

Document of  
**The World Bank**  
**FOR OFFICIAL USE ONLY**

Report No: ICR00006175

IMPLEMENTATION COMPLETION AND RESULTS REPORT

TRUST FUND NUMBER TFOA3066

ON A

GRANT FROM THE GLOBAL ENVIRONMENT FACILITY

IN THE AMOUNT OF US\$8 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR THE

CAPACITY STRENGTHENING FOR IMPLEMENTATION OF MINAMATA CONVENTION  
ON MERCURY PROJECT

June 30, 2023

Environment, Natural Resources and The Blue Economy Global Practice  
East Asia and Pacific Region

## CURRENCY EQUIVALENTS

(Exchange Rate Effective October 30, 2022)

Currency Unit = Chinese Yuan Renminbi (CNY)

---

CNY 7.25 = US\$1

---

US\$0.14 = CNY 1

FISCAL YEAR

July 1 – June 30

Regional Vice President: **Manuela V. Ferro**

Country Director: **Mara K. Warwick**

Regional Director: **Benoit Bosquet**

Practice Manager: **Ann Jeannette Glauber**

Task Team Leader(s): **Ms. Anisi, Laurent Granier**

ICR Main Contributor: **Gabriel Seth Sidman**

## ABBREVIATIONS AND ACRONYMS

<b>CPF</b>	Country Partnership Framework
<b>DEE</b>	Department of Ecology and Environment
<b>ESMF</b>	Environmental and Social Management Framework
<b>FECO</b>	Foreign Economic Cooperation Office
<b>GEF</b>	Global Environment Facility
<b>ICR</b>	Implementation Completion and Results Report
<b>ISR</b>	Implementation Status and Results Report
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MEE</b>	Ministry of Ecology and the Environment
<b>MEP</b>	Ministry of Environmental Protection
<b>MIS</b>	Management Information System
<b>MTR</b>	Midterm Review
<b>NCGMC</b>	National Coordination Group for the Minamata Convention
<b>NESS</b>	National Environmental Statistics System
<b>NSB</b>	National Statistics Bureau
<b>PAD</b>	Project Appraisal Document
<b>PDO</b>	Project Development Objective
<b>PMO</b>	Project Management Office
<b>PPS</b>	Pollution Permitting System
<b>PVC</b>	Polyvinyl Chloride

## TABLE OF CONTENTS

<b>DATA SHEET .....</b>	<b>1</b>
<b>I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES .....</b>	<b>5</b>
<b>A. CONTEXT AT APPRAISAL .....</b>	<b>5</b>
<b>B. SIGNIFICANT CHANGES DURING IMPLEMENTATION .....</b>	<b>8</b>
<b>II. OUTCOME .....</b>	<b>9</b>
<b>A. RELEVANCE OF PDOs .....</b>	<b>9</b>
<b>B. ACHIEVEMENT OF PDOs (EFFICACY) .....</b>	<b>10</b>
<b>C. EFFICIENCY .....</b>	<b>16</b>
<b>D. JUSTIFICATION OF OVERALL OUTCOME RATING .....</b>	<b>17</b>
<b>E. OTHER OUTCOMES AND IMPACTS.....</b>	<b>17</b>
<b>III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME .....</b>	<b>19</b>
<b>A. KEY FACTORS DURING PREPARATION .....</b>	<b>19</b>
<b>B. KEY FACTORS DURING IMPLEMENTATION .....</b>	<b>20</b>
<b>IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME... 21</b>	
<b>A. QUALITY OF MONITORING AND EVALUATION (M&amp;E) .....</b>	<b>21</b>
<b>B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE .....</b>	<b>22</b>
<b>C. BANK PERFORMANCE .....</b>	<b>24</b>
<b>D. RISK TO DEVELOPMENT OUTCOME .....</b>	<b>26</b>
<b>LESSONS AND RECOMMENDATIONS .....</b>	<b>26</b>
<b>ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS .....</b>	<b>28</b>
<b>ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION .....</b>	<b>34</b>
<b>ANNEX 3. PROJECT COST BY COMPONENT .....</b>	<b>36</b>
<b>ANNEX 4. EFFICIENCY ANALYSIS .....</b>	<b>37</b>
<b>ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS....</b>	<b>38</b>
<b>ANNEX 7. ACTIONS OF THE NATIONAL STRATEGY IMPLEMENTED, AND PROJECT OUTPUTS/OUTCOMES VERSUS MINAMATA CONVENTION REQUIREMENTS.....</b>	<b>40</b>



**DATA SHEET**

**BASIC INFORMATION**

**Product Information**

Project ID	Project Name
P151281	Capacity Strengthening for Implementation of Minamata Convention on Mercury Project
Country	Financing Instrument
China	Investment Project Financing
Original EA Category	Revised EA Category
Partial Assessment (B)	Partial Assessment (B)

**Organizations**

Borrower	Implementing Agency
People's Republic of China	Foreign Economic Cooperation Office of the Ministry of Ecology and Environment

**Project Development Objective (PDO)**

Original PDO

The PDOs are to (a) develop a national strategy on mercury and related action plans, and (b) improve China's mercury management capacity and readiness to implement this strategy in the project provinces.

PDO as stated in the legal agreement

The project development objectives (PDOs) are to (a) develop a national strategy on mercury and related action plans, and (b) improve China’s mercury management capacity and readiness to implement this strategy in the project provinces.



**FINANCING**

	Original Amount (US\$)	Revised Amount (US\$)	Actual Disbursed (US\$)
<b>World Bank Financing</b>			
TF-A3066	8,000,000	7,739,733	7,739,733
<b>Total</b>	<b>8,000,000</b>	<b>7,739,733</b>	<b>7,739,733</b>
<b>Non-World Bank Financing</b>			
Borrower/Recipient	8,000,000	12,690,000	12,900,060
<b>Total</b>	<b>8,000,000</b>	<b>12,690,000</b>	<b>12,900,060</b>
<b>Total Project Cost</b>	<b>16,000,000</b>	<b>20,429,733</b>	<b>20,639,793</b>

**KEY DATES**

Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
09-Sep-2016	06-Feb-2017	17-May-2019	30-Apr-2021	30-Oct-2022

**RESTRUCTURING AND/OR ADDITIONAL FINANCING**

Date(s)	Amount Disbursed (US\$M)	Key Revisions
29-Oct-2020	3.20	Change in Results Framework Change in Components and Cost Change in Loan Closing Date(s) Change in Implementation Schedule

**KEY RATINGS**

Outcome	Bank Performance	M&E Quality
Highly Satisfactory	Satisfactory	Substantial

**RATINGS OF PROJECT PERFORMANCE IN ISRs**

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US\$M)
01	16-Dec-2016	Satisfactory	Satisfactory	0



02	27-Jun-2017	Satisfactory	Satisfactory	.80
03	26-Dec-2017	Satisfactory	Moderately Satisfactory	1.04
04	27-Jun-2018	Satisfactory	Moderately Satisfactory	1.10
05	07-Jan-2019	Satisfactory	Moderately Satisfactory	1.31
06	03-Oct-2019	Moderately Satisfactory	Moderately Satisfactory	1.75
07	20-Apr-2020	Moderately Satisfactory	Moderately Satisfactory	2.42
08	30-Oct-2020	Moderately Satisfactory	Moderately Satisfactory	3.38
09	11-Jun-2021	Moderately Satisfactory	Moderately Satisfactory	4.01
10	17-Dec-2021	Moderately Satisfactory	Moderately Satisfactory	4.39
11	07-Jul-2022	Satisfactory	Moderately Satisfactory	5.81
12	28-Oct-2022	Satisfactory	Satisfactory	7.49

## SECTORS AND THEMES

### Sectors

Major Sector/Sector (%)

**Public Administration 80**

Central Government (Central Agencies) 60

Sub-National Government 20

**Energy and Extractives 10**

Mining 10

**Industry, Trade and Services 10**

Other Industry, Trade and Services 10

### Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3) (%)

**Environment and Natural Resource Management 100**

Environmental policies and institutions 100



**ADM STAFF**

Role	At Approval	At ICR
Vice President:	Victoria Kwakwa	Manuela V. Ferro
Country Director:	Bert Hofman	Mara K. Warwick
Director:	Julia Bucknall	Benoit Bosquet
Practice Manager/Manager:	Iain G. Shuker	Ann Jeannette Glauber
Project Team Leader:	Ms. Anisi, Jiang Ru	Ms. Anisi, Laurent Granier
ICR Co Author:		Gabriel Seth Sidman





## I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

### A. CONTEXT AT APPRAISAL

#### Context

1. Mercury is a chemical element that is among the most toxic contaminants worldwide and of global concern. Mercury accumulates through the food chain and exposure can disrupt development in fetuses and young children; cause long-term cognitive dysfunction along with neurological development impacts; and lead to detrimental effects on the digestive and immune systems, lungs, kidneys, skin, and eyes.<sup>1</sup> Mercury is also highly mobile—it can circle the globe before it becomes oxidized, making its control an issue of transboundary importance.
2. As of 2013, China was estimated to be the biggest emitter of atmospheric mercury in the world, accounting for about one third of global emissions.<sup>2</sup> Mercury waste and emissions left portions of the Chinese population at risk of dangerous exposure to mercury through the use of contaminated water, air, and food sources such as fish or even rice grown in soils with elevated levels of mercury. In the same year, the Minamata Convention on Mercury was adopted by the international community to protect human health and the environment from anthropogenic emissions and releases of mercury and its compounds. China became a signatory to the Convention in 2013 and ratified it in 2016.<sup>3</sup> During the negotiation process of the convention, China confirmed that its mercury production, uses, and emissions involved several entities from many different sectors.
3. At the time of appraisal, reducing exposure to mercury was therefore a high priority for the Chinese Government. China was working to meet its Convention commitments, including the creation of a Minamata Initial Assessment, which provided a first review of the main sources of mercury emissions, releases, and priorities for reducing exposure in the country, along with a review of China's policies related to mercury reduction. A few other previous interventions had focused on mercury abatement for specific sectors, but this piecemeal approach was not enough to give an overarching and comprehensive understanding of mercury emission and use in the country, which was needed for the requirements of the convention. The use of mercury in China was highly complex, woven into many industrial processes in many sectors over a wide geographical spread. Efforts to understand, map, and monitor mercury use in the country were difficult. There was a noted lack of data on mercury mines, recycling facilities, and information on mercury trade at both the country and local levels. Methods for estimating emissions remained very basic and were not calibrated for local conditions. China also lacked policy and strategy

---

<sup>1</sup> Rustagi, N., and R. Singh. 2010. "Mercury and Health Care." *Indian Journal of Occupational and Environmental Medicine*: 14(2), 45–48.

<sup>2</sup> United Nations Environment Programme. 2013. *Global Mercury Assessment 2013*. Geneva, Switzerland: UN Environment Programme, Chemicals and Health Branch.

<sup>3</sup> The Minamata Convention commits its members to reducing mercury exposure through banning new mercury mines and phasing out existing ones, phasing out and phasing down mercury use in many products and processes, and controlling air emissions and land and water releases, among other measures.



documents to evaluate the cost-benefit and effectiveness of various mercury control measures along with policies that would translate these measures into action.

4. The Government therefore requested World Bank support to develop a national strategy on mercury and action plans for priority sectors, along with building capacity in key provinces to manage, monitor, and control the use, release, and emission of mercury. These efforts were needed to obtain a more accurate and holistic understanding of the mercury footprint in the country and take important steps toward accurately monitoring and scaling down China's mercury use to help meet its obligations under the Minamata Convention and improve the health of its population.

5. This was the first World Bank-supported project in China for the reduction of mercury releases and emissions, although there had been several Global Environment Facility (GEF)-financed projects previously implemented by other institutions. The project meant to tackle the complex mix of industries which released and emitted mercury in China, the limited information and tracking of mercury flows in the country that had not been systematically assessed, and the lack of an overarching plan or prioritization of the actions needed to reduce use and emissions.

6. The project was aligned to the World Bank Group's Country Partnership Strategy for China FY2013–16 (Report No. 67566), which included an outcome on 'Supporting Greener Growth', of which one sub-outcome was 'Demonstrating Pollution Management Measures'. Under this outcome, the World Bank was supporting the reduction in air pollution and hazardous waste and improving environmental governance. In addition, mercury reduction was a key component of the programming directions<sup>4</sup> for the sixth GEF replenishment phase, 2014–2018. As part of the financial mechanism of the Minamata Convention, GEF provides financial support to eligible countries, including China, to reduce mercury use worldwide. The GEF-6 Chemicals and Waste focal area had an objective to 'develop the enabling conditions, tools and environment for the sound management of harmful chemicals and wastes'.

### **Theory of Change (Results Chain)**

7. The Project Appraisal Document (PAD; Report No. PAD139) did not include a Theory of Change, as it was not a World Bank requirement at that time.<sup>5</sup> A Theory of Change was developed during the 2019 midterm review (MTR) and was fine-tuned for this Implementation Completion and Results Report (ICR) (Figure 1).

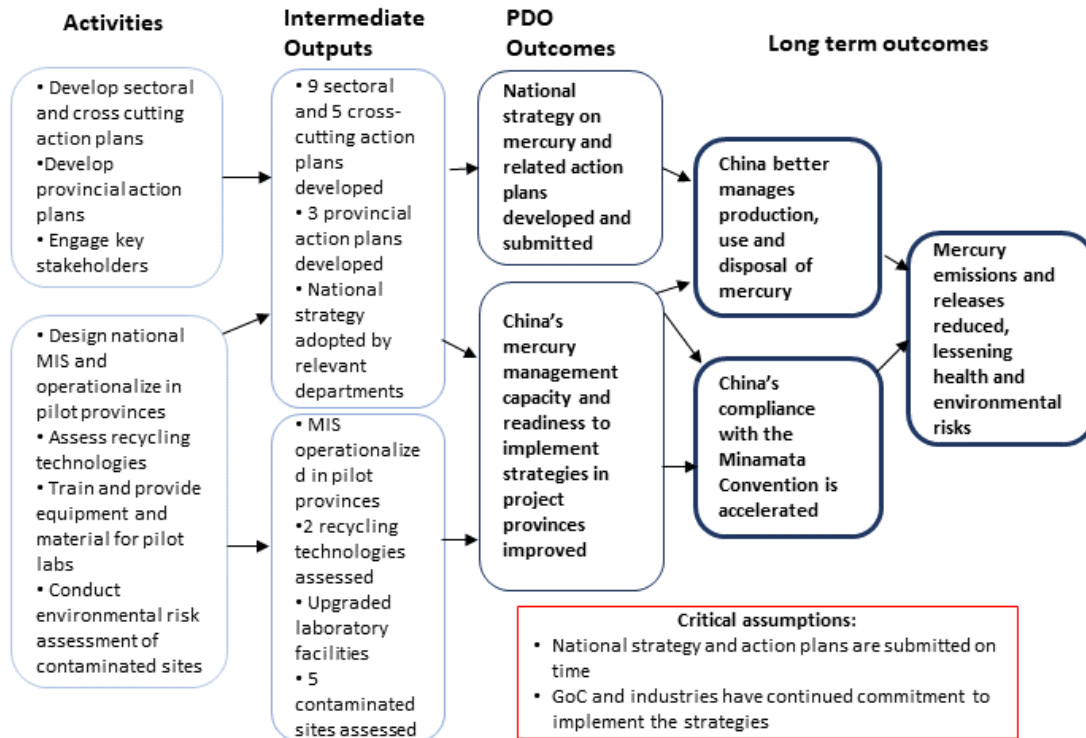
---

<sup>4</sup> Global Environment Facility, GEF Assembly Document GEF/A.5/07/Rev.01, May 2014.

<sup>5</sup> The inclusion of a Theory of Change in PADs became mandatory in May 2018, after the approval date of this project.



Figure 1. Theory of Change Developed during the MTR and Fine-Tuned for This Report



### Project Development Objectives (PDO)

8. The PDOs in the PAD and in the Grant Agreement were identical: (a) develop a national strategy on mercury and related action plans and (b) improve the Recipient's (China's) mercury management capacity and readiness to implement this strategy in the project provinces. The participating provinces were Guizhou, Hunan, and Shaanxi. As this project was financed by the GEF, the PDOs were also the 'Global Environmental Objectives', reflecting the need for GEF-financed projects to enhance global environmental benefits.

### Key Expected Outcomes and Outcome Indicators

9. There were two PDO-level results indicators in the PAD:

- A national strategy developed and submitted for approval (corresponding to the first PDO outcome)
- Mercury flow tracked by a fully functional management information system (MIS; corresponding to the second PDO outcome).



## Components

**Component 1: Development of National Strategy and Sectoral and Provincial Action Plans** (At approval: US\$3.6 million GEF grant; at completion: US\$3.7 million)

10. Activities under this component provided analytical and technical support for the development and delivery of a national mercury strategy and sector- and province-specific action plans. The Ministry of Environmental Protection (MEP)/Foreign Economic Cooperation Office (FECO), supported by project-financed consultants, worked closely with industry associations and other stakeholders to deliver analytical reports and proposals constituting the various elements of the comprehensive national strategy. The component also supported stakeholder engagement activities and development of specific action plans in the pilot provinces of Guizhou, Hunan, and Shaanxi.

**Component 2: Capacity Strengthening for Mercury Management and Risk Assessment** (At approval: US\$4.0 million GEF grant; at completion: US\$3.8 million)

11. Activities under this component built capacity at the national level, for the project provinces and other stakeholders on mercury management and risk assessment, through, among others, (a) the development of a national mercury MIS, (b) the capacity building of pilot laboratories, (c) environmental risk assessments of selected mercury-contaminated sites, (d) assessment of mercury management and recycling and recycling technologies in relevant sectors, and (e) knowledge sharing and dissemination.

**Component 3: Project Management** (At approval: US\$0.4 million GEF grant; at completion: US\$0.3 million)

12. This component financed project management and implementation support activities, including coordination with relevant stakeholders, at the national level and the project provinces.

## B. SIGNIFICANT CHANGES DURING IMPLEMENTATION

### Revised PDOs and Outcome Targets

13. The PDOs were not revised.

### Revised PDO Indicators

14. The PDO indicators were not revised.

### Revised Components

15. The components were not revised, although over the course of the project implementation there were some minor adjustments in allocation of funding between components, as discussed in section III.B 'Key Factors during Implementation' below.



## Other Changes

16. The project was restructured in October 2020 as a result of the MTR, with an extension of 18 months from the original end date of April 30, 2021, to October 30, 2022. The Results Framework and implementation schedule were revised to reflect the newly proposed closing date for the end targets of the key results indicators and the updated schedule for the remaining project activities.

## Rationale for Changes and Their Implication on the Original Theory of Change

17. The extension had no impact on the original Theory of Change, the project design, the PDO, or indicators and targets in the Results Framework.

18. One of the main reasons for the extension was the COVID-19 pandemic, which struck during project implementation and caused periodic lockdowns and other restrictions in China, which delayed and cancelled some project-related travel. Other factors contributing to the need for extension included the following: the original implementation duration of four years was unrealistic; additional activities were implemented due to significant savings because of exchange rate fluctuations and competitive procurement processes; procurement delays occurred early on due to difficulty in receiving bids for the multiple highly technical consulting activities; and institutional reforms led to leadership and staffing changes in the environmental authorities at the national, provincial, and local levels.

## II. OUTCOME

### A. RELEVANCE OF PDOs

**Rating: High**

#### Assessment of Relevance of PDOs and Rating

19. The project is aligned with the World Bank Group’s Country Partnership Framework (CPF) for the People’s Republic of China FY2020–2025, (Report No. 117875-CN). One of the three main areas of engagement in the CPF is “promoting greener growth including reducing air, soil, water pollution,” which the project supported by promoting an enabling environment for China to reduce air, soil, and water pollution from mercury. In addition, cooperation on global knowledge and development, which is a cross-cutting theme in the CPF, was supported by helping China to report on mercury emissions and releases to the Minamata Convention. The project was in line with the CPF goal to support China’s contribution to global public goods, as mercury can be emitted into the atmosphere, be built into products sold through regional and global supply chains, and can accumulate in fish and sediment far from its waste source. The project also supported minimizing greenhouse gas emissions as a co-benefit of reduced mercury emissions from industrial processes, which is also a global public good.

20. Objective 2.2 of the CPF is “Reducing air, soil, water and marine plastic pollution,” as China faces institutional restraints such as variable local capacity to monitor, report, and share environmental data and enforce environmental regulations, limited data transparency, and lack of institutional coordination for pollution management. The CPF highlights the project’s relevance to Objective 2.2 and points out that



mercury pollution is a major issue for the country. The project’s PDO indicators are included as supplementary progress indicators for this objective within the CPF.

21. The project remains highly relevant to China’s 14th Five-Year Plan (2021–25), which aims to reduce air, water, and soil pollution through its goal to “accelerate the green transformation of the development model.” This goal includes specific targets for “clean production transformations” of the cement clinker and non-ferrous industries, both of which are specifically addressed by the project. The plan also aims to improve coordination and governance of pollution control, both of which are improved by the national strategy component of the project.

22. The project has high relevance to the current strategy for the GEF-8 replenishment phase (2022–2026).<sup>6</sup> GEF-8’s Chemicals and Waste focal area has an objective that aims at the “creation, strengthening and supporting the enabling environment and policy coherence to transform the manufacture, use and sound management of chemicals and to eliminate waste and chemical pollution.” Mercury continues to be a GEF priority, as GEF remains one of the few multilateral sources of funding for the Minamata Convention and mercury reduction in general.

**B. ACHIEVEMENT OF PDOs (EFFICACY)**

**Rating: High**

23. The project had two outcomes: (a) develop a national strategy on mercury and related action plans and (b) improve the Recipient’s (China’s) mercury management capacity and readiness to implement this strategy in the project provinces.

**Assessment of Achievement of Each Objective/Outcome**

*Outcome 1: Develop a national strategy on mercury and related action plans and achievements of the relevant PDO level and intermediate level indicators*

24. With project support, FECO developed the national strategy and submitted it to the Ministry of Ecology and the Environment (MEE) for approval, thus achieving the target of PDO Indicator 1. Further, the strategy and action plans developed under the project have already been incorporated into and are being implemented through China’s 14th Five-Year Plan and other national and sectoral strategies and programs (Table 1).

**Table 1. Overview of Indicator Targets and Achievements for Outcome 1.**

Indicator	Original Target	Actual Achievement
<b>PDO Indicator</b>		
1. National strategy developed and submitted for approval	Submitted for approval	National strategy submitted for approval to MEE; the target has been exceeded as some actions contained in the national strategy have already been incorporated into key national and sectoral strategies and implemented.

<sup>6</sup> Global Environment Facility. Document GEF/R.08/29/Rev.01. April 2022.



Indicator	Original Target	Actual Achievement
<b>Intermediate Indicators</b>		
1.1 Development of three provincial action plans	3 plans, submitted for approval	3 + 1 plans, approved in Guizhou, Hunan, and Shaanxi province and one municipal plan approved in Tongren municipality.
1.2 Development of sectoral action plans	9 plans, submitted for provincial approval	9 plans; some actions from the plans have been implemented by the relevant sectors.

25. **Development of the national strategy.** The national strategy on mercury has been developed as a main outcome of the project, covering all the sectors and elements addressed by the Minamata Convention that are relevant to China. Under the leadership of MEE and with guidance from the National Coordination Group for the Minamata Convention (NCGMC), which represented 17 ministries<sup>7</sup> along with industry groups and associations representing at least 10 sectors,<sup>8</sup> FECO, supported by consultants, worked closely with the key stakeholders to deliver analytical reports and proposals constituting the various components of the comprehensive national strategy. More than 30 discussion and consultation meetings on the national strategy were organized by FECO, which ensured coordinated inputs and buy-in from the relevant agencies. The project also financed the development of nine sectoral action plans and five cross-cutting reports in a comprehensive national document which were incorporated into the national strategy. Furthermore, three provincial and one municipal action plans were developed under the project in parallel to the national strategy in the pilot provinces of Guizhou, Hunan, and Shaanxi and the Tongren municipality that had significant mercury issues. The provincial plans adopted the same framework but customized it to their local context and laid out more specific measures.

26. The draft national strategy has been submitted to MEE for approval after several iterations based on feedback from MEE and other relevant ministries and stakeholders. Final approval by MEE is expected by the end of 2023. The national strategy is an umbrella document, synthesized from the sectoral action plans (which are stand-alone documents), while the provincial action plans were developed in parallel with experiences and lessons captured in real time, as elaborated below. In some instances, the proposed mercury control measures and guidelines may not be specific to mercury, but rather are integrated in multi-pollutant control texts and provisions.

27. The nine sector action plans (meeting the Intermediate Indicator 1.2 target) are comprehensive, covering the major mercury emitting industries in China. This is broader than the Minamata Convention requirements, including mercury supply and trade, mercury-added products, environmentally sound

<sup>7</sup> In 2017, the State Council approved the establishment of the National Coordination Group for the Minamata Convention, which consists of 17 ministries and commissions: the former Ministry of Environmental Protection (MEP), the Ministry of Foreign Affairs, the Development and Reform Commission, the Ministry of Science and Technology, the Ministry of Industry and Information Technology, the Ministry of Finance, the former Ministry of Land and Resources, the Ministry of Housing and Urban-Rural Development, the former Ministry of Agriculture, the Ministry of Commerce, the former Health and Family Planning Commission, the former General Administration of Customs, the former General Administration of Quality Supervision and Inspection, the former General Administration of Safety Supervision, the former General Administration of Food and Drug Administration, the Bureau of Statistics, and the Bureau of Energy.

<sup>8</sup> The industry groups consulted included the China Non-Ferrous Metals Industry Association, Chinese Academy of Natural Resources Economics and China Non-Ferrous Metals, China Petroleum and Chemical Industry Federation, China Chlor-Alkali Industry Association, China Battery Industry Association, China Association of Lighting Industry, China Association for Medical Devices Industry, China Electricity Council, China Cement Association, and the Beijing Municipal Institute of Labour Protection (meeting the intermediate indicator target of 10 key mercury sectors represented by project participants).



management of wastes from mercury-contaminated sites, and the use of mercury in the PVC<sup>9</sup> production sector and at five atmospheric point sources (coal fired power plants, coal fired industrial boilers, non-ferrous smelting facilities, cement clinker production, and waste incineration facilities). In addition, five cross-cutting strategies were developed beyond the strategies accounted for in the Intermediate Indicator 1.2 target. These discuss environmentally sound management of contaminated sites, environmentally sound management of waste, monitoring and development of Environmental and Social Management Frameworks (ESMFs), social impact monitoring, health monitoring, and research and development. The three provincial action plans, plus an additional municipal action plan for Tongren municipality in Guizhou, have been prepared and subsequently approved by the provincial and municipal authorities (thus exceeding the Intermediate Indicator 1.1 target). Furthermore, the provincial action plans have been integrated into the provincial environmental monitoring plans and industrial emission standards in Hunan and Tongren.

28. **Incorporation and implementation of the national strategy and action plans.** The target for PDO Indicator 1 was exceeded because of the impact of the national strategy on China's mercury abatement policies and results. While the national strategy is yet to be approved (which is a matter of formality), MEE and the NCGMC have in fact already endorsed the incorporation and implementation of elements of the national strategy through the broader sectoral and industry strategies and programs. More specifically, the relevant elements of the strategy and action plans have been incorporated in China's 14th Five-Year Plan, sectoral strategies, and carbon peak and neutrality strategies, owing to FECO's and NCGMC's strong efforts to promote the integration, working closely with at least 17 ministries and 10 industry associations as mentioned above (a detailed description of ways in which the national strategy has been incorporated into mercury-related sector plans and programs is included in annex 7). Some examples include the December 2020 ban on the production of all mercury-added products which is being enforced (with exceptions for mercury-containing thermometers and sphygmomanometers until 2025, related to Article 4 of the Minamata Convention); the updated guidelines of the National Hazardous Waste List for industrial solid and hazardous waste for priority industries (which should lead to a reduction in mercury content in waste that can enter into water and soil); soil pollution prevention and control programs nationwide; and contaminated site remediation projects considering mercury control actions, such as the closure and ecological restoration of a mercury mine waste dump in Guizhou Province.

29. Mercury monitoring is also included in the 14th Five-Year Plan for Ecological and Environmental Monitoring and the requirements for mercury-free materials for PVC production have been added to the equivalent plan for the development of the raw materials industry. Based on the action plans developed under the project, starting from January 1, 2019, the use of mercury or mercury compounds was prohibited in the manufacturing processes of sodium methoxide, potassium methoxide, sodium ethoxide, and potassium ethoxide (related to Article 5 of the Minamata Convention). Mercury use is already dropping in some industries: mercury mining reduced from 144,500 in 2018 to 109,100 tons in 2020 according to China's national report to the Minamata Convention. The 14th Five-Year Plan also places a ban on new primary mercury mining (related to Article 3 of the Minamata Convention), including issuing new mercury mine exploration licenses and mining licenses, which has led to a continuous decline in

---

<sup>9</sup> Polyvinyl Chloride (PVC) is one of the most commonly used thermoplastic polymers worldwide.





China’s mercury production. By 2020, China’s mercury production was 1,993 tons, a decrease of 10.71 percent, compared to the previous year.<sup>10</sup>

30. The project’s achievements helped China accelerate its compliance with the requirements of the Minamata Convention and have exceeded the requirements (a full list of project achievements versus the Minamata Convention requirements is found in annex 7). For example, the convention requires five sectoral action plans on point source categories: for coal-fired power plants, coal-fired industrial boilers, non-ferrous metal production, waste incineration facilities, and cement clinker production. The project completed sector action plans for all these five sectors as well as other sectors, as shown in annex 7.

31. The strategies and action plans fed into China’s first National Report<sup>11</sup> submitted in December 2021 by MEE as China’s focal point to the Minamata Convention. Their incorporation into the 14th Five-Year Plan and other broader national strategies and sector plans is a testimony of MEE’s endorsement of the strategy and action plans.

*Outcome 2: Improve China’s mercury management capacity and readiness to implement the strategy in the project provinces level and intermediate level indicators*

32. The design and establishment of the mercury MIS was the project’s main activity that improved China’s mercury management capacity and readiness. The MIS was first trialed and operationalized in the pilot provinces, thus meeting the original PDO target (Table 2). The project exceeded the target by facilitating the achievement of national operationalization through the concerted efforts of MEE, FECO, National Statistics Bureau (NSB), and other involved parties. The MIS was endorsed by MEE and then NSB to be integrated into the national information system connected to and complementing two important environmental monitoring systems: the National Environmental Statistics System (NESS) and the Pollution Permitting System (PPS).

**Table 2. Overview of Indicator Targets and Achievements for Outcome 2**

Indicator	Original Target	Actual Achievement
<b>PDO Indicator</b>		
2. Mercury flow tracked by a fully functional MIS	MIS in operation in the three provinces	MIS in operation nationally, managed by the NSB and integrated into the national information system connected to and complementing two environmental monitoring systems.
<b>Intermediate Indicators</b>		
2.1 Recycling technologies assessed	2	100% achieved. Two factories assessed: The project financed assessment of a Mercury Recovery Technology imported from Sweden and a locally developed high-temperature distillation process, both of which were successful in removing mercury waste from mercury-added products and non-ferrous smelting waste residue.

<sup>10</sup> <https://baijiahao.baidu.com/s?id=1701874358184825660&wfr=spider&for=pc>.

<sup>11</sup> <https://mercuryconvention.org/en/parties/reporting/2021>.



Indicator	Original Target	Actual Achievement
2.2 Mercury contaminated sites with environmental risks assessed	5	180% achieved. Nine sites assessed: Assessments including water, air, and soil sampling were completed at a site in Tongren and risk management frameworks for a site in Shaanxi, four sites in Hunan, and three in Tongren.
2.3 Participants in consultation activities during project implementation	1,600	164% achieved. 2,621
2.4 Number of key mercury sectors represented by participants	10	100% achieved. 10
2.5 Participants in dissemination events	750	526% achieved. 39,516 in person and an estimated 645,000 joining online activities.
2.6 Participants in dissemination events - female	300	742% achieved. 22,275 in person and an estimated 50% joining online events.

33. The MIS tracks mercury transport and use through a Mercury Flow Report, which includes data entered by enterprises on mercury-related industries and verified by the provincial and local environmental authorities. The statistical information contained in the MIS includes basic information on the entities that use or interact with mercury, their production capacity, inventory, usage, and destination of the mercury or mercury compounds. As part of the national information system, the MIS statistics comply with the requirements of the ‘Statistics Law of the People’s Republic of China’ and the ‘National Statistical Quality Assurance Framework (2021)’, thus ensuring the authenticity and validity of the data.

34. The NSB and MEE are responsible for implementing statistical surveys of chemical substances controlled by the international environmental chemical conventions, including key substances controlled by the Stockholm Convention and Minamata Convention. The first data submission and verification were completed in all 32 provinces and the statistics report was finalized in March 2022. The relevant mercury statistics and survey data were also published in the ‘China Ecological and Environmental Statistical Annual Report’ issued by MEE. This statistics report fulfilled the commitment to disclose mercury-related data made in China’s first National Report submitted to the Minamata Convention in December 2021, which is disclosed on the United Nations Environmental Programme website. It represented the first national-level monitoring report for mercury, with information on enterprises, capacity, output, inventory, and the use and destination of mercury and mercury compounds. The reports are now compiled annually. The second statistics report will be finalized in 2023 and informs China’s Interim National Report to Minamata Convention to be submitted by December 2023.

35. The operational MIS provided China a monitoring structure to better understand the baseline, trends, scope, transport, and fate of mercury in the country. This filled the gap of a dedicated subsystem for mercury in the national information systems. The integration of the MIS into the national information system ensures its long-term sustainability and increased efficiency by avoiding repetitive reporting, which has far-reaching impact. It helped China provide more accurate national reporting to the Minamata Convention and will continue to do so in the long term. It is one of the few national-level, dedicated mercury MISs worldwide, and goes beyond Minamata Convention requirements, as the convention does not require a national MIS.



36. Additional activities under Component 2 contributed to meeting the PDO outcome to improve capacity and readiness in the pilot provinces to implement the national strategy on mercury. Three laboratories—the Environmental Monitoring Center in Xunyang, Shaanxi, the Tongren Municipal Monitoring Center in Guizhou, and the Hunan Provincial Research Institute of Environmental Protection—received flue gas mercury samplers and flue gas mercury rapid analyzers to improve their capacity to measure mercury, along with trainings to use the equipment. Additional equipment was purchased to measure atmospheric mercury at the Shaanxi Institute of Environmental Sciences, the Hunan Provincial Research Institute of Ecological and Environmental Sciences, and the Tongren Municipal Environmental Monitoring Station. These had been effectively utilized by the end of the project and informed studies to update the mercury emissions baseline for priority industries. The project established the flue gas mercury testing facility and built capacity, as measured by inter-laboratory comparison exercises.<sup>12</sup> This new equipment and testing financed by the project improved the accuracy, sensitivity, and selectivity of environmental monitoring by introducing a standardized procedure, which would codify and facilitate broad application of the method. Sustainability of the utilization of monitoring equipment was enhanced by host institutions building in costs in their budgets to cover personnel, operating costs, and equipment upgrades. FECO staff also conducted international and domestic study tours (Slovenia, Italy, and the United States) to learn and exchange experience about mercury emission monitoring.

37. The project completed environmental risk assessments at nine mercury-contaminated sites (surpassing the Intermediate Indicator 2.2 target of five). Many of the sites were state-owned legacy mercury mining locations because they were no longer in operation and thus had no operating enterprises. Water, air, and soil sampling was completed for an environmental risk assessment at a site in Tongren and risk management frameworks were prepared for a site in Shaanxi, four sites in Hunan, and three in Tongren.

38. Mercury recycling assessments for Intermediate Indicator 2.1 were carried out at two locations: Shaanxi Anxin CRT Recycling Co., Ltd. and Guizhou Gravity Science and Technology Environmental Protection Co., Ltd. (a solid waste disposal site), both private companies. At these locations, the project financed an assessment of the use of a Mercury Recovery Technology imported from Sweden and a locally developed high-temperature distillation process, both of which were successful in removing mercury waste from mercury-added products and non-ferrous smelting waste residue.

39. The project also financed several capacity-building and awareness-raising efforts in the project provinces, surpassing intermediate targets on the number of participants (in consultation activities and at dissemination events, including the number of female participants). Despite the COVID-19 pandemic, an estimated 39,516 individuals participated in events (surpassing the target for Intermediate Indicator 2.5) with female participants making up about 56 percent of the total (above the target for Intermediate Indicator 2.6). In addition, there were about 645,000 virtual participants, partially via the innovative use of social media, which was a significant over-achievement in the engagement indicators and impact. The targeted 10 sectors were included in these events or in consultations through the national strategy process described above for PDO 1 (meeting the target for Intermediate Indicator 2.4).

40. Project-financed dissemination activities in Hunan focused on publicity, including education programs for schools, communities, and environmental monitoring employees, resulting in 27,000 people

---

<sup>12</sup> Where the same sample is analyzed by a reference laboratory and the participating labs.



receiving information at in-person events and 60,000 through TV publicity along with 150 teachers and 1,450 students receiving lectures on mercury pollution control and 1,000 environmental department staff trained. Shaanxi carried out nine training meetings in Xi'an for solid waste businesses, attended by 4,800 representatives, of which around half were women. The environmental protection office building publicized the Minamata Convention to its staff several times and exhibitions on the convention were held in communities with around 1,200 people participating (including 900 women and youth). In Guizhou, a book on understanding mercury hazards was published, along with public awareness events on the Minamata Convention with 36,000 people participating, and online publicity via the website of the Department of Ecology and Environment (DEE). Tongren completed an online activity encouraging citizen reporting of polluted areas via WeChat and other platforms and held an online competition on knowledge of the Minamata Convention.

41. These activities helped build capacity and readiness in the provinces to implement the mercury reduction strategy and help China comply with the requirements of the Minamata Convention. Investing in the laboratories improved the robustness and accuracy of monitoring that is needed for the national strategy; the environmental risk assessments built capacity to safely manage mercury waste, a key necessity for the strategy; and the recycling assessments helped China understand which technologies are most cost-effective and useful for minimizing the need for additional primary mercury mining, an additional goal of the strategy. To address the convention requirement for countries to develop strategies for identifying and assessing sites contaminated by mercury, the project carried out risk assessments for contaminated sites. Without the project, it is unlikely that mercury pollution would have received such focus through targeted campaigns and capacity building. Further, China would have been unlikely to advance so quickly toward compliance with the Minamata Convention and assess mercury use and emissions across such a wide range of sectors. Future work may be necessary to ensure proper capacity in additional mercury-contaminated or mercury-using facilities in the pilot provinces, as well as in the non-pilot provinces where mercury is present.

### **Justification of Overall Efficacy Rating**

42. The project met or exceeded the PDO indicator targets and intermediate indicator targets and achieved its two outcomes as defined in the PDO. The overall efficacy is therefore rated High.

## **C. EFFICIENCY**

**Rating: Substantial**

### **Assessment of Efficiency and Rating**

43. Efficiency is assessed based on the cost-effectiveness analysis of the allocated budgets to achieve the PDOs.

44. As the project focused on providing technical support to strengthen institutional capacity for mercury pollution control and reduction, no attempt was made either at appraisal or at ICR to conduct efficiency analysis of the investment on mercury control per se. Instead, the discussion of efficiency focuses on the implementation and project management efficiency. It is however well understood that sustainably managing and reducing mercury provides significant economic benefits at the local, regional,



and global scale, as reduction in mercury exposure improves human health and reduces health care costs (Zhang et al. 2021;<sup>13</sup> Chen et al. 2019<sup>14</sup>).

45. **Implementation efficiency was substantial.** The project was implemented in six years, including an 18-month extension of the grant's original closing date. This implementation period was reasonable, given the significant impact of the COVID-19 pandemic and that the original duration of four years was too ambitious. The project had three distinct components, covered three pilot provinces plus one pilot municipality, designed and implemented a complex MIS, carried out extensive fieldwork in the project sites of the pilot provinces, and consulted and involved grassroots entities and communities with varying levels of institutional capacity. Implementation challenges at the early stage also contributed to project delays; see the discussion in key factors during implementation. By the revised closing date, all project activities and investments were complete, and 97 percent of the grant funds was utilized. In addition, the project fully achieved or exceeded all PDO and intermediate outcome targets.

46. Cost-effectiveness was high for project management, with only a single Project Management Office (PMO) at the national level in FECO. FECO signed an implementation agreement with each of the pilot provinces and municipality, without setting up PMOs at the provincial level. This approach not only kept costs low but also helped internalize institutional capacity building. As a result, project management cost was only US\$0.28 million, accounting for less than 4 percent of the project cost.

47. During implementation, detailed cost-effectiveness analyses were carried out to help prioritize actions and best practices to address key mercury issues for different sectors. The reports also quantified the costs associated with the various mercury control measures that are needed to comply with and implement the Minamata Convention. The findings have informed the national strategy and action plans developed under the project to improve production practices of mercury-related industries, manage existing mercury pollution issues, and avoid or reduce future mercury releases to the environment.

#### D. JUSTIFICATION OF OVERALL OUTCOME RATING

48. Given the High ratings for relevance and efficacy along with the Substantial rating for efficiency, the overall outcome is rated Highly Satisfactory.

#### E. OTHER OUTCOMES AND IMPACTS

##### Gender

49. Gender was considered as a cross-cutting element for the project, especially due to the disproportionately harmful impacts that mercury poisoning has on pregnant women. However, project activities were centered around upstream, policy-level interventions, monitoring capacity, and technical assessments rather than on community health. The national human health monitoring strategy that the project prepared included indicators for women and children and emphasized the importance of focusing

---

<sup>13</sup> Zhang, Y., Z. Song, S. Huang, P. Zhang, Y. Peng, P. Wu, J. Gu, S. Dutkiewicz, H. Zhang, S. Wu, F. Wang, L. Chn, S. Wang, and P. Li. 2021. "Global Health Effects of Future Atmospheric Mercury Emissions." *Nature Communications* 12: 3035. <https://doi.org/10.1038/s41467-021-23391-7>.

<sup>14</sup> Chen, L., S. Liang, M. Liu, Y. Yi, Z. Mi, Y. Zhang, Y. Li, J. Qi, J. Meng, X. Tang, H. Zhang, Y. Tong, W. Zhang, X. Wang, J. Shu, and Z. Yang. 2019. "Trans-provincial Health Impacts of Atmospheric Mercury Emissions in China." *Nature Communications* 10: 1484. <https://doi.org/10.1038/s41467-019-09080-6>.



on special population groups, including both women and children. The project's Intermediate Indicator 2.6 measured the participation of women in dissemination events, which was greatly surpassed (56 percent women participants against a target of 40 percent) due to the high participation of women in virtual events. The Central PMO in FECO was headed by a woman and the PMO staff were mostly women. The technical consultant teams also had a good gender balance.

### **Institutional Strengthening**

50. The project brought about significant institutional benefits, as it achieved its objectives that are directly related to the Government's capacity and readiness to reduce mercury releases and emissions. As a result, the relevant national and provincial government agencies and associations of mercury-related sectors received support and improved their capacity on mercury management and strategic planning for mercury reduction and phase-out. Several project activities also enhanced the pilot provinces' readiness to implement the national strategy on mercury, including improving monitoring capacity of provincial laboratories, assessing recycling technologies and capacity and carrying out risk assessments at mercury-contaminated sites and capacity-building/awareness-raising events. Through the awareness-raising activities, environmental agencies in the other provinces also benefited directly and indirectly from the formulation and implementation of the national strategy and MIS. The project strengthened China's ability to carry out its monitoring and reporting obligations to the Minamata Convention and accelerate its implementation. FECO improved its project management capacity, including in project identification and planning, implementation, procurement and fiscal management, environmental and social safeguards, and monitoring and evaluation (M&E). Institutional strengthening at the national, provincial, and municipal levels is further discussed in section II.B on efficacy.

### **Mobilizing Private Sector Financing**

51. The project did not mobilize any private sector financing. However, it partnered with industrial associations to produce sectoral strategies, including for private mercury recycling plants and private suppliers of monitoring equipment to carry out activities. The project carried out assessments of mercury management and recycling technologies in two private companies. Improving private sector capacity and engagement in mercury abatement is a potential area for future work.

### **Poverty Reduction and Shared Prosperity**

52. The project did not directly work on poverty reduction or shared prosperity, as its activities were focused on policy, capacity building, and monitoring. Recent (and hopefully increased future) reductions in mercury contamination that the project's activities helped spur will particularly benefit the poor, as the poor often live in remote areas near the polluting factories and are disproportionately affected by mercury pollution. The ongoing implementation of the national strategy and action plans, as well as future reductions in mercury pollution, could improve the health of communities living near the waste areas or point source emissions.

### **Other Unintended Outcomes and Impacts**

53. The project was forced to adapt to the COVID-19 pandemic, especially through virtual stakeholder engagement. An unexpected positive outcome was the greatly increased participation that the project



was able to achieve through these virtual events. Virtual activities included online knowledge dissemination activities in the pilot provinces, an environmental knowledge Q&A and competition in Tongren City related to the Minamata Convention which harnessed WeChat and other platforms for citizen pollution monitoring, and online and television dissemination and awareness-raising activities related to mercury pollution.

### **III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME**

#### **A. KEY FACTORS DURING PREPARATION**

54. The project benefitted from a focused design with the project objectives clearly stated and responsive to China's priorities while meeting the World Bank's goals as set out in the CPF. The PDOs were realistic and recognized that policy interventions take time, and their ultimate approval could be beyond the project's control or beyond the project duration.

55. The project objectives and indicators were well designed. The first outcome was clear and easily measurable in terms of developing the national strategy and submitting it for approval. The second outcome was more subjective: improving management capacity and readiness to implement the strategy. The creation of the MIS was the main indicator to measure this second outcome, which was a somewhat narrow indicator for a broad capacity strengthening reference. However, the MIS does improve both management and readiness, as an information system is a necessary foundational step for both. The intermediate indicators were clear and mostly covered provincial-level activities. However, the work on improving laboratory capacity to monitor mercury was not directly reflected in any of the intermediate indicators.

56. The design of the components matched the project objectives, with the risks assessed appropriately and mitigation measures built into the design. The relevant environmental and social factors were adequately incorporated in the design. The design also allowed for the activities to be implemented concurrently for the most part, without the need for certain components to be completed before others. This perhaps contributed to the project's slow implementation start as many activities were being handled at the same time, but likely led to a productive second half of the project in which multiple results were being achieved simultaneously. The modality of involving the provincial and municipal actors in the design also proved efficient and effective. The use of implementation agreements between FECO and the DEEs was an efficient approach and allowed local ownership of provincial activities, which improved their integration into sectoral plans, capacity building, and sustainability.

57. The anticipated length of the project (four years) turned out to be unrealistic. Given the highly technical nature and complexity of the project, the large number of consultancies that needed to be procured and the recognition (even before the project began) that the FECO procurement team was inexperienced and the procurement process was lengthy, a longer time frame would have been preferable. The highly technical nature of the project, combined with the relative lack of local firms with experience in mercury abatement, was not recognized as a risk during the design of the project.



## **B. KEY FACTORS DURING IMPLEMENTATION**

58. The project was implemented largely as designed, with a few minor adjustments during implementation and a single extension of the grant closing date. Challenges and delays encountered during implementation were successfully resolved and did not affect the project's final outputs or outcomes.

59. FECO provided strong project management with transparent financial reporting and proactive coordination with NCGMC, MEE, and the provincial and local agencies, as well as consultants. It collaborated effectively with the World Bank to achieve results. Additional staff were brought in during periods when the project needed more attention. Audit reports noted strong financial management. FECO's ability to coordinate and carry out policy dialogue with different ministries and obtain approval from NSB and other governmental agencies helped greatly improve sustainability and cross-sectoral coordination and collaboration between the national and provincial governments. Communication was aided by the operationalization of a national coordination group comprising 17 ministries.

60. FECO, the DEEs, and the World Bank adapted well to the COVID-19 pandemic, a factor outside their control. There were some procurement delays due to factors within the control of FECO and the Government, including lengthy procurement processes, secondment of staff to other positions to work on nonproject activities, and a governmental reorganization. However, FECO responded well to these issues and was ultimately able to speed up procurement and reach project outcomes with the extension. The extension was well anticipated and discussed in advance to ensure that the restructuring was carried out efficiently after considering various options.

61. The need for restructuring was flagged before the MTR and several potential options were considered. During project implementation, some adjustments to activities were made due to savings from exchange rate fluctuations, procurement processes, and cancelled activities (such as reduced international and domestic travel, study tours, physical workshops, and events). Cancelled activities were largely due to the COVID-19 pandemic and the discovery that the factory targeted for the recycling technology assessment in Hunan (exported its waste to Guizhou instead of processing on site, so no recycling assessment was possible there). The savings were used to purchase additional monitoring equipment for Shaanxi Province and Tongren municipality and conduct more baseline studies to reflect the latest development in some priority industries. No new indicators were added as the new work was within the ambit of the key indicators under the two technical project components.

62. World Bank oversight was consistent, with a dozen missions and technical visits over the course of six years, with the final four missions being virtual due to the pandemic. The October 2019 mission served as the MTR. Aide Memoires generated for each mission detailed action items, decisions, and stakeholders met. The World Bank provided excellent support in reducing bottlenecks in implementation through communications and technical guidance and by maintaining a consistent team throughout the project with whom FECO could work and build rapport.





## **IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME**

### **A. QUALITY OF MONITORING AND EVALUATION (M&E)**

**Rating: Substantial**

#### **M&E Design**

63. The project framing, design, and Theory of Change were focused and straightforward. The Results Framework was easily understandable, which benefitted M&E efforts to measure both implementation performance and results/outcomes. The indicators were specific, realistic, measurable, attributable, and concentrated on incremental achievements that were within the project's control. The intermediate indicators covered project activities well, except for the capacity building of provincial laboratories and the increase in capacity to monitor atmospheric mercury emissions, which in hindsight should have been included.

64. There was some ambiguity in the scope of the PDO 2 indicator. The MIS was planned to be designed from the start as a national system, but the project's target was only to have the system operational in the three pilot provinces by project end, because national-level operationalization was rightly envisaged to be a longer process than was achievable during the original project duration. The PAD, however, does not clearly state this differentiation between national design and operationalization at the national level. It includes the activity 'development of a National Mercury MIS' in the component description, while the indicator target is 'MIS in operation in the three provinces.'

#### **M&E Implementation**

65. M&E quality was rated Satisfactory throughout the project and benefitted from a clear and focused Results Framework with a limited number of indicators. The key PDO-level indicators and intermediate indicators were closely monitored and reported on in a timely manner through semiannual progress reports provided by FECO, with inputs from the provincial and municipal environmental authorities. The World Bank encouraged FECO to go beyond the original envisaged indicator targets, especially for the national implementation of the MIS, which was eventually very successful. Establishing the MIS for mercury management at the national level and integrating it into the NSB's information system required extra effort, given the magnitude of work, cross-sectoral coordination, national-level endorsement, and fieldwork required to cover a vast area across many industries and provinces. The M&E was based on monitoring data and evidence-based analysis. The key results are explained in the assessment of PDO 2 in the efficacy section.

#### **M&E Utilization**

66. The project was adaptable, switching to monitoring website traffic analysis rather than in-person meetings when many stakeholder events became virtual. M&E data were integral to making the need for a project extension clear, as targets were not being met as quickly as anticipated. The M&E data and analysis have been and will continue to be used to guide resource allocation and decision-making by the relevant environmental authorities. It has provided scarce data, video footage, and pictures and will serve as firsthand and evidence-based information for scientific research in the future. This kind of focus and



financing in support of M&E is commendable, especially given the relatively small size of the grant. As mentioned earlier, the M&E system is already being used by the NSB and MEE nationwide and informed the National Report to the Minamata Convention. The relevant activities are being financed and sustained under their budget.

#### **Justification of Overall Rating of Quality of M&E**

67. Based on the above discussion, M&E quality is rated Substantial.

### **B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE**

#### **Environmental Safeguards**

68. The project's direct environmental impact was limited and it was rated a Category B project (Partial Assessment). Environmental Assessment - OP/BP 4.01 was the only environmental safeguard policy triggered for the project to ensure that the national strategy considered the potential environmental impact of 'downstream' activities, that is, activities implementing the strategy after the project closed, especially those involving the handling of mercury-contaminated waste. The project developed an ESMF, disclosed on July 18, 2016 through the World Bank's InfoShop and nationally on FECO's website, which provided a preliminary screening of the environmental impacts of the project. Environmental screening was to be carried out as part of the risk assessments for contaminated sites to identify issues that would need to be assessed in the preparation of remediation plans for future downstream activities. The ESMF also encouraged terms of reference for all consulting contracts related to the national strategy and action plans to include requirements to integrate strategies for downstream activities to be based on environmental safeguards and international best practices. The national strategy includes a brief section on safeguards, which mentions the need to build the capacity of the national and local stakeholders to implement the Minamata Convention and enforce policies, regulations, rules, standards, and action plans associated with implementing the Convention.

69. The ESMF included a stepwise approach that could be put into place for environmental assessments of downstream activities, including (a) environmental impact screening, (b) environmental classification of investment activities (from Class A for those having major negative environmental impacts to Class C for those having negligible impact) and the subsequent determination of the type of environmental documents needed, (c) preparation of the environmental documents, (d) public participation, (e) environmental audit and approval, (f) supervision, and (g) reporting.

70. ESMF implementation was satisfactory. The project did not encounter any environmental safeguards-related issues during implementation and complied with environmental safeguards. A grievance redress mechanism was developed and was disclosed nationally through the MEP/FECO website in 2016. No complaints were received during the project.

#### **Social Safeguards**

71. The project did not have any direct negative social impacts, as it was focused on the development of strategies, action plans, management systems, monitoring, and assessments. World Bank policies on Indigenous Peoples - OP/BP 4.10 and Involuntary Resettlement - OP/BP4.12 were triggered as the



strategies and action plans drafted by the project could lead to future activities that close down mercury using businesses where ethnic minority or vulnerable groups are employed, leading either to a loss of their livelihoods or the handling of toxic waste near communities where vulnerable groups live. Discovery of mercury contamination near such communities could lead to involuntary resettlement.

72. The ESMF included several measures to mitigate potential social impacts that could arise during the project and prepare downstream activities to manage such social risks. These measures included ensuring that consultant terms of reference included a task to develop guidelines for mitigating impacts on employees and communities near contaminated sites, integrating safeguards in the guidelines for site assessments, and providing guidelines for carrying out stakeholder and public consultations and disclosure of information for downstream activities. The ESMF also included a measure to ensure that laboratory facilities that were renovated or contaminated sites assessed by the project would not expropriate additional land and lead to involuntary resettlement.

73. The steps identified in the ESMF for downstream project social safeguards assessment were to (a) identify major stakeholders of downstream investments; (b) analyze impacts, degrees, categories, and consequences on local groups; (c) get to know major stakeholders' (especially women and vulnerable groups) viewpoints on project impacts; (d) get to know people's perceptions on current mercury production and treatment, views on emission reduction strategies, and ensure that their concerns are reflected; (e) create social management plans; and (f) adopt approaches to avoid and mitigate negative impacts. The ESMF included guidelines on the contents of social assessment reports, a framework for public participation, an Ethnic Minority Planning Framework, and a Resettlement Policy Framework. These two social safeguards instruments were prepared under the ESMF to establish the principles and guidelines for site-specific ethnic minority development plans and resettlement action plans, in case of negative impacts to ethnic minorities and land acquisition and resettlement identified during project implementation. However, there were no such instances during project implementation.

74. The project did not encounter any issues relating to social safeguards during implementation and complied with applicable social safeguards.

### **Financial Management**

75. Project financial management was of good quality. The yearly audits by the Audit Service Center of the China National Audit Office found the project in compliance with Chinese accounting standards and with the terms of the Grant Agreement. Interim unaudited financial statements were at times submitted late by FECO, but no major issues were found. Financial management was rated satisfactory throughout the project, except in the October 2020 Implementation Status and Results Report (ISR) because of some project staff being reassigned to nonproject assignments. This issue was quickly resolved by FECO by hiring new staff.

### **Procurement**

76. Procurement was carried out in accordance with the World Bank procurement policies. FECO created a Procurement Plan at appraisal and managed procurement processes throughout implementation. Procurement was identified as a moderate risk in the PAD, given the FECO project team's lack of familiarity with World Bank procurement policies and procedures. This was mitigated by World



Bank-provided training and timely and frequent support and communication with FECO staff. As mentioned in the previous sections, some procurement delays occurred during implementation due to FECO's lengthy standard procurement process and the difficulty in obtaining multiple bids for certain highly technical consultancies. However, such delays were recognized and addressed and did not have a lasting impact. Procurement reviews consistently found the project to be in compliance with the World Bank's procurement policies and requirements. FECO routinely prepared and updated the annual procurement plans that were submitted to the World Bank. The World Bank provided training and hands-on support to FECO in contracting consultants and goods procurement and worked with the project team to help shorten the preparation and review time and processes while strengthening quality assurance.

### **C. BANK PERFORMANCE**

#### **Quality at Entry**

77. The design of the project was sound. The PDOs and indicators were clear, realistic, and attributable with a high level of ambition. There was a mix of technical, institutional, and policy interventions that also included highly technical capacity building for specific sectors with support from a World Bank team with diverse expertise. The design of implementation arrangements was fit for purpose, with implementation of the provincial activities devolved to the DEEs to improve ownership and increase the likelihood of sustainability. The World Bank team and FECO compared various implementation modalities that were applied in similar previous operations, including the establishment of a Provincial Project Management Office in each pilot province, signing a Memorandum of Understanding between FECO and each DEE without allocating resources to the DEEs, and establishing subgrants with the pilot enterprises. In the end, the chosen modality of signing an implementation agreement between FECO and each DEE proved to be effective and increased implementation efficiency. A relatively small amount of funding was provided to the DEEs, who demonstrated ownership to help implement the relevant pilot activities and achieved synergies in financing, technical advice, and coordination with various stakeholders.

78. The project was of high strategic relevance, and the World Bank played an important role in ensuring that project activities responded well to China's need at project appraisal to meet its monitoring, reporting, and mercury reduction obligations under the Minamata Convention. It helped address some of the issues facing China's ability to reduce mercury use and emissions: a uniquely complex and large set of industries that utilized mercury, when information on these sectors was limited; the unknown status and environmental risks of mercury-contaminated sites; the lack of assessment of the effectiveness of mercury management and recycling technologies and practices; the dearth of official information on mercury trade; and the use of non-customized, global emission factors for the estimation of emissions. The World Bank also ensured that fiduciary arrangements were adequate and the environmental and social aspects were considered appropriately during the environmental and social assessments.

79. The identification of moderate procurement risk due to the lack of experienced staff in FECO proved to be important to provide extra training for FECO on World Bank processes, especially given the large number of consultancies that needed to be contracted. The World Bank also clearly recognized that the project was highly technical and thus included support from technical and international advisers. The implementation agreement between FECO and each pilot province and municipality improved efficiency during implementation.



80. The World Bank developed an Implementation Support Plan, which included plans for technical support to FECO in the development of the national strategy and the MIS, as well as risk assessments at contaminated sites. The Implementation Support Plan envisaged implementation support missions on a semiannual basis, along with support from the Beijing office. The World Bank provided timely support on environmental and social safeguards, poverty, gender, social development, and institutional strengthening aspects, as noted.

### **Quality of Supervision**

81. The World Bank maintained a focus on development impact, targeted outcomes, and the innovations piloted under the project. The team supported the project through regular missions, frequent audio meetings, and provided hands-on support to help identify issues as they arose and helped address them proactively. Aide Memoires and ISRs systematically discussed progress toward achieving the development objectives, flagged key issues with proposed actions, and followed up to ensure that issues were addressed in a timely and proactive manner. The World Bank identified the potential need for an extension early and discussed and agreed with FECO on the most efficient ways of handling the restructuring. The World Bank helped the project remain highly adaptable, especially during the COVID-19 pandemic. The pandemic could have derailed project activities, but a shift to a virtual mode (including virtual missions) and frequent communication and fast turnaround helped keep the project on pace and increased grant disbursement, which contributed to accelerated implementation and improved project performance.

82. The World Bank helped improve the development impact of the project, as evidenced by the successful push for the MIS to go beyond the original target of being operational in the three pilot provinces, even though the difficulties of achieving its national-level operationalization caused some doubts from in country stakeholders at the time. Eventually, the persistence and extra efforts proved worthwhile, with the MIS being operational at the national level and incorporated in the NSB's information system.

83. The World Bank project team included a mix of international and local staff and consultants that provided implementation support on technical aspects, as well as project management, financial, safeguards, and operational aspects. World Bank supervision and implementation support of fiduciary and safeguard compliance were consistently carried out, as noted. The task team leaders and most of the core team members remained on the project throughout implementation which provided continuity and developed and maintained an effective working relationship with the government counterpart and stakeholders. The World Bank was able to bring to China globally relevant knowledge as well as experience in helping other countries comply with the Minamata Convention and reduce mercury.

### **Justification of Overall Rating of Bank Performance**

84. Based on the above discussion on quality at entry and quality of supervision, World Bank performance is rated Satisfactory.



#### D. RISK TO DEVELOPMENT OUTCOME

85. The risk of a lack of integration in mercury monitoring in long-term government budgets and processes was mitigated by ensuring that the MIS was integrated into the NESS and PPS within the NSB instead of being managed separately by FECO. Integration of the MIS into the NSB's monitoring system ensures funding of mercury monitoring and reporting. The provincial laboratories will need to ensure that they can continue to maintain and efficiently utilize the mercury monitoring equipment, such as the atmospheric mercury emissions monitoring equipment provided by the project.

86. The risk of low technical capacity and financing to reduce mercury use and emissions for the various mercury-using industries and provinces can be mitigated by further involvement of development partners and the provision of grant financing to build capacity in specific mercury-using sectors. An upcoming World Bank-implemented GEF project could support the non-ferrous metal industry (P175980 'Sustainable Mercury Management in Non-ferrous Metal Industry') as a second phase of this project. Projects implemented by other GEF implementing agencies will phase out the production of mercury-containing medical thermometers and sphygmomanometers (such as project GEF ID 10349 implemented by the United Nations Development Programme). Building on the pilot experience and awareness-raising efforts of the project and expanding activities to other provinces and key industries nationwide will help in more robust and complete monitoring, reporting, and enforcement.

87. There is also a risk that government policies and enforcement of mercury reductions may lag China's Minamata Convention commitments. However, the government's involvement and ownership of the project and commitment to its outcomes should limit this risk. The project involved many key national, provincial, and municipal governmental entities, who were engaged and incorporated elements of the national strategy and action plans in their own strategies and programs. Before the grant closed, China had passed laws that will begin to reduce mercury usage, such as the ban on new mercury mines and the phase-out of mercury-added products.

#### LESSONS AND RECOMMENDATIONS

88. **Piloting the MIS in the project provinces proved to be a successful first step toward national operationalization and the integration of the MIS into the NSB's existing information system an effective approach to ensure efficiency and sustainability.** Given the decentralized nature of the Government in China, piloting of the MIS in high-mercury use provinces proved to be a successful method to showcase local government progress and generate national interest in mercury flow monitoring and reporting. After the initial provincial pilot, the process of operationalizing the MIS at the national level and its integration into the NSB statistical system was lengthy and required cross-sectoral coordination, but these extra efforts were critical to ensure a sustainable and national impact and increased efficiency. Future projects on pollution issues in China should consider provincial pilots and subsequent integration into national-level statistics systems.

89. **Mercury recycling is a cost-effective way to reduce the use of mercury in some industrial processes.** The assessments of mercury recycling technologies conducted under the project indicate that recycling is a cost-effective way to reduce use of mercury in some industries, such as non-ferrous metal smelting industry, especially in terms of reducing the use of primary mercury. In future investment



operations, mercury recycling technologies and practices should be piloted at the enterprise level to validate their technical and financial viability for scaling up to the entire industry. This would incentivize the enterprises to be the front-runners of technological innovation through technical assistance and grant financing. It will also promote the circular economy, energy savings, and reduction of greenhouse gas emissions. The findings of the assessments laid a good foundation for follow-on projects.

90. **A partnership approach between China and the World Bank and strong governmental commitment were key to successful project implementation.** A constructive working relationship and continuity in both FECO and the World Bank task teams enabled issues to be addressed quickly. Government buy-in and commitment to the national strategy, provincial and municipal action plans, and the MIS helped overcome the risk of project activities getting bogged down. Future projects should endeavor to build similar strong partnerships and plan for longer implementation periods to facilitate coordination over a wide range of geographical and sectoral government agencies.

91. **Implementation agreements with local governments are an effective implementation modality for decentralizing project activities.** The implementation modality of having FECO working closely with the provincial and municipal DEEs on pilot activities based on implementation agreements was very successful. This approach was a middle ground between setting up full project management units at the provincial level and only setting up subgrants with the enterprises. Cost efficiency was achieved by allocating a relatively small percentage of the grant funding to the provincial and municipal environmental authorities to help coordinate and implement the relevant pilot activities. Similar technical assistance projects with local pilot activities should consider using implementation agreements to ensure streamlined and effective participation by local governments.

92. **Virtual stakeholder engagement events can reach a much larger audience.** Because of the impact of the COVID-19 pandemic, the project expanded some of its stakeholder engagement activities to a virtual setting. This led to significant over-achievement in the engagement indicators, as large numbers of people were able to participate more easily. For similar future operations, such an approach could be replicated to achieve greater impact even under normal circumstances.

93. **Highly technical projects can experience challenges in procurement.** The project suffered some procurement delays because of the scarce availability of consultants with the highly technical and specific skillsets needed for mercury abatement activities. Similar projects should consider this factor when deciding on project duration and make extra efforts during implementation to identify and engage qualified candidates. Bundling too many tasks in one contract may make procurement difficult due the demand for multiple technical expertise in different areas under a single package.



**ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS**

**A. RESULTS INDICATORS**

**A.1 PDO Indicators**

**Objective/Outcome:** Develop a national strategy on mercury and related action plans

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
National strategy developed and submitted for approval	Text	No national strategy  01-Nov-2016	Submitted for approval  21-Oct-2022		Submitted for approval and relevant actions implemented  31-Oct-2022

**Comments (achievements against targets):**

The target has been exceeded as some actions contained in the National Strategy have already been incorporated and implemented in broader key national and sectoral strategies, plans and programs.

**Objective/Outcome:** Improve China’s mercury management capacity & readiness to implement the strategy in provinces

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
----------------	-----------------	----------	-----------------	-------------------------	-------------------------------





Mercury flow tracked by a fully functional MIS	Text	No system to track mercury flow 30-Sep-2016	MIS in operation in three pilot provinces 21-Oct-2022		MIS in operation nationwide 31-Oct-2022
<b>Comments (achievements against targets):</b> The target has been exceeded as the MIS is in operation not only in the three pilot provinces but also nationwide.					

**A.2 Intermediate Results Indicators****Component:** Development of National Strategy and Sectoral and Provincial Action Plans

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Development of three provincial action plans	Text	No provincial action plans 01-Nov-2016	Submitted for approval 31-Oct-2022		Approved by the three provincial governments and some actions implemented 21-Oct-2022
<b>Comments (achievements against targets):</b> Exceeded the original target since the three provincial plans (plus one municipal plan) have been approved by the provincial (and municipal) authorities, and some proposed actions are implemented through the soil pollution and heavy metal pollution prevention and control programs and other relevant programs.					



Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Development of sectoral action plans	Number	0.00 01-Nov-2016	9.00 31-Oct-2022		9.00 21-Oct-2022
<p><b>Comments (achievements against targets):</b> Exceeded target because the nine sectoral action plans have been developed and submitted and some actions proposed have been implemented by the relevant sectors.</p>					

**Component:** Capacity Strengthening for Mercury Management and Risk Assessment

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Recycling technologies assessed	Number	0.00 01-Nov-2016	2.00 31-Oct-2022		2.00 21-Oct-2022
<p><b>Comments (achievements against targets):</b> Target fully achieved. Assessment was carried out on mercury recycling technology at Shaanxi Anxin CRT Recycling Co., Ltd. and Guizhou Gravity Science and Technology Environmental Protection Co., Ltd.</p>					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised	Actual Achieved at
----------------	-----------------	----------	-----------------	------------------	--------------------



				Target	Completion
Mercury contaminated sites with environmental risks assessed	Number	0.00	5.00		9.00
		01-Nov-2016	31-Oct-2022		21-Oct-2022

**Comments (achievements against targets):**

Target 180% achieved. Environmental risk management assessment carried out for nine contaminated sites in Shaanxi, Hunan and Guizhou province.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Participants in consultation activities during project implementation	Number	0.00	1,600.00		2,621.00
		01-Nov-2016	31-Oct-2022		21-Oct-2022
Number of key mercury sectors represented by participants	Number	0.00	10.00		10.00
		01-Nov-2016	31-Oct-2022		21-Oct-2022

**Comments (achievements against targets):**

Target 164% achieved. China Non-Ferrous Metals Industry Association, Chinese Academy of Natural Resources Economics and China Non-Ferrous Metals, China Petroleum and Chemical Industry Federation, China Chlor-Alkali Industry Association, China Battery Industry Association, China Association of Lighting Industry, China Association For Medical Devices Industry, China Electricity Council, China Cement Association, Beijing Municipal Institute of Labour Protection.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised	Actual Achieved at
----------------	-----------------	----------	-----------------	------------------	--------------------



				Target	Completion
Participants in dissemination events	Number	0.00	750.00		39,516.00
		01-Nov-2016	31-Oct-2022		21-Oct-2022
Participants in dissemination events - female	Number	0.00	300.00		22,275.00
		01-Nov-2016	31-Oct-2022		21-Oct-2022

**Comments (achievements against targets):**

Target 526% achieved. 39,516 participants in physical events, with 56% female participation versus the target of 40%. The total number of participants are about 645,000 including virtual events.



**B. KEY OUTPUTS BY COMPONENT**

<b>Objective/Outcome 1: Develop a national strategy on mercury and related action plans</b>	
Outcome Indicators	1. National strategy developed and submitted for approval
Intermediate Results Indicators	1. Development of three provincial action plans 2. Development of sectoral action plans
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	1. National strategy adopted by relevant departments 2. Three provincial and one municipal plans developed and integrated into heavy metal pollution management program 3. Nine sectoral action plans created and implemented into national strategy
<b>Objective/Outcome 2: Improve China’s mercury management capacity and readiness to implement the strategy in provinces</b>	
Outcome Indicators	1. Mercury flow tracked by a fully functional MIS
Intermediate Results Indicators	1. Recycling technologies assessed 2. Mercury contaminated sites with environmental risks assessed 3. Participants in consultation activities during project implementation (including number of key mercury sectors represented by participants) 4. Participants in dissemination events (including number of female participants)
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	1. MIS operational not only in the three pilot provinces but nationwide 2. Two recycling technologies assessed in Shaanxi and Guizhou 3. Nine mercury contaminated sites assessed 4. 2,417 participants in consultation activities including participants in 10 key mercury sectors 5. 39,516 participants in physical dissemination events including 22,275 women and an estimated 645,000 participants in virtual awareness-raising events

## ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

### A. TASK TEAM MEMBERS

Name	Role
<b>Preparation</b>	
Ms. Anisi, Jiang Ru	Task Team Leader(s)
Guoping Yu	Procurement Specialist
Fang Zhang	Financial Management Specialist
Yunqing Tian	Team Member
Laurent Granier	Team Member
Zhuo Yu	Team Member
Yan Zhang	Team Member
Songling Yao	Social Specialist
Chongwu Sun	Social Specialist
Nina Queen Irving	Team Member
Bernardita Ledesma	Team Member
<b>Supervision/ICR</b>	
Ms. Anisi, Laurent Granier	Task Team Leader(s)
Hongkun Yang	Procurement Specialist
Fang Zhang	Financial Management Specialist
Chau-Ching Shen	Team Member
Yan Zhang	Procurement Team
Zhuo Yu	Team Member
Xieli Bai	Team Member
Chie Ingvoldstad	Team Member
Jie Pan	Team Member
Shuang Zhou	Social Specialist
Xiaodan Huang	Environmental Specialist



**B. STAFF TIME AND COST**

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US\$ (including travel and consultant costs)
<b>Preparation</b>		
FY15	1.440	15,045.57
FY16	15.253	114,103.76
FY17	7.199	53,653.44
FY18	0	- 3.07
<b>Total</b>	<b>23.89</b>	<b>182,799.70</b>
<b>Supervision/ICR</b>		
FY18	10.339	101,502.96
FY19	4.973	76,109.90
FY20	6.669	79,167.09
FY21	9.032	72,477.04
FY22	13.406	112,211.14
FY23	10.012	70,204.31
<b>Total</b>	<b>54.43</b>	<b>511,672.44</b>



ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US\$, millions)	Of which GEF (US\$, millions)	Of which Counterpart (US\$, millions)	Actual at Project Closing (US\$, millions)	Of which GEF (US\$ millions)	Of which Counterpart (US\$ millions)	GEF Percentage of Approval (%)	Counterpart Percentage of Approval (%)
Development of National Strategy and Sectoral and Provincial Action Plans	4.72	3.60	1.12	3.96	3.70	0.25	103	84
Capacity Strengthening for Mercury Management and Risk Assessment	10.48	4.00	6.48	15.90	3.84	12.06	96	152
Project Management	0.80	0.40	0.40	0.65	0.28	0.38	69	82
<b>Total</b>	<b>16.00</b>	<b>8.00</b>	<b>8.00</b>	<b>20.51<sup>15</sup></b>	<b>7.82</b>	<b>12.69</b>	<b>98</b>	<b>128</b>

<sup>15</sup> This value is from the latest disbursement data provided by FECO, which varies slightly with the value shown in the Data Sheet at the beginning of this document due to exchange rate differences.



**ANNEX 4. EFFICIENCY ANALYSIS**

Not applicable.



#### **ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS**

The World Bank team and FECO/Central PMO have held many discussions and exchanged information on the ICR to ensure candid and objective evaluation and reporting of the project processes and results. We agree that this is a highly satisfactory project with significant national impact on sustainable mercury reduction.

The project has helped improve China's capacity to comply with and implement the Minamata Convention and accelerate the process. Moreover, it has also contributed to global public goods through carbon emission reduction achieved by synergistic mercury control and air quality improvement measures.

During the preparation and implementation of the project, the World Bank team and FECO have enjoyed a highly effective collaboration and have overcome the negative effects of COVID-19. We very much appreciate the World Bank team's professionalism and down-to-earth attitude, which has gained our respect and is exemplary. The project achievements are a result of the great efforts of the partnership from both sides.

We look forward to further cooperating with the World Bank, including piloting mercury reduction and recycling technologies and strengthening of regulatory framework for sustainable mercury management and other relevant fields in the future.

Foreign Environmental Cooperation Center



## **ANNEX 6. SUPPORTING DOCUMENTS**

### **World Bank Documents**

1. The World Bank, Project Appraisal Document (PAD1839)
2. GEF Grant Agreement
3. Project Restructuring Paper (RES36510)
4. Aide Memoires
5. Implementation Status and Results Reports
6. Project audit documents
7. The World Bank, China- Country Partnership Framework (CPF, FY20–FY25, Report No. 117875-CN)
8. The World Bank, China - Country Partnership Strategy for the Period FY2013–2016 (Report No. 67566-CN)

### **Borrower Documents**

1. Government Implementation and Completion Report and Annexes
2. Government bi-annual progress reports
3. Actions implemented by relevant mercury using sectors
4. Project outputs/outcomes versus the Minamata Convention requirements



**ANNEX 7. ACTIONS OF THE NATIONAL STRATEGY IMPLEMENTED, AND PROJECT OUTPUTS/OUTCOMES VERSUS MINAMATA CONVENTION REQUIREMENTS**

Recommendations and Actions of the National Strategy Implemented

**Table 7.1. Actions Implemented by the Relevant Sectors**

Sectors	Actions	Progress
Mercury supply sources and trade	Action 1: Strictly and orderly implement the national policy of closing primary mercury mining by 2032.	The Ministry of Natural Resources has included the management requirements for primary mercury mining rights in the 14th Five-Year Plan for the Protection and Utilization of Natural Resources, which requires “No new mercury mines will be built, and mercury mining will be gradually stopped.”
	Action 2: Identify and statistics on mercury and mercury compounds stocks above the scale.	In 2021, with the approval of the National Bureau of Statistics, MEE issued the ‘Statistical Survey System of Controlled Substances in International Conventions on Chemical Environment’, the first statistical system for the mercury-related industries was established and implemented, and the statistical work of inventory information has been incorporated into it.
<u>Mercury-added products</u>	Action 4: Promote the mercury-free replacement process for mercury-containing batteries and energy-saving lamps.	The ‘Content Limitation of Mercury, Cadmium and Lead for Zinc Anode Primary Battery (GB 24427-2021)’ has been revised and issued, which specifies that when the mercury content in the battery is less than 1 µg/g or 5 µg/g, and the mercury content in the buckle battery is not more than 5 µg/g and the mercury content in other batteries is not more than 1 µg/g, it is marked as ‘mercury-free’.
	Action 5: Ban the import and export of mercury-containing thermometers and sphygmomanometers.	In July 2020, China submitted to the Convention Secretariat the customs codes for controlled mercury-containing products, including mercury-containing thermometers and mercury-containing sphygmomanometers, to give separate customs codes for each type of mercury-containing product.
	Action 6: Strictly regulate and phase out mercury-containing thermometers and sphygmomanometers.	In October 2020, National Medical Products Administration issued the ‘Notice on the Implementation of the Minamata Convention on Mercury’ (Drug Administration Comprehensive Instrument Note [2020] No. 95), which stipulated that the validity period of registration certificates for mercury-containing thermometers and mercury-containing sphygmomanometers shall not exceed December 31, 2025.
	Action 7: Develop and implement a program to promote the use of mercury-free thermometers and sphygmomanometers	The GEF-funded project ‘Demonstration of phase-out of mercury-containing medical thermometers and sphygmomanometers in China’ was approved in December 2021. It will support 5–6 manufacturers of mercury-containing thermometers and sphygmomanometers to carry out phasing out activities, so as to facilitate enterprises to shut down their production lines of mercury-



Sectors	Actions	Progress
		containing thermometers and sphygmomanometers as scheduled.
	Action 8: Strengthen capacity building for the promotion and application of mercury-free thermometers and sphygmomanometers	The GEF-funded project ‘Demonstration of phase-out of mercury-containing medical thermometers and sphygmomanometers’ will support pilot and promotional activities for the application of mercury-free thermometers and sphygmomanometers in medical institutions in two administrative regions and the related project experience will provide a reference for promoting the use of mercury-free thermometers and sphygmomanometers nationwide.
	Action 9: Regularly carry out compliance enforcement inspections of phased-out mercury-added products	MEE organizes the annual intensive inspection to include the production enterprises of mercury-added products in the scope of inspection.
	Action 10: Strengthen the quality supervision and management of the replacement products for phased-out mercury-added products	The State Administration for Market Regulation, in conjunction with its spot inspection of product quality, regularly carries out quality supervision and management of mercury-added products that have been eliminated and replaced.
Mercury wastes and contaminated sites	Action 24: Study the establishment of environmentally sound management practices and mechanisms for mercury waste.	The Directory of National Hazardous Wastes (Version 2021) included waste mercury and mercury compounds in the category of hazardous waste. MEP will follow up the progress of the Convention and promote the domestic management process accordingly.
	Action 25: Study the development of technical specifications or guidelines for the environmentally sound disposal of mercury wastes.	In December 2021, MEE issued the ‘Guidelines for the Environmental Management of Hazardous Wastes, Lead and Zinc Smelting’ and ‘Guidelines for the Environmental Management of Hazardous Wastes, Copper Smelting’.
	Action 26: Strengthen the environmentally sound management and disposal of mercury waste capacity building.	Combined with the annual intensive inspection work, enforcement inspections of relevant enterprises will be carried out. International cooperation projects will be developed to apply for GEF support to carry out demonstration activities for the environmentally sound management of mercury-containing waste.
	Action 27: Establish and improve an inventory of mercury-contaminated sites Action 28: Progressively promote risk assessment and remediation of mercury-contaminated sites.	Promote related work in conjunction with the implementation of the soil pollution prevention and control action plan. International cooperation projects will be developed to apply for GEF support to carry out contaminated site remediation activities.
Mercury Monitoring, risk assessment and	Action 29: Conduct monitoring and risk assessment of mercury contamination levels in the environment and humans.	Mercury monitoring in related environmental media has been incorporated into the ‘14th Five-Year Plan for Ecological and Environmental Monitoring’ compiled and printed by MEE.



Sectors	Actions	Progress
research and development	Action 32: Encourage research and development of mercury-free processes and products.	The 14th Five-Year Plan for the Development of Raw Materials Industry issued by the Ministry of Industry and Information Technology has included the requirements for the control of mercury-free and mercury-added products in the production of PVC industry.
	Action 33: Promote research and development of online flue gas mercury monitoring equipment and specialized mercury removal technologies.	The GEF-funded Project Information Framework document 'Sustainable Mercury Management in Non-ferrous Metal Industry' was approved in December 2021, which will support non-ferrous metal smelters such as lead and zinc to conduct online monitoring activities of flue gas mercury and demonstration interactions of specialized mercury removal technologies and prepare a demonstration results dissemination plan based on the results of the demonstration activities to support the dissemination of online monitoring and specialized mercury removal technologies in the whole industry.
	Action 34: Conduct evaluation studies on additional annexes to the Convention in due course.	The research and assessment of the relevant mercury-added products and mercury-using processes in the listing proposals considered by the fourth Conference of the Parties has been completed, and the socioeconomic impact assessment of the proposed mercury-added products and mercury-using processes will be further carried out accordingly.

**Table 7.2. Project outputs/outcomes versus the Minamata Convention requirements**

Topic	Requirements of the Convention	Project Outputs/outcomes
Action plan preparation	<ul style="list-style-type: none"> <li>• 5 sectoral action plans on the atmosphere point source categories shall be submitted to the Conference of the Parties               <ul style="list-style-type: none"> <li>○ Coal-fired power plants</li> <li>○ Coal-fired industrial boilers</li> <li>○ Smelting and roasting processes used in the production of non-ferrous metals</li> <li>○ Waste incineration facilities</li> <li>○ Cement clinker production facilities.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• 14 sectoral action plans (or strategies) were developed               <ul style="list-style-type: none"> <li>○ Management of mercury supply sources and trade</li> <li>○ Use of mercury in mercury-added products</li> <li>○ Use of mercury in PVC production sector</li> <li>○ Coal-fired power plants</li> <li>○ Coal-fired industrial boilers</li> <li>○ Smelting and roasting processes used in the production of non-ferrous metals</li> <li>○ Waste incineration facilities</li> <li>○ Cement clinker production facilities</li> <li>○ Strategy on environment sound management of waste</li> <li>○ Strategy on environmental sound management of contaminated sites</li> <li>○ Strategy on environmental monitoring and development of an ESMF</li> </ul> </li> </ul>



Topic	Requirements of the Convention	Project Outputs/outcomes
		<ul style="list-style-type: none"> <li>○ Social impact monitoring strategy for the implementation of the national strategy</li> <li>○ Strategy for health monitoring; and</li> <li>○ Strategy for research and development.</li> <li>● Some actions have been implemented by relevant sectors (exceeding the targets)</li> </ul>
	<ul style="list-style-type: none"> <li>● No provincial implementation plans</li> </ul>	<ul style="list-style-type: none"> <li>● 3 provincial implementation plans developed               <ul style="list-style-type: none"> <li>○ Shaaxi Province</li> <li>○ Hunan Province</li> <li>○ Guizhou Province</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>● No municipal implementation plans</li> </ul>	<ul style="list-style-type: none"> <li>● 1 municipal implementation plan developed (exceeding the targets)               <ul style="list-style-type: none"> <li>○ Tongren City</li> </ul> </li> </ul>
MIS Establishment	<ul style="list-style-type: none"> <li>● No MIS required</li> </ul>	<ul style="list-style-type: none"> <li>● MIS established and operated in the three provinces</li> </ul>
	<ul style="list-style-type: none"> <li>● No requirements</li> </ul>	<ul style="list-style-type: none"> <li>● MIS integrated into a national statistical survey system for controlled substances under the International Convention on the Environment of Chemicals (National Bureau of Statistics [2021] No. 60) was established and regularly implemented in the whole country, covering all the 34 provincial-level administrative regions in China (exceeding the targets)</li> </ul>
	<ul style="list-style-type: none"> <li>● No requirements</li> </ul>	<ul style="list-style-type: none"> <li>● Implementation of international environmental conventions was included in the important content of central ecological and environmental protection supervision, which is of great significance to incorporate international compliance work into daily environmental supervision and strictly implement the compliance responsibilities of local governments (exceeding the targets)</li> </ul>
Promotion on Convention Implementation	<p>Article 3: Mercury supply sources and trade</p> <ul style="list-style-type: none"> <li>● Not allow new primary mercury mining at the date of entry into force of the Convention</li> <li>● Strictly and orderly implement the national policy of closing primary mercury mining by 2032.</li> <li>● Identify and statistics on mercury and mercury</li> </ul>	<ul style="list-style-type: none"> <li>● Starting from August 16, 2017, the mining of new primary mercury mines was prohibited, and local land and resources authorities stopped issuing new mercury exploration and mining permits. Starting from August 16, 2032, the mining of primary mercury mines will be completely prohibited.</li> <li>● The Ministry of Natural Resources has included the management requirements</li> </ul>



Topic	Requirements of the Convention	Project Outputs/outcomes
	<p>compounds stocks above the scale.</p>	<p>for primary mercury mining rights in the 14th Five-Year Plan (2021–2025) for the Protection and Utilization of Natural Resources, which requires ‘promoting the implementation of the commitments in the Minamata Convention on Mercury, which entered into force, such as the moratorium on the establishment of new mercury mining rights and the closure of mercury mines’ and ‘No new mercury mines will be built, and mercury mining will be gradually stopped.’</p> <ul style="list-style-type: none"> <li>The statistical work of inventory information on mercury and mercury compounds stocks has been implemented in the national statistical survey system.</li> </ul>
<p>Promotion on Convention Implementation</p>	<p>Article 4: Mercury-added products</p> <ul style="list-style-type: none"> <li>Limit and eliminate the use of mercury in mercury-added products (Annex A after the phase-out date)</li> <li>Ban the import and export of mercury-containing thermometers and sphygmomanometers.</li> </ul>	<ul style="list-style-type: none"> <li>Starting from January 1, 2021, it is prohibited to import or export mercury containing switches and relays (excluding extremely accurate capacitance and loss measurement bridges with a maximum mercury content of 20 milligrams per bridge, switch, or relay, as well as high-frequency RF switches and relays used for monitoring instruments).</li> <li>Starting from January 1, 2021, it is prohibited to produce mercury preparations (highly toxic pesticide products) and mercury-containing batteries (mercury oxide primary batteries and battery packs, zinc mercury batteries, cylindrical alkaline manganese batteries with mercury content higher than 0.0001%, and button type alkaline manganese batteries with mercury content higher than 0.0005%).</li> <li>As of January 1, 2021, the production, import, and export of mercury-containing products listed in the annex are prohibited (except for the production of mercury-containing thermometers and mercury-containing sphygmomanometer). From January 1, 2026, the production of mercury-containing thermometers and mercury-containing sphygmomanometer will be prohibited.</li> <li>Develop and implement a program to promote the use of mercury-free thermometers and sphygmomanometers.</li> </ul>





Topic	Requirements of the Convention	Project Outputs/outcomes
		<p>Strengthen capacity building for the promotion and application of mercury-free thermometers and sphygmomanometers</p> <ul style="list-style-type: none"> <li>• The GEF-funded project ‘Demonstration of phase-out of mercury-containing medical thermometers and sphygmomanometers in China’, approved in December 2021, will support pilot and promotional activities for the application of mercury-free thermometers and sphygmomanometers in medical institutions in two administrative regions, and the related project experience will provide a reference for promoting the use of mercury-free thermometers and sphygmomanometers nationwide.</li> <li>• Strengthen the quality supervision and management of the replacement products for phased-out mercury-added products. The State Administration for Market Regulation, in conjunction with its spot inspection of product quality, regularly carries out quality supervision and management of mercury-added products that have been eliminated and replaced (exceeding the targets).</li> </ul>
Promotion on Convention Implementation	<p>Article 5: Manufacturing processes in which mercury or mercury compounds are used</p> <ul style="list-style-type: none"> <li>• Shall not allow, by taking appropriate measures, the use of mercury or mercury compounds in the manufacturing processes listed in Part I of Annex B</li> <li>• Shall take measures to restrict the use of mercury or mercury compounds in the processes listed in Part II of Annex B.</li> </ul>	<ul style="list-style-type: none"> <li>• Starting from August 16, 2017, it is prohibited to use mercury, mercury compounds as catalysts or mercury containing catalysts in the production process of new acetaldehyde, vinyl chloride monomers, and polyurethane. It is prohibited to use mercury or mercury compounds in the production processes of sodium methoxide, potassium methoxide, sodium ethoxide, and potassium ethoxide. The mercury consumption per unit product of vinyl chloride monomer production process in 2020 decreased by 50% compared to 2010 (exceeding the targets).</li> <li>• Starting from January 1, 2019, the use of mercury or mercury compounds as catalysts for the production of acetaldehyde is prohibited. Starting from August 16, 2027, it is prohibited to use mercury containing catalysts to produce polyurethane and to use mercury or</li> </ul>



Topic	Requirements of the Convention	Project Outputs/outcomes
		<p>mercury compounds to produce sodium methoxide, potassium methoxide, sodium ethoxide, and potassium ethoxide (exceeding the targets).</p> <ul style="list-style-type: none"> <li>Regularly carry out compliance enforcement inspections of phased-out mercury-added products. MEE organizes the annual intensive inspection to include the production enterprises of mercury-added products in the scope of inspection (exceeding the targets).</li> </ul>
Promotion on Convention Implementation	<p>Article 8: Emissions</p> <ul style="list-style-type: none"> <li>Shall take measures to control emissions and may prepare a national plan setting out the measures.</li> </ul>	<ul style="list-style-type: none"> <li>National plan prepared.</li> </ul>
	<p>Article 9: Releases</p> <ul style="list-style-type: none"> <li>Shall identify the relevant point source categories.</li> </ul>	<ul style="list-style-type: none"> <li>The statistical work of inventory information on mercury and mercury compounds releases will be implemented in the national statistical survey system (exceeding the targets).</li> </ul>
	<p>Article 10: Environmentally sound interim storage of mercury, other than waste mercury</p> <ul style="list-style-type: none"> <li>Shall take measures to ensure that the interim storage in an environmentally sound manner.</li> </ul>	<ul style="list-style-type: none"> <li>The statistical work of inventory information on interim storage of mercury will be implemented in the national statistical survey system (exceeding the targets).</li> </ul>
	<p>Article 11: Mercury wastes</p> <ul style="list-style-type: none"> <li>Managed in an environmentally sound manner</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of environmentally sound management practices and mechanisms for mercury waste. The Directory of National Hazardous Wastes (Version 2021) included waste mercury and mercury compounds in the category of hazardous waste. At present, the threshold of category III waste under the Convention is still under negotiation, and the compilation of relevant guidelines for sound management is in progress.</li> <li>Development of technical specifications or guidelines for the environmentally sound disposal of mercury wastes. In December 2021, MEE issued the 'Guidelines for the Environmental Management of Hazardous Wastes, Lead and Zinc Smelting' and 'Guidelines for the Environmental Management of Hazardous Wastes, Copper Smelting'. At present, the threshold of Category III waste under the Convention is still under negotiation, and</li> </ul>



Topic	Requirements of the Convention	Project Outputs/outcomes
		<p>the compilation of relevant guidelines for sound management is in progress.</p> <ul style="list-style-type: none"> <li>• Strengthen the environmentally sound management and disposal of mercury waste capacity building. Combined with the annual intensive inspection work, enforcement inspections of relevant enterprises will be carried out. International cooperation projects will be developed to apply for GEF support to carry out demonstration activities for the environmentally sound management of mercury-containing waste (exceeding the targets).</li> </ul>
Promotion on Convention Implementation	<p>Article 12: Contaminated sites</p> <ul style="list-style-type: none"> <li>• Shall endeavor to develop appropriate strategies for identifying and assessing sites contaminated by mercury or mercury compounds.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish and improve an inventory of mercury-contaminated sites.</li> <li>• Progressively promote risk assessment and remediation of mercury-contaminated sites. Promote related work in conjunction with the implementation of the soil pollution prevention and control action plan. International cooperation projects will be developed to apply for GEF support to carry out contaminated site remediation activities (exceeding the targets).</li> </ul>
Promotion on Convention Implementation	<p>Article 13: Financial resources and mechanism</p> <ul style="list-style-type: none"> <li>• Provide, within its capabilities, resources in respect of those national and</li> <li>• Take activities that are intended to implement this Convention.</li> </ul>	<ul style="list-style-type: none"> <li>• A preliminary strategy study was implemented (exceeding the targets).</li> </ul>
	<p>Article 14: Capacity building, technical assistance, and technology transfer</p> <ul style="list-style-type: none"> <li>• Shall cooperate to provide, within their respective capabilities, timely and appropriate capacity building and technical assistance.</li> </ul>	<ul style="list-style-type: none"> <li>• Capacity building in demonstration provinces and cities (exceeding the targets):               <ul style="list-style-type: none"> <li>○ Pilot of Mercury Management Information Reporting</li> <li>○ Upgrading of the provincial environmental analytical laboratory</li> <li>○ Assessment of mercury management and recycling technologies</li> <li>○ Awareness raising at different levels</li> </ul> </li> </ul>
	<p>Article 19: Research, development, and monitoring</p> <ul style="list-style-type: none"> <li>• Shall endeavor to cooperate to develop and improve mercury research, development, and monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct monitoring and risk assessment of mercury contamination levels in the environment and humans. Mercury monitoring in related environmental media has been incorporated into the '14th Five-Year Plan for Ecological and</li> </ul>



Topic	Requirements of the Convention	Project Outputs/outcomes
		<p>Environmental Monitoring<sup>1</sup> compiled and printed by MEE.</p> <ul style="list-style-type: none"><li>• Encourage research and development of mercury-free processes and products. The 14th Five-Year Plan for the Development of Raw Materials Industry issued by the Ministry of Industry and Information Technology has included the requirements for the control of mercury-free and mercury-added products in the production of PVC industry.</li><li>• Promote research and development of online flue gas mercury monitoring equipment and specialized mercury removal technologies. The GEF-funded PIF document 'Sustainable Mercury Management in Non-ferrous Metal Industry' was approved in December 2021, which will support non-ferrous metal smelters such as lead and zinc to conduct online monitoring activities of flue gas mercury and demonstration interactions of specialized mercury removal technologies, and prepare a demonstration results dissemination plan based on the results of the demonstration activities to support the dissemination of online monitoring and specialized mercury removal technologies in the whole industry (exceeding the targets).</li><li>• Conduct evaluation studies on additional annexes to the Convention in due course. The research and assessment of the relevant mercury-added products and mercury-using processes in the listing proposals considered by the fourth Conference of the Parties has been completed, and the socioeconomic impact assessment of the proposed mercury-added products and mercury-using processes will be further carried out in accordance with the decision adopted by the fourth Conference of the Parties to promote the domestic approval process of the listing amendments.</li></ul>