

PROJECT INFORMATION DOCUMENT (PID)
APPRAISAL STAGE

Report No.: PIDA1045

Project Name	CH GEF Municipal Solid Waste Management Project (P126832)
Region	EAST ASIA AND PACIFIC
Country	China
Sector(s)	Solid waste management (100%)
Theme(s)	Pollution management and environmental health (50%), Environmental policies and institutions (50%)
Lending Instrument	Specific Investment Loan
Project ID	P126832
Borrower(s)	International Department, Ministry of Finance
Implementing Agency	Foreign Economic Cooperation Office of Ministry of Environmental Protection
Environmental Category	A-Full Assessment
Date PID Prepared/Updated	20-May-2014
Estimated Date of Board Approval	22-Sep-2014
Decision	
Other Decision	

I. Project Context

Country Context

The rapid increase of production and consumption in China since 1978 has brought significant environmental pollution and ecological degradation. The Chinese Government is committed to reversing this downward environmental trend and has made environmental protection a national priority. As part of China's commitment, China has ratified numerous conventions including the Stockholm Convention on Persistent Organic Pollutants (POPs) in 2004 for which a National Implementation Program (NIP) was prepared in 2007. POPs are a group of chemical substances that persist in the environment, can be transported far from their sources and bio-accumulated through the food web, and can "lead to serious health effects including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease and even diminished intelligence." Under the Stockholm Convention, a total of 21 chemical substances are listed as POPs, including pesticides (such as DDT), industrial chemicals (such as polychlorinated biphenyls, PCBs) and unintentional by-products of industrial processes, such as dioxins and furans. According to the NIP, municipal solid waste (MSW) incineration is one of the key sources of dioxin and furan release in China.

Sectoral and Institutional Context

Municipal solid waste (MSW) management is a growing concern for China's cities. With China's rapid

economic development, urbanization, and rising standards of living, the quantity of MSW collected and transported has increased more than five-fold nationwide from about 85 thousand tons per day in 1980 to about 430 thousand tons per day in 2009 and is projected to reach 1.6 million tons per day in 2030. No country has ever experienced as large and rapid an increase in waste generation.

Modern MSW management, which, in order of preference, favors minimization (reduction), reuse, recycling, recover (digestion and composting) is gaining ground in China. To reduce waste and increase recycling, the Chinese government has formulated a number of important laws and development plans including sections in the Five Year Plans, the ‘Solid Waste Pollution Prevention and Control Law’ (2005), and the ‘Circular Economy Promotion Law’ (2009). The 12th Five Year Plan (FYP) envisages that by 2015 all counties will be able to adequately manage solid wastes. The 12th FYP emphasizes recycling and aims to demonstrate in 80 cities proper waste and recycling of post-consumer materials, including through rational integrated recycling systems, effective management, and a variety of recycling approaches and technologies to achieve a higher rate of recovery. Recently, the State Council published a “public announcement on kitchen waste management”, which focuses on separate collection and treatment of restaurant waste and requires that 33 cities implement plans to this end.

An increasing number of cities are preparing and implementing plans for source segregation and recycling. One such city is Ningbo which is implementing a United States Dollar (USD) 246 million segregation and recycling project supported by a USD 80 million World Bank loan. The project addresses a key aspect of MSW in China, namely the large organic content, which along with other materials, such as plastic bag and packaging materials that are not recycled by informal waste pickers are transported to disposal facilities. One key constraint to the development of MSW segregation and recycling plans is the lack of statistical data on waste generated in a municipality; rather, data compiled in the Yearbook Urban and Rural Construction Statistical Yearbook represents only the amount of waste that is collected and transported for treatment or disposal, excluding waste that is recycled by the informal recycling or disposal routes. The latter is said to make up 20 percent – 30 percent of the total waste stream. Without a complete and thorough understanding of the amount and types of MSW being generated by households and industrial, commercial and institutional entities, it is impossible to plan effective waste segregation and recycling programs, or plan appropriate treatment and disposal facilities.

At the same time, incineration is becoming more and more the disposal method of choice in urban areas motivated by a shortage of urban land for landfills and the national policy encouraging energy generation from waste (“waste-to-energy”). A series of incentive policies are in place to encourage investment in MSW incinerators, including value added tax refunding, prioritized commercial bank loans, state subsidy (2%) for loan interest, and favorable feed-in tariff for the electricity sale into the grid. The April 2011 State Council-endorsed a formal document entitled “Suggestions for Further Strengthening MSW Management”, which was jointly prepared by 16 ministries requires that in cities that lack land priority should be given to incineration. Consequently, the number of MSW incinerators in China is projected to increase from 93 in 2009 to 200 in 2015, with a corresponding increase in daily disposal capacity from 55.4 thousand tons to 140 thousand tons.

Plans for MSW management, including disposal through incineration, are generally made within municipal or, at times, district level jurisdictional boundaries. Regional management options are seldom applied. This has in part also fuelled the proliferation of MSW incinerators, including of smaller and recycled plants, which match smaller jurisdictions’ waste generation and financial capacity.

MSW incinerators may be publicly or privately owned. In the latter case, they are often established under a concessionary agreement between the municipal /district urban management bureau and an investor, whereby the former provides land and the latter investment capital.

Tipping fees, set by municipal governments and included in the concession agreement, are generally low

compared to Western levels. Often arrears in the payment of tipping fees accumulate since district governments face difficulty in collecting waste management fees from households. Recognizing this problem, the 12th FYP envisages increasing both the waste treatment levy and the level of fiscal subsidies. Furthermore, the above-referenced 'Suggestions for Further Strengthening MSW Management' recommends pushing forward tipping fee collection based on the "polluters pay" principle.

Regulatory Framework regarding MSW Incineration

At the national level, MSW management, including disposal, is under the purview of the Ministry of Housing, Urban and Rural Development (MOHURD). At the municipal level, urban management bureaus (UMBs) are responsible for MSW collection, transportation and disposal. UMBs are also responsible for construction and operation of disposal facilities, including landfills and incineration plants. District level environmental protection bureaus (EPBs) are charged with monitoring MSW incinerators' air emissions, waste water discharges and fly ash disposal, and enforcing standards. This "institutional split" is different from many developed countries where environmental protection authorities are in charge of all aspects of MSW management.

An environmental impact assessment (EIA) is required prior to the construction of an MSW incinerator. The EIA document lays out in generic terms the operational and environmental standards that the plants must abide by. Construction of the plant may begin when the EIA is approved. Following a trial period, the plant is commissioned and may begin regular operations when it is certified that it fulfils the environmental requirements set out in the EIA. After commissioning, UMBs and EPBs monitor the plant strictly within the boundaries of their legislated mandates. Integrated monitoring of plant operating conditions and environmental impact is not prescribed in legislation and occurs rarely.

Dioxin Emissions and MSW Incineration

The dioxin release inventory in China's NIP identified waste incineration as the third largest among nine dioxin release sources in China, following ferrous and non-ferrous metal production, and heat and power generation. Few of China's MSW incinerators apply in their operations the Best Available Techniques (BAT) or Best Environmental Practices (BEP) defined in the Stockholm Convention (SC) on POPs in a comprehensive manner. This is particularly true for older incinerators. Inadequate waste input control, operations management, and monitoring and control systems prevent optimal combustion, leading to dioxin formation in post-combustion zones. The high moisture content of the waste delivered to incinerators inhibits the combustion process, while chlorine containing waste fractions lead to dioxin precursors, both causing generation of dioxins. Where air pollution control devices are not sophisticated, dioxins absorbed in small particulates remain in the flue gas and are emitted to the atmosphere. Sophisticated incinerators can reduce the formation of dioxins, but still have to address the problem of dioxins captured in the residues of pollution control devices. New facilities in large cities are generally designed such that they can limit emissions to below 0.1 ng toxic equivalent (TEQ)/Nm³. However, often incinerator operators lack the skills and knowledge of BAT/BEP. There is no regulatory requirement for certification of incinerator operators; neither is there a training and certification program specially designed for incinerator operators.

Regulatory Environment for the Management of Dioxin Emissions from MSW Incinerators

Policy makers in China recognize the adverse environmental impacts that MSW incinerators may cause. The April 2011, the State Council-endorsed 'Suggestions for Further Strengthening MSW Management' requires that compliance by MSW incinerators with emission standards be ensured. Plants are to establish daily monitoring and provide monthly reports to the UMBs and EPBs. Moreover, the supervision capacity of UMBs and EPBs are also to be strengthened and the feasibility of introducing third-party professional institutions to implement supervision is to be explored. Finally,

technical innovation in clean combustion, dioxin control, and safe fly ash disposal is to be promoted. The recent PRC State Council and World Bank joint publication Urban China Toward Efficient, Inclusive, and Sustainable Urbanization also calls for improved environmental management of waste disposal, in general and waste incineration, in particular.

Several technical codes issued by MOHURD regulate the operations of MSW incinerators. These include (i) Technical Code for Projects of Municipal Solid Waste Incinerators (CJJ90-2009), (ii) Technical Specification for Operation, Maintenance and Safety of MSW Incinerators (CJJ128-2009), and (iii) MSW Incinerator and Heat Recovery Boiler (GB/T18750-2008). The codes need to be updated to be more consistent with the Stockholm Convention BAT/BEP and to take into account the technical characteristics of the fluidized bed incineration technology, which is gaining more prominence in China.

MOHURD intends for all UMBs to continuously monitor incinerator operating conditions. To this end, MOHURD's 12th Five Year Program includes an initiative with an estimated cost of USD 330million to equip each city with an information technology (IT) based system to monitor every incinerator. The first step in this initiative would be for MOHURD to develop technical specifications and protocols for the IT systems.

With regard to dioxin emissions, on May 30, 2014 the Ministry of Environmental Protection (MEP) issued an amendment to the Standard for Pollution Control on the Municipal Solid Waste Incineration (GB 18485-2014 GB 18485-2001 2014-07-01) reducing the dioxin emission limit from 1.0 ng I-TEQ/Nm³ to 0.1 ng I-TEQ/Nm³. Existing incinerators must comply with the new limit value by January 1, 2016. With this amendment, China has the same limit on dioxin emissions as Japan and the European Union.

However, there are still some important regulatory weaknesses, which may be summarized as follows:

- (a) Key regulatory requirements for the establishment and operation of waste incinerators in China are essentially technical requirements for operating temperature of not less than 850° C and a residence time of not less than 2 seconds. While there are some additional technical guidelines in place, they are not standards or regulatory requirements. There are no regulatory provisions for corrective actions against non-compliant incinerators. Furthermore, the regulation does not specify the circumstances and durations when waste incinerators can have operating temperatures below 850° C, such as during start up and shut-down of incinerator units, or actions required to maintain the required combustion temperature.
- (b) There is no legal requirement for regulators to monitor on a continuous basis, incinerator operating conditions and other indicators that, in the absence of the ability to continuously monitor dioxin emissions, allow detection of excessive dioxin emissions.
- (c) Requirements and conditions proposed or required in the original EIA document that lead to the establishment of the waste incinerator do not form part of the site-specific operating conditions. Once the EIA is approved and permit is issued for facility construction, the content of the EIA document is almost never used as a regulatory requirement.
- (d) Sampling and analysis of dioxin emission is carried out once a year by an institute contracted by that the incinerator operator. There are about 20 institutes with such capacity nationwide, mostly concentrated in the industrial eastern provinces. The existing standard for dioxin emissions from MSW incinerators Standard for Pollution Control from MSW Incineration (GB 18485-2001) requires that "normal operating conditions be maintained at the time of testing. However, EPBs do not have jurisdiction over waste management and the operating conditions of the waste incinerator. This situation leads to the critical issue that when dioxin emission is being sampled, no factual data are recorded on operating conditions that effect dioxin emissions, such as the waste feed rate, type of material being fed, fuel consumption, lime and activated carbon consumption. Consequently, when dioxin sampling is conducted once a year, there is no

assurance that the waste incinerator is actually being operated under typical operating condition.

(e) Chinese regulations stipulate that fly ash, which contains dioxins, heavy metals and other toxic pollutants, and, therefore, is toxic, be adequately treated and disposed of in hazardous waste landfills. However, this requirement is often not fulfilled due to high cost, unavailability of hazardous waste landfills, or poor enforcement.

Public Disclosure of Emission Data. There are no clear requirements for the disclosure of dioxin emission test results to the public. In late 2013, MEP embarked on an initiative to disclose more pollution source information through the stipulation of key national, provincial and local pollution sources. Online monitoring air pollution data from key sources are to be disclosed to the public with one day of collection. As yet, MSW incinerators have not been classified as key national emission sources and dioxin emissions cannot be monitored on line. Some provincial EPDs have disclosed this information and may include MSW incinerators in their provincial lists of key pollution sources. In general, the lack of reliable information on pollutant emissions from MSW incinerators coupled with the public's general limited knowledge on the environmental and public health impacts of such emissions fuels the public's aversion to any MSW incineration, even where it has a legitimate place in an integrated MSW management system after maximizing other preferred waste management measures and follows BAT and BEP.

Demonstration Cities

The project will build capacity in two “demonstration cities”, namely Kunming and Ningbo, for application of BAT/BEP. Kunming city is the capital of Yunnan Province and a typical growing second-tier city in China. In 2010, the urban area of Kunming City had a population of 4.85 million generating 4,850 tons of MSW per day. By 2015, the population is expected to reach 5.22 million generating 5,220 tons of MSW per day. In 2010, the daily MSW collection capacity in Kunming's urban areas was 6,133tons. Kunming has taken several notable initiatives to promote modern MSW management. Having been designated by the central government as the MSW segregation demonstration city in Yunnan, Kunming is in the process of preparing a city wide MSW segregation plan and looking for good models to learn from.

With regard to disposal of household waste, Kunming has decided to rely entirely on incineration. To this end, four incinerators, Dongjiao, Wuhua, Xishan, and Konggang, with a total processing capacity of 4,600tons per day were built between 2008 and 2010. Three of the incinerators employ the fluidized bed technology and one the mass burning technology. Both technologies are widely applied across China. As such, project experiences with these incinerators would be highly relevant for replication in other incinerators. Furthermore, being about to complete a fifth plant, Chenggong with a capacity of 700 tons per day, Kunming is also typical of cities with oversized infrastructure and associated operational budget constraints.

Information on the incinerators' operating conditions is scarce at best. In January 2013, Kunming UMB began requiring incinerators to provide monthly reports on operating conditions, by filling out a standard form. However, to date only one of the incinerators has provided such reports and data collected are incomplete. Information requested in the form excludes important data, such as hourly operating temperatures during operations, flue gas oxygen concentration, and heavy metal emissions, as well as toxicity levels of fly ash. Furthermore, not all data requested in the form, such as fuel consumption were adequately provided.

Under these circumstances, during project preparation, expert assessment of the incinerators had relied on review of facility designs and general operating guidelines, visual inspection of the facilities, and interviews with facility operators. The assessment concluded that the plants' design and general operating guidelines are consistent with the Stockholm Convention BAT/BEP. It recommended institution of plant specific standard operating procedures, operator training and certification, and

implementation of a preventive maintenance program. Additionally, several improvements in the in the pollution control system were recommended to ensure consistent achievement of the 0.1ng TEQ/Nm³ limit.

Under the proposed project, the above listed four incinerators would undergo thorough operational and environmental performance audits to determine the extent to which their current operations are consistent with Stockholm Convention BAT and BEP and the procedural and hardware improvements needed for them to fully comply with them. The incinerators are committed to undertake an improvement program and financially viable would be provided with project grant support for capital investments in needed hardware.

On the regulatory side, the Yunnan Environmental Protection Department (YEPD) has piloted, with UK Department for International Development support, integrated permits for wastewater discharges from industrial enterprises, a first in China. Kunming City wishes to use a similar approach to regulate MSW incinerators in line with national and Stockholm Convention requirements. With regard to information disclosure, Kunming UMB together with YEPD intends to use its existing state-of-the-art, interactive Digital Urban Management Platform (<http://km12319.com>) to publicize real-time MSW incinerator operating performance and (non-dioxin) emission data.

The other demonstration city, Ningbo also has three incinerators, which process 2,950 tons of the 3,455 tons of MSW generated in the city daily. The city is implementing the World Bank supported Ningbo Municipal Solid Waste Minimization and Recycling Project, which aims to assist selected districts in Ningbo Municipality to increase the volume and proportion of municipal solid waste recycled with processes for waste separation at source and recycling. Under this project, Ningbo would receive support to institute in UMB and EPB the capacity to continuously monitor incinerators' operating conditions and to strengthen the capacity of the EPB dioxin laboratory. No investments are foreseen for Ningbo's incinerators.

II. Project Development Objective(s)

The project aims to build capacity and demonstrate best available techniques and best environmental practices in MSW incineration in accordance with the Stockholm Convention.

III. Project Description

Component 1. Capacity Building for Improved Operation and Regulation of MSW Incinerators

This Component would support two closely linked sub-components aiming to increase capacity to better operate and regulate MSW incinerators so as to reduce dioxin and other pollutant emissions:

- a. Building Capacity for Improved Incinerator Operations and Emissions Control through: operational and environmental performance audits, operational improvement programs, BAT/BEP training programs for incinerator operators and managers, and investments in selected demonstration incinerators in equipment for further dioxin reduction; and
- b. Capacity Building for Improved Regulation of MSW Incinerators through: piloting of integrated permits; establishing continuous access by regulators to incinerator operating and emission data; stack tests for dioxin; enhancing the sampling capacity and QC\$QA at the Ningbo Dioxin Laboratory, training of regulators; updating/developing national-level technical standards for MSW incinerator operators, and public awareness raising and disclosure of incinerator operating and emissions data.

Component 2. Capacity Building for Improved MSW Management Planning

This component would promote improved MSW management planning through: a study on regional planning of MSW disposal; a study on the system of statistical indicators and MSW classification; a twinning scheme for Kunming MSW management officials to learn from Ningbo counterparts on their MSW segregation project experiences; an assessment of the impact of MSW segregation on dioxin emissions in Ningbo; and project results monitoring and dissemination.

Component 3. Project Management

IV. Financing (in USD Million)

Total Project Cost:	32.89	Total Bank Financing:	0.00
Financing Gap:	0.00		
Financing Source			Amount
Borrower			20.89
Global Environment Facility (GEF)			12.00
Total			32.89

The project will be funded through a USD12 million GEF grant and USD20.91 million counterpart funds.

Additionally, the project will be supported by the implementation of activities under the Ningbo Municipal Solid Waste Minimization and Recycling Project worth about USD 30 million. The Stockholm Convention Guidelines on BAT/Guidance on BEP emphasizes the importance for environmental protection of coordinating the waste incineration process with upstream management techniques and of considering activities to minimize waste, notably resource recovery, reuse, recycling, waste separation in MSW management planning.¹ By providing USD 246 million to waste minimization, including notably through source segregation, the above-mentioned Ningbo loan project strongly complements the GEF grant activities for the attainment of the PDO. Under Component 2, the GEF grant will support an assessment of the impact of MSW segregation in project districts on dioxin emissions from an incinerator that receives waste stream from those districts. The study will help the incinerator adjust its operating conditions in accordance with the evolving waste composition. Results of the study will inform other Chinese cities' integrated MSW management plans. Specifically, Kunming and Ningbo will be twinned with the objective of Kunming city and district MSW management officials to learn directly from their counterparts' hands on experiences in implementing the segregation and recycling activities. As such, the Ningbo loan project is part of the baseline, while the GEF grant funded activities are incremental. However, in general, both World Bank loan and GEF grant funded activities should be viewed as parts of the larger joint Government of China – World Bank effort to promote environmentally sustainable MSW management in China.

V. Implementation

A. Institutional and Implementation Arrangements

FECO has established a Project Management Office (henceforth "FECO PMO") to be in charge of overall project implementation in coordination with the project management offices in Kunming and in

¹ <http://chm.pops.int/Implementation/BATandBEP/Guidance/tabid/3636/Default.aspx>. Accessed on May 27, 2014.

Ningbo (see below). FECO PMO will also be responsible for overall project result monitoring, and for preparing annual progress reports, based on input from the Kunming and Ningbo PMOs. FECO PMO will execute the national level activities under Components 1 and 2, while technical oversight will be provided by relevant units of MOHURD.

In Kunming, the existing PMO of the Yunnan Urban Environment Project established at the Environmental Cooperation Office under Yunnan Provincial Environmental Protection Department (henceforth “Yunnan PMO”) will take the responsibility for overall project monitoring and coordination for Kunming activities. Kunming Municipality has established a Project Leadership Group, which is headed by the responsible vice mayor, and comprises Kunming UMB, the Kunming EPB, the Finance Bureau, the Commerce Bureau, the Development and Reform Commission, the Industry and Information Commission, and the municipality’s five district governments.

In Ningbo, a Project Management Office established at the Ningbo Solid Waste Management Center under the Ningbo Municipal EPB (henceforth “Ningbo PMO”) will be responsible for project management, coordination and implementation of Ningbo related activities under Component 1 and 2.

B. Results Monitoring and Evaluation

Project results would be monitored continuously to gauge progress towards the PDO. FECO would manage the overall Monitoring and Evaluation (M&E) system and provide the Bank with semi-annual reports. The PMOs in Kunming and Ningbo would carry out M&E of the activities that they execute. They would transmit the information to FECO through semi-annual reports.

C. Sustainability

The sustainability of the demonstrated operational improvements at the demonstration incinerators beyond the project will depend on the plant’s ability to cover the associated recurrent costs and regulatory enforcement. The project will select incinerators that demonstrate the needed financial capacity and build local monitoring and enforcement capacity, as mechanisms to address these factors.

Continuous monitoring of operating conditions by KUMB is likely to be sustainable as MOHURD is committed to promoting this practice nationwide.

VI. Safeguard Policies (including public consultation)

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

Comments (optional)

Environmental Assessment OP/BP 4.01 is triggered.

VII. Contact point

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