China, People's Republic of: Sustainable Management of Fly Ash from Municipal Solid Waste Incineration

Project Name: Sustainable Management of Fly Ash from Municipal Solid Waste Incineration

Project Number: 49019-001

Country: China, People's Republic of

Project Status: Closed

Project Type / Modality of Assistance: Technical Assistance

Source of Funding / Amount: TA 8963-PRC: Sustainable Management of Fly Ash from Municipal Solid Waste Incineration Technical Assistance Special Fund US$ 300,000.00

Strategic Agendas: Environmentally sustainable growth

Drivers of Change: Governance and capacity development

Sector / Subsector: Water and other urban infrastructure and services - Urban solid waste management

Gender Equity and Mainstreaming: No gender elements

Description: The Government of the People's Republic of China (PRC) has requested policy and advisory technical assistance (TA) from the Asian Development Bank (ADB) to enhance the policies and practices regarding the safe and sustainable management and reuse of fly ash from municipal solid waste incineration plants in the PRC. The TA is in line with the key policies of the government's Twelfth Five-Year Plan, 2011-2015, which supports increased incineration of total treated solid waste and strategically supports key initiatives planned in the PRC's National New-Type Urbanization Plan, 2014-2020. The TA is aligned with the strategic priorities of ADB's Midterm Review of Strategy 2020 and the country partnership strategy, 2011-2015 for the PRC to achieve environmentally sustainable growth.

The impact will be improved urban environmental quality in the PRC, aligned with the PRC's National New-Type Urbanization Plan, 2014-2020. The outcome will be improved sustainability of fly ash management from municipal solid waste incineration in the PRC. The TA is expected to have three outputs that will contribute to the achievement of the outcome and impact: (i) technical standards for safe capture, processing, reuse, and sustainable disposal of fly ash from municipal solid waste incineration plants (MSWIPs) developed; (ii) policy recommendations and implementation action plan for safe reuse and sustainable disposal of fly ash from MSWIPs prepared; and (iii) capacity on technologies and establishing an information and service center on advanced sustainable MSWIP fly ash management in the PRC improved.
The PRC's reform and economic miracle have lifted millions out of poverty and created wealth and an urban middle class. The urbanization ratio increased and the urban population rose to nearly 700 million in 2013. However, rapid urbanization came at a heavy toll on the environment. The environmental impact of urban development caused by polluting industries, urban sprawl, unsustainable transport, consumption-based lifestyles, and illegal dumping of solid waste is massive. The effects are environmental degradation, loss of natural land and farmland, and pollution of air, water, and soil. Solid waste generation increases disproportionately faster than urban population growth, mainly as the rising urban middle class is pushing up per capita consumption levels. Integrated, efficient, and sustainable municipal solid waste management, municipal waste incineration, and sustainable management of fly ash and slag are the key goals that PRC cities need to achieve, which will also contribute to better environmental quality across the country. Managing fly ash is particularly challenging because it often contains toxic components and is considered hazardous waste depending on the characteristics of the waste, the incineration technology, and operations. The magnitude of the task is significant. For example, fly ash amounts to an estimated 3.2 million tons per year in the PRC, 300,000 tons per year in the Beijing Tianjin Hebei region, and 50,000 tons per year in Tianjin.

The Master Plan for National Urban Domestic Solid Waste Treatment Facilities under the Twelfth Five-Year Plan, 2011-2015 aims to increase the capacity of urban incineration of domestic waste by 35% nationwide. Thus, an increasing number of MSWIPs were built in the PRC, amounting to an estimated 200 at present, and 100 more are planned. While incineration solves some of the solid waste management problems, it leaves large amounts of fly ash and slag in need of environmentally sound reuse and/or sustainable final disposal. In Tianjin, a pilot facility to treat fly ash and convert it into a reusable resource for construction materials is under way, and is expected to be in operation by the end of 2015.

In the early days of waste incineration, toxic pollutants such as dioxins had caused serious threats to public health, but current technologies including sophisticated filtration and detoxification systems make it possible to situate a MSWIP in urban areas, and to minimize their impact on environmental quality, especially air quality. Solutions to safe management and reuse of fly ash and slag have been developed and mainstreamed in the aforementioned countries. Fly ash and slag are being retrieved, metals and other deposits extracted, and the residue is being reused as supplements to building materials such as asphalt, cement, and bricks. This is seen as one of the sustainable solutions for final disposal of fly ash and slag, compared with disposal in sanitary landfill sites or subgrade deposit areas. In the PRC, research, standards, and administrative regulations for pollution control from MSWIPs and for sustainable management of slag from MSWIPs have been successfully developed and applied. However, sustainable use and final disposal of fly ash remain a challenge. In some cases, fly ash is categorized as hazardous waste and is treated depending on the composition of the waste that is burned and depending on the incineration process and temperature. Research of policies and practices abroad, and of lessons to be applied to the PRC MSWIPs, as well as the development of technical guidance, standardization, and administrative regulations are urgently needed.

**Impact**
Urban environmental quality in the PRC improved (PRC National New-Type Urbanization Plan, 2014-2020)

**Project Outcome**

<table>
<thead>
<tr>
<th>Description of Outcome</th>
<th>Sustainability of fly ash management from municipal solid waste incineration in the PRC improved</th>
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<tbody>
<tr>
<td>Progress Toward Outcome</td>
<td>Sustainable use of fly ash depends on toxicity i.e. content of heavy metals, chlorides and un-stabilized toxic elements such as dioxins, both if disposed in sanitary or hazardous landfills and especially if reused in construction materials. A representative survey of incineration plants in the PRC including sampling, and laboratory testing of fly ash especially with regards to dioxin and heavy metal content was carried out and the gathered primary and secondary data have been used to develop technical guidelines and policy recommendations for improved sustainable management, treatment and final disposal of fly ash in the PRC.</td>
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**Implementation Progress**

<table>
<thead>
<tr>
<th>Description of Project Outputs</th>
<th>1. Technical standards for safe capture, processing, reuse, and sustainable disposal of fly ash from MSWIPs developed 2. Policy recommendations and implementation action plan for safe reuse and sustainable disposal of fly ash from MSWIPs prepared 3. Capacity on technologies and establishing an information and service center on advanced sustainable MSWIP fly ash management in the PRC improved</th>
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</thead>
<tbody>
<tr>
<td>Status of Implementation Progress (Outputs, Activities, and Issues)</td>
<td>The consulting firm was mobilized in May 2016. An interim workshop was completed in July 2017 and the interim report was presented including fly ash treatment methods and technologies with evaluations of advantages and disadvantages. International and domestic good practices and challenges were discussed. Training was provided for policy makers, scientists and incineration and fly ash treatment plant operators. A draft final report and presentation materials were submitted to ADB in November 2017. The final workshop was held in Tianjin on 12 December 2017 with participants from the Ministry of Housing and Urban-Rural Development, Solid Waste and Chemicals Management Center. The final report was submitted and approved in December 2017. It included further specified technical guidelines and policy recommendations.</td>
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**Geographical Location**
Tianjin

**Summary of Environmental and Social Aspects**
Environmental Aspects

Involuntary Resettlement

Indigenous Peoples

### Stakeholder Communication, Participation, and Consultation

**During Project Design**

Consultation meetings were held with the Tianjin Municipal Government, Tianjin Environmental Protection Bureau, Tianjin Fly Ash Engineering Center, and municipal solid waste incinerator plant operators, landfill operators, and other stakeholders were conducted during the technical assistance project preparation.

**During Project Implementation**

Consultation meetings were held with the Ministry of Housing, and Urban-Rural Development, the Ministry of Environmental Protection, the Tianjin Municipal Government, Tianjin Environmental Protection Bureau, Tianjin Fly Ash Engineering Center, various municipal solid waste incinerator plant operators and fly ash treatment and management operators, landfill operators, and other stakeholders were conducted during the technical assistance project implementation. For a survey to collect primary data, incinerator operators were consulted. A representative survey and consultations involving municipal waste incineration and fly ash treatment plants was carried out and further consultations involving landfill operators and potential construction material supplement users were conducted.

### Business Opportunities

Consulting Services

It is estimated that the TA will require 7 person-months of international and 15 person-months of national consulting services, including: (i) three international specialists (a) solid waste management and waste incineration plant specialist/team leader (4 person-months), (b) solid waste policy, standards, and institutional specialist (2 person-months), and (c) environment specialist (1 person-month); and (ii) four national specialists (a) solid waste policy, standards, and institutional specialist/deputy team leader (5 person-months), (b) solid waste management and waste incineration plant specialist (4 person-months), (c) environment specialist (4 person-months), and (d) information technology and database management specialist (2 person-months). The specialists will be engaged through a firm in accordance with Guidelines on the Use of Consultants (2013, as amended from time to time) of the Asian Development Bank using the quality- and cost-based selection method, with a quality cost ratio of 90:10.

### Responsible ADB Officer

Rau, Stefan

### Responsible ADB Department

East Asia Department

### Responsible ADB Division

Urban and Social Sectors Division, EARD

### Executing Agencies

Tianjin Municipal Government
B1102 TEDA Bldg.
Jienfannan Road, Tianjin
People's Republic of China, 30042

### Timetable

**Concept Clearance**

01 Jul 2015

**Fact Finding**

-  

**MRM**

-  

**Approval**

25 Sep 2015

**Last Review Mission**

-  

**Last PDS Update**

21 Mar 2018

### TA 8963-PRC

#### Milestones

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<th>Signing Date</th>
<th>Effectivity Date</th>
<th>Closing</th>
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#### Financing Plan/TA Utilization

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#### Cumulative Disbursements

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