

PROJECT IMPLEMENTATION REPORT

Project ID:	6921
Project Name:	Demonstration of Mercury Reduction and Minimization in the Production of Vinyl Chloride Monomer in China
Countr(ies):	China
Implementing Agency:	UNIDO

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I. Overview

A. Description

Project name

Demonstration of Mercury Reduction and Minimization in the Production of Vinyl Chloride Monomer in China

Country

China

GEF ID

6921

Implementing Agency

UNIDO

Executing Entity

Foreign Economic Cooperation Office, Ministry of
Environmental Protection, China

Trust Fund

GET

Project Type

FSP

PIR Submission

9/8/2025

Fiscal Year , PIR Number

FY 2025 , 7th PIR

Objective

To reduce risks of mercury on human health and the environment from industrial production of Vinyl Chloride Monomers (VCM) in China.

B. Ratings and Disbursements

Implementation Progress

Satisfactory

Development Objective

Satisfactory

Overall risk

Low Risk

Project Financing

17,658,000.00

Cumulative Disbursement

15,906,766.94

C. Key Dates

CEO Endorsement/Approval

7/5/2017

Agency Approval

9/7/2017

Implementation Start 10/4/2017	First Disbursement 12/21/2017
Expected MTR 12/31/2021	Actual MTR 7/1/2021
Expected Completion 12/31/2025	Actual Completion

II. PROGRESS STATUS AND ISSUES

A. Progress: Information on progress and outcomes of project implementation activities

Outcome 1. Institutional, regulatory, and enforcement capacity to fulfill obligations concerning VCM production sector under the Minamata Convention.

- 95% of the outcome indicators under the outcome 1 have been achieved by FY2024.
- In 2024 and 2025, FECO conducted a series of targeted supervisions and inspections at 14 PVC enterprises with the total production capacity of more than 4.8 million tons/year in Inner Mongolia and Shanxi. These efforts aimed to enforce key policy measures, including the mandatory halving of mercury use in the sector as well as the gradual decrease of mercury use and the implementation of clean production audits. The inspections were designed to consolidate the progress made during the mercury reduction phase and to establish a stronger foundation for continued environmental compliance and sustainable production practices.
- Under Output 1.2: Strengthening national managerial and enforcement capacity to coordinate and monitor the VCM production sector, preparations have been made for the final study tour for FECO staff to Japan in July 2025. The visit will include high-level meetings, policy dialogues, and site visits in Tokyo and Shizuoka. These activities aim to provide participants with in-depth exposure to Japan's regulatory framework, advanced technologies, and collaborative stakeholder approaches in mercury waste management. The study tour will (i) strengthen bilateral technical exchange on mercury waste management between China and Japan; (ii) Enhance understanding of non-mercury catalyst production and waste stabilization; (iii) identify potential areas for collaboration in monitoring, inventory, and site remediation.

Outcome 2: Mercury emission and dioxin release reduced from VCM production through promotion of BAT/BEPs and if economically and technically feasible eliminate mercury.

- 80% of the outcome indicators under the outcome 2 have been achieved.
- The mercury-free catalyst and alternative technology evaluation, which began in FY 2024, was concluded in FY 2025. Six production units across four PVC plants-two of which rank among the top 20 largest PVC producers in Asia-participated in the evaluation. The study tested two types of mercury-free catalysts: gold-based and copper-based. Each test unit operated between 8,000 and 10,000 hours, providing substantial data on catalyst performance under real production conditions.

Throughout FY 2025, the participating PVC plants continued to adapt and improve their technical equipment to accommodate the new catalysts. This process was supported by technical assistance and troubleshooting from the project management unit. The total co-financing contribution from the four PVC plants reached USD 31,366,000, significantly exceeding the project's investment of USD 2,286,000.

FECO, in collaboration with the Ministry of Ecology and Environment and the Chlor-Alkali Association, conducted a survey to assess the current status of mercury-free technology trials in Inner Mongolia. The survey aimed to collect data on implementation progress, technical performance, and challenges encountered by enterprises engaged in transitioning to mercury-free processes.

Despite the successful completion of trial runs, both gold- and copper-based mercury-free catalysts still face unresolved technical and economic uncertainties when compared to low-mercury alternatives. These challenges currently limit their potential for wide-scale industrial application, even after considerable R&D investments by both the Chinese government and the private sector.

Key issues identified include:

- Technical feasibility: The data collected so far is insufficient for a conclusive assessment of catalyst performance and associated waste recycling processes. In addition, variations in plant design and operations across PVC producers hinder the development of standardized conclusions.
- Technical availability: Differences between catalyst producers and end users, coupled with limited collaboration and information exchange, continue to delay widespread adoption.
- Environmental and health risks: Data gaps remain regarding emissions, wastewater, and other environmental and occupational health parameters.
- Economic feasibility: Incomplete performance data impedes a comprehensive cost-benefit analysis and limits investor confidence.

In light of these findings, the four participating PVC plants, along with industry experts, have jointly agreed that further R&D, pilot testing, technological optimization, and comprehensive data collection are needed before a definitive conclusion on mercury-free catalyst viability can be reached.

- Following the results of the technology evaluation, a demonstration of the gold-based mercury-free catalyst is currently underway and is expected to be completed in 2025. This demonstration aims to further assess the catalyst's technical performance, environmental impact, and economic viability under extended industrial operating conditions, building on the insights gained during the earlier trial phase.
- FECO actively participated in two major industry association-organized seminars focused on the current status of mercury-free PVC in China. At both the Chlor-Alkali Association Technical Conference in September 2024 and the Petrochemical Federation Annual Meeting in November 2024, FECO delivered presentations on the industry's compliance landscape, sharing insights on regulatory progress, challenges, and ongoing efforts toward mercury-free production. The industry has expressed its commitment to actively support China's compliance with relevant international obligations by steadily advancing the reduction of mercury use and undertaking mercury-free catalyst trials. Many enterprises have indicated their intention to develop roadmaps or transition plans for adopting mercury-free alternatives, tailored to their specific operational contexts and future development goals.

Outcome 3: Promote the recovery of mercury from mercury-containing waste in VCM production process.

- 80% of the outcome indicators under the component 3 has been achieved.

- In September 2024, FECO organized an expert review meeting to discuss and validate the findings of an assessment study on mercury-related policies and the management practices across the entire industrial supply chain of mercury catalyst manufacturers and mercury recycling facilities in Tongren City, as well as to review the implementation status of mercury pollution prevention and control policies at the local level. The study was conducted by the Beijing University of Science and Technology.

- The Beijing University of Science and Technology, in collaboration with the Tongren Environmental Protection Bureau (EPB), is implementing a pilot initiative on the Pollutant Release and Transfer Register (PRTR). This includes designing, distributing, and collecting standardized statistical forms to survey mercury-related data from enterprises across the jurisdiction. The ongoing analysis aims to identify trends, compliance levels, and data gaps. This initiative supports the pilot activities for whole-process environmentally sound management (ESM) of mercury in Tongren City. Its outcomes will help map the mercury flow across the full industrial chain, enhance local ESM practices, and inform the development or revision of national policies, regulations, and standards related to the implementation of the Minamata Convention.

- In June 2025, FECO conducted a field mission to Guizhou Province to assess the current status of mercury use in the region. The provincial environmental authorities expressed strong support for the activities implemented in Tongren City, recognizing their value as a pilot initiative and a model for mercury management across the province. They also conveyed interest in pursuing further cooperation with FECO in the future.

Outcome 4: Appropriate strategies developed for identifying and assessing mercury contaminated sites from VCM production.

- 70% of the outcome indicators under the component 4 have been achieved.

- In 2024, following a nationwide screening process, two enterprises were selected for preliminary risk assessments of mercury-contaminated sites: Wuhu Ronghui Chemical Company in Anhui Province and Qinghai Yihua Chemical Company in Qinghai Province. Through a competitive public tender, the Technical Centre for Soil and Rural Ecology and Environment was commissioned to undertake the assessment at the Wuhu site, while Beijing University of Chemical Technology was selected for the Qinghai site. In 2025, FECO conducted an on-site survey at the Qinghai calcium carbide-based PVC enterprise to assess current contamination status. In addition, two expert review meetings were convened to evaluate and approve the investigation and risk assessment plans, with particular focus on the proposed sampling methodologies. The two implementing units have completed preliminary site inspections and finalized the sampling plan. Sampling activities are currently underway and the full assessment is expected to be completed by the end of October 2025.
 - Throughout 2025, FECO maintained active communication with local environmental management departments in Anhui and Qinghai provinces to prepare for capacity-building initiatives on mercury-contaminated site management. Ultimately, Anhui Province was selected to implement the sub-project titled "Investigation and Supervision of Mercury-Contaminated Sites," focusing on enhancing local technical and institutional capacity to implement environmental management of mercury-contaminated sites. Specifically, the sub-project will conduct awareness raising and training for relevant environmental management departments, enterprise technicians and the public in Q3 2025.

Outcome 5: Promotion of knowledge, experience and lesson sharing and environmental awareness raising among stakeholder groups.

- The project has exceeded all outcome indicators by FY25.
- In November 2024, FECO participated in the “Workshop on Strengthening UNIDO's Project Partnerships and Capacity Building in China,” hosted by UNIDO's Regional Office in China. During the workshop, FECO shared project updates, lessons learned, and best practices with stakeholders from across the UNIDO project portfolio in China.
- In 2024, the UNIDO Headquarters conducted its annual country programme assessment for China, in which this project was selected as one of the focal initiatives. FECO actively engaged in the assessment process, providing required documentation and coordination support to ensure the successful completion of the review.
- Additional awareness raising and knowledge sharing events will be organized in Q3 and Q4 2025.

B. Challenges: Information on challenges of project implementation activities

Preparations for the gold-based mercury-free demonstration are underway following the technology evaluation results and agreements among FECO, experts, and the PVC plants. However, the sharp fluctuations in global gold prices may significantly increase the cost of gold-based catalysts. This poses a potential risk to the financial viability of the demonstration and could dampen the interest and commitment of participating enterprises.

C. Stakeholder Engagement

The project has successfully engaged key stakeholders to varying degrees in the design and implementation of planned activities, securing their ongoing support and commitment. Stakeholders have participated in a range of consultative meetings, technical workshops, and capacity-building events related to project objectives. Engagement has included the following groups:

- Industry associations, such as the China Petroleum and Chemical Industry Federation, China Chlor-Alkali Industry Association, and the China Chemical Industry Environmental Protection Association, which have supported policy dialogue and sector-wide outreach;
- Research and development institutions, including Beijing University of Chemical Technology, University of Science and Technology Beijing, the Chinese Academy of Sciences, the Chinese Research Academy of Environmental Sciences, and the Beijing Municipal Research Institute of Eco-Environmental Protection, which have contributed to technical assessments, pilot studies, and capacity-building initiatives;

Industrial enterprises, including catalyst manufacturers, PVC producers, and waste catalyst recyclers, which have participated in pilot testing, provided co-financing, and supported the demonstration and evaluation of alternative technologies.

D. Gender Equality

- The project has consistently prioritized gender equality, with particular emphasis on promoting women's participation in decision-making and leadership roles. Within the project implementation team-comprising leaders from FECO, staff from the Finance and Accounting Division, and the Minamata Convention Division-9 out of 10 members are women, representing 90% of the team. Women have also held significant leadership roles across expert teams, industry

associations, and participating enterprises. Notable examples include the Director of the Department of Corporate Safety and Environmental Protection at Zhongtai Chemical Co. Ltd., the Manager of Guizhou Wanshan Tianye Green Technology Co., Ltd., and the President of the China Chlor-Alkali Industry Association. In addition, most of the provincial project managers leading capacity-building efforts across 19 provinces are women.

- Gender equality has also been actively mainstreamed in the project's design and implementation:

o In sub-projects focused on pilot demonstrations, outreach activities, and provincial-level capacity-building, special attention has been given to ensuring women's participation and integrating gender considerations throughout all activities.

o In October 2024, a FECO delegation visited two PVC plants and one mercury-free catalyst manufacturer in Inner Mongolia to assess progress in technology testing and R&D. Of the seven mission members, five were women, including subject experts.

o In June 2025, another FECO mission was conducted in Guizhou Province to survey mercury use in the region. Three out of the four mission members were women, accounting for 75%. These efforts demonstrate the project's commitment to fostering an inclusive environment where women play a central role in shaping the future of mercury-free technologies and environmentally sound practices.

E. Knowledge Management

Effective knowledge management and information sharing are vital for engaging key stakeholders in the VCM sector and for raising awareness about the environmental and social impacts of mercury use in production processes. At the core of the project's knowledge management strategy is the reduction of mercury use and emissions, as well as the advancement of Minamata Convention implementation within the PVC industry through awareness raising events, training sessions, publicly-available flyers/factsheets, besides a range of targeted interventions, including the demonstration and promotion of low-mercury technologies in selected pilot provinces and plants, the evaluation of mercury-free alternatives, and the environmentally sound management of mercury-related activities in Tongren City—one of the project's key focus areas.

A knowledge sharing platform (www.mercury.org.cn) has been established. some key project relevant information was disclosed through the platform. Lectures and workshops were conducted for relevant knowledge sharing among government agencies, industrial associations, research institutions, companies and workers in PVC industry. Flysheets, postures, display boards and banners, meetings were applied in knowledge sharing among communities.

III: Minor Amendments

CONTEXT	
Result Framework	
Components and Cost	
Institutional And Implementation Arrangements	

Financial Management	
Implementation Schedule	
Executing Entity	
Executing Entity Category	
Minor Project Objective Change	
Safeguards	
Risk Analysis	
Increase of GEF Financing up to 5%	
Co-Financing	
Location of Project Activity	
others	

IV: Geographic Coordinates of Project Activities

Location Name	Latitude	Longitude	GeoName ID
China - Beijing	39.91	116.4	

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China- Guizhou Province, Tongren City- Guizhou Gravity Technology Environmental Protection CO., LTD.	27.33	109.01	1,809,445

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China- Guizhou Province, Tongren City- Guizhou Wanshan Tianye Green Technology Co., LTD	27.51	109.22	1,809,445

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China- Shaanxi Province, Yulin City- Shaanxi Beiyuan Group Co., Ltd.	38.74	110.20	1,785,769

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China- Inner Mongolia Autonomous Region, Ordos City- Inner Mongolia Ordos Group Co., Ltd	39.37	107.01	8,347,664

Location Description:

Activity Description:

Evaluation of mercury-free catalysts and mercury-free alternative technologies

Location Name	Latitude	Longitude	GeoName ID
China- Xinjiang Uygur Autonomous Region, Urumqi City- Xinjiang Zhongtai Chemical Co., Ltd	43.84	87.50	1,529,102

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China- Xinjiang Uygur Autonomous Region, Shihezi City- Tianneng Chemical Co., Ltd	44.33	86.06	1,529,195

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
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China- Inner Mongolia Autonomous Region, Baotou City- Baotou Haipingmian Polymer Industry Co., Ltd.	40.60	109.78	2,038,432
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Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China- Inner Mongolia Autonomous Region, Wuhai City- Inner Mongolia Yihua Chemical Co., Ltd	39.47	106.72	1,791,249

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China- Ningxia Hui Autonomous Region, Shizuishan City- Ningxia Younglight Chemical Co.Ltd	39.30	106.73	1,794,806

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China- Shandong Province, Jining City- Shandong Lutai Chemical Co., Ltd.	35.09	116.58	1,805,518

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China- Shaanxi Province, Yulin City- Shaanxi Jintai Chlor-Alkali Chemical Co., Ltd.	38.74	110.22	1,785,769

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
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China- Xinjiang Uygur Autonomous Region, Shihezi City- Shihezi Tianyu Xinshi Chemical Co., Ltd	44.36	86.09	1,529,195
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Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
China-Henan Province, Qinyang City- Haohuayuhang Chemical Co., Ltd.	35.25	113.28	1,797,556

Location Description:

Activity Description:

V. ANNEX

Uploaded Document

Document Category M and E Document	Title 6921_2025_PIR_UNIDO_China_Annex 1_Mercury-free Evaluation Annual Report
Document Category M and E Document	Title 6921_2025_PIR_UNIDO_China_Annex 2_2024 Financial Audit Report
Document Category M and E Document	Title 6921_2025_PIR_UNIDO_China_Annex 3_Meeting Minutes
Document Category M and E Document	Title 6921_2025_PIR_UNIDO_China_Annex 4_Financial Implementation Report
Document Category M and E Document	Title 6921_2025_PIR_UNIDO_China_Annex 5_Workplan and Budget
Document Category M and E Document	Title 6921_2025_PIR_UNIDO_China