms is submitted to national authorities for consideration and eventual adoption.								