



1. Project Data

Project ID

P115561

Project Name

China HCFC Phase-Out Project

Country

China

Practice Area(Lead)

Environment, Natural Resources & the Blue Economy

L/C/TF Number(s)

TF-13143

Closing Date (Original)

31-Dec-2017

Total Project Cost (USD)

162,104,169.65

Bank Approval Date

22-Nov-2012

Closing Date (Actual)

30-Jun-2019

IBRD/IDA (USD)
Grants (USD)

Original Commitment

168,474,150.00

168,474,150.00

Revised Commitment

168,474,150.00

162,104,169.65

Actual

168,462,524.00

162,104,169.65

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2. Project Objectives and Components

a. Objectives

According to the Project Appraisal Document (PAD) (p.vi) and the Financing Agreement of November 28, 2012(p. 7) the objective of the project was “to reduce Hydrochlorofluorocarbon (HCFC) production and HCFC-141b consumption in the polyurethane (PU) foam sector in order to contribute to the Recipient's endeavor to comply with its Montreal Protocol phase-out obligations for HCFCs by 2015, as well as to reduce emissions of Greenhouse Gas (GHG) from the production and PU foam sectors”.



b. Were the project objectives/key associated outcome targets revised during implementation?

No

c. Will a split evaluation be undertaken?

No

d. Components

The project included five components:

Component 1: Investment in HCFC-141b Consumption Reduction in the PU Foam Sector (appraisal estimate US\$204.3 million, actual US\$ 105.9 million): According to the ICR (p. 55) the cost of this component was lower because the project's actual mix of enterprises had lower conversion costs than the original ones identified. Many enterprises outside of the targeted sub-sectors were phasing out HCFC-141b under this project. These enterprises were larger HCFC consumers than the originally identified enterprises and therefore had lower per unit costs leading to a smaller total conversion cost.

This component was to finance; i) the introduction of zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP) alternative technologies to HCFC-141b to support phase-out of about 12,000 metric tons (MT) of HCFC-141b in three subsectors in China: (1) reefers and containers; (2) refrigeration and freezers; and (3) small household appliances; ii) support to select enterprises in other sub-sectors, including without limitation insulation pipes and panels, solar water heaters, and block foam, to cover at least another 2,000 MT of HCFC-141b consumption in order to meet the overall reduction target of at least 14,000 MT by 2015; iii) support to foam system houses to modify their production process, in order to provide hydrocarbon pre-blended polyol to enterprises that cannot adopt full-scale hydrocarbon technology.

Component 2: Investment in HCFC Production Reduction (appraisal estimate US\$260.4 million, actual US\$360.4 million): The ICR (p. 12) stated that the total cost of US\$360.4 million was the projected lost profit borne by HCFC producers under the project. The value was the profit per metric ton (using 2010 figures) of each chemical multiplied by the actual phase-out of each chemical under the project through 2030. The number was larger than the projected cost at appraisal as the reductions in HCFC-22 production were much larger than anticipated at the time, which therefore increased the total expected lost profit borne by HCFC-22 producers.

This component was to finance: i) support to HCFC producers presently operating in China to assist them in reducing their production of HCFCs to the level of 29,122 Ozone Depleting Potential (ODP) tons in 2013 and 26,210 ODP tons in 2015, representing production reduction of 3,833 ODP tons from the 2010 level of 30,043 ODP tons, whereby compensation was to be made on the basis of reduced production levels through agreed production quotas; ii) support to the establishment of production capacity for new low-carbon alternatives. HCFC producers whose establishment/operation licenses were approved prior to end-December 2008 were to be eligible for financing under this component. The right to manufacture HCFCs was to be based on the actual production level in 2010. According to the ICR (p. 55) the total cost is the projected lost profit borne by HCFC producers under the project. The actual cost is larger than the projected cost at appraisal as the reductions in HCFC-22 production were much larger than anticipated, which therefore increased the total expected lost profit borne by HCFC-22 producers.

Component 3: Technical Assistance and Policy Support (appraisal estimate US\$16.35 million, actual US\$7.75 million): According to the ICR (p. 12) due to the reduced grant funds approved for Component 3,



the technical assistance activities (especially those related to capacity strengthening of local ecology and Environmental Bureaus (EEBs)) were reduced to about six local EEBs in the provinces that had a large number of foam enterprises and HCFC producers. This component was to finance: i) provision of technical assistance to support HCFC-141b phase-out in the foam sector, including training activities on the project cycle for sub-grants, identification and testing of low-carbon blowing agents, establishment of technical support centers, technical workshops on zero ODP and low-GWP alternatives, development of guidelines for use of hydrocarbons in different foam applications, and revision of existing foam standards to remove any barriers for HCFC-141b phase-out; ii) provision of support to activities related to identification and testing of potential substitutes for HCFCs; iii) identification of additional TA activities beyond mid-2013 for the production sector; iv) strengthening the capacity of Foreign Environmental Cooperation Center (FECO) and local Environmental Protection Bureaus to carry out workshops on technologies and new HCFC phase-out policies of the government, enforce HCFC phase-out regulations, and deliver financial assistance to small foam enterprises; v) introduction of a tradable HCFC production quota system in China in 2013; vi) strengthening the capacity of the Implementation Supporting Agency, to carry out its functions.

According to the ICR (p.55) due to the reduced grant funds approved for this component, TA activities incorporated in the project, especially those related to capacity strengthening of local Ecology and Environmental Bureaus (EEBs) were reduced to about six local EEBs in the provinces with a large amount of foam enterprises and HCFC producers. However, a separate undertaking monitored by FECO and delivered by a local EEB was employed to fill this gap.

Component 4: Project Management (appraisal estimate US\$11.25 million, actual US\$8.40 million): This component was to finance provision of technical assistance to improve the capacity of FECO and the PMO to manage, supervise, coordinate, monitor and evaluate the implementation of the Project. The ICR (p. 55) stated that since this component was fee based, the difference between the appraisal and actual estimates was due to the change in total project financing.

Component 5: Preparation of HCFC Phaseout Activities Post 2015 (appraisal estimate US\$2.0 million, actual US\$0.47 million): This component was to finance scoping and preparation of activities and relevant studies as needed on HCFC phase-out beyond 2015. The ICR (p. 55) stated that the actual amount was less than estimated because the ExCom's actual requirements were less stringent than expected for project proposals for subsequent phases of HCFC phase-out.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost: The project was estimated to cost US\$494.7 million, actual cost was US\$482.9 million.

Financing: The project was to be financed by a grant from the Ozone Project Trust Fund of the Multilateral Fund for the Implementation of the Montreal Protocol in the amount of US\$168.47 million. Actual disbursement was US\$168.46 million.

Borrower Contribution: The Borrower was to contribute US\$326.3 million. The actual contribution was US\$314.5 million.

Dates: The project was restructured four times:



- On September 4, 2013 the project was restructured to process a reallocation of proceeds to allocate the additional grant financing in the amount of US\$95 million by the Multilateral Fund which had been included in the appraisal design but was still pending when the project was approved. The amount was to cover the implementation of the production sector, related Technical Assistance and project management activities. These activities were included in the Grant Agreement but did not have any financing yet.
- On April 17, 2015 the project was restructured to increase the funding for the project by US\$300,000 to allow for the implementation of component 5 for which no financing had been allocated since the executive committee of the Multilateral Fund had not yet approved it.
- On August 2, 2016 the project was restructured to reduce the allocation for Component 3 by US\$3.35 million and reallocate US\$3 million to Component 2 and US\$350,000 to Component 1 to allow for a reverse auction to provide incentives for additional HCFC producers to dismantle their idle HCFC production facilities. Also, component 5 received US\$170,000 from the executive committee of the Multilateral Fund to support the preparation of Stage II of the production sector plan.
- On December 18, 2017 the project was restructured to extend the closing date by 18 months from December 31, 2017 to June 30, 2019 to allow for the implementation of conversion and sub-projects that were experiencing delays because the companies could not resume production unless they have met the inspection and certification requirements of local Ecology and Environmental Bureaus (EEBs) and firefighting departments. Also, more time was needed to implement technical assistance and policy support activities which were essential for ensuring the sustainability of the complete phasing out of the three targeted sub-sectors.

3. Relevance of Objectives

Rationale

The project supported China's commitment to the Montreal Protocol. The Montreal Protocol requires developing countries known as "Article 5" countries to gradually phase-out HCFC consumption and production starting in 2013 and completely phasing-out of HCFC consumption and production by 2030. Accelerated HCFC phase-out applies to developed and developing countries, with the latter being subject to a freeze on baseline levels of HCFC consumption and production (2009-2010 average) in 2013 and a 10 percent reduction of the same in 2015.

According to the PAD (p. 1) HCFCs are ozone-depleting substances which were introduced as transitional substances to chlorofluorocarbons (CFCs) which are more potent ozone depleting substances. HCFCs are mainly used as refrigerant in refrigeration and air conditioning equipment and as blowing agents for insulation foam. In addition to HCFCs being ozone depleting substances, they are also potent greenhouse gases (GHGs) whose global warming potential (GWP) ranges from several hundred to several thousand times that of carbon dioxide.

The PAD (p. 2) stated that in 2009, China produced more than 70 percent of the global HCFC supply and was responsible for more than half of the global HCFC consumption for manufacturing foam and refrigeration products, producing solvents, and servicing existing equipment. HCFCs were also used in China as a feedstock for its large production of Polytetrafluoroethylene (PTFE) and pesticides, among other



substances. As developed countries phase-out their HCFC consumption and production (75% as of January 1, 2010 in accordance with the Montreal Protocol) and move to alternative technologies, China became the key producer in the global market for HCFC-based products and components. Therefore, the economic burden of the transition from HCFCs will be more severely experienced in China where a large number of industries and sectors along the supply chain are involved. According to the ICR (p. 6), at the time of appraisal, the annual revenue of the HCFC production sector was estimated at US\$1.4 billion and the revenue from the consumption of HCFC was estimated at US\$170 billion.

The objective of the project supported China's development of HCFC Phase-out Management Plans (HPMPs) for each sector which identified the necessary measures to control supply and consumption of HCFCs at target levels. Also, the objective of the project was in line with China's 2015 Nationally Determined Contribution (NCD) and its section on 'policies and measures to implement enhanced actions on climate change'.

At the time of appraisal, the project's PDO supported the Bank's Country Partnership Strategy (FY13-16), particularly theme 1 "supporting green growth" and outcome (1.6) on "demonstrating pollution management". At the time of project closing, the PDO was in line with the Bank's most recent Country Partnership Framework (FY20-25) and its second engagement area on "promoting greener growth".

Rating

High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To reduce Hydrochlorofluorocarbon (HCFC) production and HCFC-141b consumption in the polyurethane (PU) foam sector in order to contribute to the Recipient's endeavor to comply with its Montreal Protocol phase-out obligations for HCFCs by 2015:

Rationale

The project's causality chain from outputs to outcomes is highly technical (as verified within the Montreal Protocol governing framework) and firmly based on principles of chemistry. In the project's theory of change (TOC), the targeted outputs – i.e., converting the manufacturing processes of domestic PU foam consuming enterprises in the three key subsectors (refrigerators and freezers, reefer containers, and small household appliances) – were expected to lead to the outcome of implementing non-HCFC-141b and low global warming potential (GWP) alternatives. Moreover, the TOC also highlights the direct causality between the project's support for specific policies – i.e., the ban of the use of HCFC-141b – and the outcomes of (a) reducing HCFC production and HCFC-141b consumption in the PU foam sector and (b) reducing GHG emissions from the PU foam sector. The TOC also causally links outputs – such as the reduction in HCFC



supplies through production quotas on producers – with the outcome of achieving agreed targets, subject to the provision of commensurate financial compensation.

Outputs:

- A total of 21 phase-out contracts were signed with HCFC producers (four contracts for closure of idle production lines, 12 contracts for quota reduction, and five contracts for production closure), surpassing the target of 15 phase-out contracts signed with HCFC producers. The ICR (p. 18) stated that the project ensured that the aggregated phase-out of these contracts met the overall limit for each chemical in a given year by putting in place a production quota system starting in 2013 for each chemical and for each enterprise producing HCFCs. An extensive independent verification process verified these results.
- The project financed 58 investment sub-projects in the PU foam sector including 55 foam conversion sub-projects and three sub-projects for system houses (suppliers of raw materials for foam production), not achieving the target of 100 enterprises being covered by contracts. According to the ICR (p. 43) the target was not met due to a lack of capacity at small foam enterprises to conform with the project processing requirements. However, the ICR (p. 19) stated that these sub-projects contributed to a HCFC-141b consumption reduction of 12,989 MT (equivalent to approximately 1,430 ODP tons).
- The project supported the Ministry of Ecology and Environment (MEE) through technical assistance to put in place a quota system for HCFC consumption, covering the PU foam sector. This quota system started in 2013 and according to the ICR (p. 19) helped to ensure that the consumption levels stayed below the maximum allowable consumption limits. In 2018, MEE banned the use of HCFC-141b in the project's three targeted sub-sectors (small electric appliances, reefer containers, and refrigeration and freezers). This resulted in a HCFC-141b reduction in the PU foam sector of approximately 3,900 MT. However, the three non-HCFC foam standards were not adapted since the Chinese domestic refrigerator and electric water heater industry decided to adopt energy efficiency performance standards which combined electrical and insulation performance rather than developing a standalone standard focusing only on insulation performance. Therefore, the target of implementation of a production quota system, banning the use of HCFC-141b in targeted sub-sectors and new non-HCFC foam product standards was only partially met.
- Compliance with project requirements were met, achieving the target. The project had three levels of reporting: at the overall program level, the Bank conducted independent verifications of maximum allowable production and consumption levels of all HCFCs listed in Annex C in 2017. At the project level, the Bank confirmed achievement of HCFC-141b consumption levels in the PU foam sector. At the sub-project level, sub-project appraisal and completion reports were prepared by enterprises on a rolling basis. Also, all semi-annual progress reports were submitted on time and the Bank team found them of satisfactory quality, achieving the target.

Outcomes:

- The production of HCFC 141B, HCFC 142B and HCFC 22 was decreased from 29,122 ODP tons in 2012 to 20,714 ODP tons in 2019, surpassing the target of reducing the target to 26,210 ODP tons. This allowed China to comply with its Montreal Protocol obligations.
- The consumption of HCFC141B decreased from 5,393 ODP tons in 2012 to 4,191 ODP tons in 2019, surpassing the target of 4,450 ODP tons. According to the ICR (p. 39) the target was met in 2015 and remained below the maximum allowable consumption levels (as confirmed by the independent



verifications of both, consumption and production) which allowed China to comply with its Montreal Protocol obligations.

Rating
Substantial

OBJECTIVE 2

Objective

To reduce emissions of Greenhouse Gas (GHG) from the production and PU foam sectors:

Rationale

Outputs:

- The financing of 58 investment sub-projects in the PU foam sector is also an output under this objective. The target of 100 enterprises being covered by contracts was not achieved, as stated above.

Outcomes:

- Climate co-benefits from reduced HCFC production based on 2010 level were equivalent to 182.7 million tCO₂eq per year, surpassing the target of 63 million tCO₂. The Bank team stated (March 10, 2020) that the project confirmed the actual amount and type of HCFC produced at an enterprise level through the third-party annual verification of each enterprise. Corresponding GHG emissions were then determined by multiplying the GWP of each HCFC by the amount of reductions of HCFCs produced from the level produced in the previous year.

The largest contribution came from the rapid reduction of HCFC-22 production, which accounted for more than 119 million tCO₂eq per year. The reduction from HCFC-141b and HCFC-142 b production contributed to 24.9 million and 38.8 million tCO₂eq per year, respectively. The 58 foam conversion sub-projects accounted for 12,989 MT of the HCFC-141b phased out. The ban prohibiting the use of HCFC-141 b as a blowing agent in the three targeted sub-sectors accounted for an elimination of 3,900 MT (which was previously consumed by enterprises that were not eligible for funding from the Multilateral Fund).

- According to the ICR (p. 42) the investment and policy measures financed by the project generated GHG emission reductions of more than 12.2 million tons of Co₂e per year. The Bank team stated (March 10, 2020) that GHG emission reductions were determined by first confirming the actual phase-out of HCFCs and the alternative foam blowing substitute adopted by each foam enterprise. The net amount of GHG emission reductions is calculated from the difference between the amount of HCFCs phased out by all enterprises in GWP terms (metric tonnes multiplied by GWP) and the amount of new alternative consumed in GWP terms (metric tonnes multiplied by its GWP).

Rating



Substantial

OVERALL EFFICACY

Rationale

The achievement of both objectives was Substantial.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic efficiency:

According to the PAD (p. 12) it was not possible to conduct an economic analysis to capture the project's impact on the entire economy because it would have had to include, besides the foam sector, other productive sectors, consumers, the Government, and other aspects of risks and benefits to the Chinese society. Since the project did not have data on the impacts of other productive sectors and of ozone depletion and climate change on health and other aspects of life in China, the PAD did not include a quantitative analysis of these aspects. However, it was assumed that the cumulative impacts were to be positive and therefore reduce the conversion cost to society.

The ICR included a cost-effectiveness (CE) analysis which compared the cost of per kg of HCFC consumption phased out with the project cost at appraisal and MLF thresholds. Under the ExCom, CE was defined as the amount of MLF grant per unit weight of HCFC phased out in kg.

The ICR (p. 21) calculated that for HCFC-141b consumption reduction in the PU foam sector and grant financing of US\$72.8 million, the project phased out 16,889 metric tons of HCFC-141b, resulting in a CE of US\$4.31 per kg of HCFC-141b. At appraisal, the MLF established a CE threshold of US\$9.79 per kg for conversion of HCFC-141b to low Global Warming Potential technologies in the PU foam sector. When the analysis included the costs to beneficiary enterprises, which were not covered by the grant, the CE was US\$6.85 per kg of HCFC-141b. This value was lower than the CE threshold.

According to the ICR (p. 21) the production sector with grant financing for production reduction and closure of US\$91.5 million, the project phased out 116,692 metric tonnes of HCFCs (including HCFC-22, HCFC-141b, and HCFC-142 b) or 8,470 ozone depletion potential tonnes which resulted in a CE of US\$0.78 per kg of HCFCs.

The ICR also conducted a benefit-cost analysis which calculated for the PU foam sector a Net Present Value (NPV) of the GHG emission reductions (12.2 million tons of CO₂e per year) through 2030 of US\$3.4 billion to US\$6.8 billion, using the low and high shadow prices of carbon and a discount rate of 12 percent. For HCFC production reduction, the ICR calculated an NPV between US\$50.6 billion and US\$102.1 billion using low and



high values for the shadow price of carbon and a discount rate of 12 percent. These calculations indicate that the project was a worthwhile investment.

Operational efficiency:

The project's closing date was extended by 18 months from December 31, 2017 to June 30, 2019 to allow for the implementation of conversion and sub-projects that were experiencing delays due to the inspection and certification requirements of local Ecology and Environmental Bureaus (EEBs) and firefighting departments before companies could resume production. However, the ICR (p. 22) stated that the closing date extension did not have a negative impact on project management costs since PMU costs were financed by a fee, based on the total amount of grant financing.

Overall, the project's efficiency is rated Substantial.

Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal		0	0 <input type="checkbox"/> Not Applicable
ICR Estimate		0	0 <input type="checkbox"/> Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

The relevance of objective was High given its alignment with the most recent Country Partnership Framework. Efficacy was Substantial and Efficiency was Substantial resulting in an overall outcome rating of Satisfactory.

a. Outcome Rating

Satisfactory

7. Risk to Development Outcome

The main risks to development outcome can be categorized under the following categories:



Government risk: According to the ICR (p. 36), the government passed the ODS Management Regulations in 2010. These regulations prohibit the production and consumption of ODS without government approval. In case of a violation of the regulation, a substantial penalty will be implemented. However, even though the ICR (p. 35) states that production level for HCFCs are currently lower than the quotas assigned to each producer, once the production quotas are being substantially reduced to meet the Montreal Protocol compliance schedule, strong implementation support as part of Stage II and Stage III will be necessary. The government and the Bank are implementing a follow-on project (P156397, effectiveness March 2019 with a financing of US\$164.47 million), which objective is to reduce HCFC production and consumption, as well as to avoid and reduce the use of high global warming controlled substances in the consumption sector and the emissions of greenhouse gases from the production sector.

Technical/Financial risk: The ICR (p. 35) stated that the project outcomes face the risk of illegal production of products with HCFC-141b for Small Medium Enterprises (SMEs) as alternatives are currently more expensive and perform worse. Under Stage II, FECO is closely monitoring illegal production through prices for HCFC-141b (an increase in price increases the risk for illegal production). The Bank team stated (March 10, 2020) that a variety of measures are being implemented by the government to improve the overall monitoring, reporting, and verification to prevent illegal production and consumption of HCFCs. These include:

- Expansion of atmospheric monitoring stations to detect emission of ODS controlled substances whether they are in line with reported production and consumption information or not;
- Requiring producers of key raw material for making CFCs and HCFCs, to install real-time monitoring of their production with a direct link to the government online system. This requirement is being considered for all HCFC producers for real-time monitoring of their production as well.
- Conducting random inspection of PU foam enterprises to check whether their raw materials and products stem from illegally produced substances or not.
- Additional measures that contribute to confirming whether there are anomalies in an ODS sector, for example periodic mass balance (comparing levels and proportions) of key raw materials such as MDI (isocyanate) which is an input unique to foam manufacturing.

Environmental risk: The ICR (p. 35) stated studies identified the risk of illegal CFC-11 production in China. In order to address this risk, China suggests the establishment of a network of CFC, HCFC, and HFC monitoring stations in several Chinese provinces which are expected to be established in 2022 and would allow the international community to identify significant emission of banned CFC.

8. Assessment of Bank Performance

a. Quality-at-Entry

The ICR (p. 32) stated that the project benefited from the Bank team's diverse international expertise. According to the ICR (p. 33) the project was built on a previous Bank project, the China ODS IV project, and continued what worked well from this project such as project management and institutional arrangements, performance-based HCFC production reduction contracts, where funding was released based on verification of meeting agreed production targets, the system of production and sales quotas to restrict the supply of HCFCs for non-feedstock, or controlled applications and the sectoral model of



combining and coordinating investment, technical assistance, policy and regulatory support interventions for sustainable results.

Also, the Bank's experience in conducting HCFC-141b consumption surveys was incorporated into the project's design. According to the PAD (p. 12) the Bank team identified relevant risk factors with the key risk factor being related to the byproduct of HCFC production, HFC-23. About 30 percent of HCFC-22 producers receive CDM credits for HFC-23 emission mitigation. These credits make HCFC-22 production extremely profitable and thereby were a hindrance towards eventually obtaining cooperation of the producers in the reduction and phasing out of HCFC-22 production. To mitigate this risk, Component 2 was to commence in 2013 when CDM crediting of carbon emissions from the destruction of HFC-23 became ineligible under the European Union (EU) Emission Trading System (ETS). According to the Bank team (March 10, 2020) the mitigation of this risk was effective. Producers of HCFC-22 complied with the production quota issued by MEE for allowable production for controlled uses which in turn controlled HFC-23 byproduct generated at these producers.

The design of the project's Results Framework was adequate (see section 9a for more details). According to the ICR (p. 33) the project's environmental and social safeguard instruments benefitted from previous Bank projects. Also, the Bank team provided advice to FECO in regards to specifications for PU foam enterprises' sub-projects

Quality-at-Entry Rating

Satisfactory

b. Quality of supervision

According to the ICR (p. 33) the Bank conducted 12 formal implementation support missions on a bi-annual basis. In addition, technical visits for launch, completion and training workshops and audio/video conferences took place which allowed for a timely identifying and addressing of implementation bottlenecks. For example, the ICR (p. 33) stated that the Bank team used initial results from the independent verifications to identify shortcomings in the monitoring of HCFC exports. This allowed FECO and the import/export office to change the reporting procedures for exports by distributors. Also, the results showed that small foam enterprises did not participate at the beginning of the project which led to the government addressing HCFC phase-out in small foam enterprises through system houses. According to the ICR (p. 34) the Bank reviewed all verification reports to ensure that any suggested recommendations were implemented by FECO, the import/export office, and the MEE.

Also, on an annual basis the Bank organized regional ODS workshop to provide the opportunity to learn from policy makers, industry representatives, experts and Bank staff working on MP projects in the region.

The ICR (p. 33) stated that the Bank team ensured compliance and provided support in areas such as financial management, procurement, and environmental and social safeguard policies. Any issues in those areas were addressed in the project's 58 PU foam enterprises, which received financing, and in the 21 facilities that were closed, reduced their production capacity, or dismantled their idle capacity. The Bank also conducted trainings in financial management and procurement.



Also, according to the ICR (p. 34) the Bank was a critical intermediary between the government and ExCom and oversaw the preparation of the annual implementation plans and submitting them on behalf of the government to ExCom.

Quality of Supervision Rating

Satisfactory

Overall Bank Performance Rating

Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The project's theory of change and how project activities would lead to the intended outcomes were sound and reflected in the Results Framework. The objectives were sufficiently specified, and the selected indicators encompassed all outcomes of the PDO statement. Also, the indicators were sufficiently specific and measurable. The majority of indicators lacked a baseline.

According to the PAD (p. 11) the reporting framework included three levels: First, the Bank was to conduct an independent verification of the maximum allowable production and consumption levels of all HCFCs listed in Annex C, Group I, of the Montreal Protocol; second, the Bank was to confirm the achievement of HCFC-141b consumption levels in the PU foam sector against agreed targets by independently verifying a random sample of at least 5 percent of the manufacturing lines which have completed their conversion within a calendar year; and third, Sub-project appraisal reports and completion reports were to be required.

b. M&E Implementation

FECO was responsible for the project's M&E monitoring. According to the ICR (p. 29) FECO monitored progress towards the PDO in a timely and appropriate manner. Also, FECO submitted semi-annual project progress reports to the Bank each year to provide information on implementation progress and disbursement status. These reports were found to be of satisfactory quality. Also, FECO produced technical and financial reports in accordance with Bank guidelines on a semi-annual basis.

The ICR (p. 28) stated that the verification reports on national HCFC consumption and production for 2013, 2014, 2015, 2016, and 2017 were submitted by FECO to the Bank who submitted them to ExCom.

According to the ICR (p. 29) the project produced an online reporting platform for producers to report quarterly on their monthly production levels. A third party was contracted by FECO to conduct feedstock user verification of their consumption in 2013, 2014, and 2015. In regards to the consumption sector, an approach developed under the ODS IV project was continued. Once a company submitted a request for funding, FECO assigned a team to check baseline and eligibility of the company to receive MLF grants.



The ICR (p. 28) stated that the Mid-Term Review identified indicators included in the Results Framework that could be modified. However, the Bank team decided not to make the changes since they would not have had an impact on the quality of project implementation.

c. M&E Utilization

According to the ICR (p. 29) the project's M&E data was used at the national for planning MP compliance and at the international level for assessing MP compliance. HCFC data was monitored and verified on an annual basis.

The Bank team (March 10, 2020) stated that project management found M&E data useful for identifying new measures to maintain and reinforce effective project implementation. For example, the delays in signing small foam enterprises as beneficiaries led project management to explore a new approach to reach out to small and medium-size enterprises (SMEs). In this case, additional system house subprojects were introduced to supply HCFC-alternative foam system to foam SMEs thereby increasing project coverage. In addition, the delays experienced in completing the final steps of conversions at the enterprise level resulted in devising new measures to expedite full scale production with HCFC alternatives without compromising on the safety objectives of the project. For example, FECO mandated third party safety audits by foam safety experts which assured FECO that new manufacturing would proceed in a safe manner while awaiting local government clearances.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

The project was classified as category B and triggered the Bank's safeguard policies OP/BP 4.01 (Environmental Assessment) and OP/BP 4.12 (Involuntary Resettlement). According to the ICR (p. 30) project activities were expected to have site-specific minor or moderate adverse environmental and social impacts. FECO prepared an Environmental Management Framework which was to be used by the PU foam enterprises and for HCFC production facilities during implementation. Also, the ICR (p. 31) stated that a Resettlement Policy Framework was prepared based on surveys of a dozen sample project enterprises to provide information for the due diligence review of prior resettlement and preparation of new land acquisitions. Some production facilities and PU foam companies moved to industrial land that were based on land which was purchased before the project. A due diligence review was conducted, and it was found that the land acquired complied with China's regulations. Furthermore, no new land acquisition took place under the project. Employee compensation action plans were developed for all enterprises involving labor lay-off which followed China's labor law. According to the ICR (p. 31) the project did not encounter any compliance issues.



b. Fiduciary Compliance

Financial Management:

According to the ICR (p. 32) the project's accounting and financial reporting was in line with the requirements specified in the grant agreement. Also, the project's financial management system provided accurate and timely information. Furthermore, the withdrawal procedure and funds flow arrangement were adequate. The ICR (p. 32) stated that the project did not encounter any significant issues related to financial management. The Bank team (March 10, 2020) stated that FM weaknesses were primarily related to slight delays in the submission of a few Interim Financial Reports (IFRs). These delays were due to staff changes or the time-consuming information exchange procedure in between departments within FECO. The issue was addressed by FECO during project implementation through improvement of its inter-communication channels and back-up system for designated staff. Finally, all audit reports had unqualified opinions.

Procurement:

The ICR (p. 32) stated that the project followed the Bank's procurement rules and its procurement performance was rated Satisfactory throughout implementation. The project benefited from the Foreign Environmental Cooperation Center's (FECO) experience in working on similar projects in China before. During project preparation the Bank team identified the capacity of beneficiary enterprises as a Moderate risk. FECO addressed this risk by contracting an Implementation Support Agent. Also, some enterprises hired procurement agents to support their capacity. According to the ICR (p. 32) the project experienced some delays in the procurement of consulting services for the technical assistance (TA) component. However, the ICR stated that this was related to changing TA needs during implementation.

c. Unintended impacts (Positive or Negative)

NA

d. Other

NA

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Satisfactory	
Bank Performance	Satisfactory	Satisfactory	
Quality of M&E	Substantial	Substantial	



Quality of ICR	---	Substantial
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12. Lessons

The ICR (p. 36-37) provided several lessons learned which were adapted by IEG:

- **Increasing local capacity to manage and monitor ODS-phase out is essential for achieving sustainable phase-out targets.** In this project, strengthening the capacity of local EEBs has supported China in its efforts to monitor the use of HCFC-141b in the consumption sector by registering foam enterprises consuming HCFC-141b.
- **Increasing access of SMEs to alternative technology, reducing costs and safety risks, and increasing market access of cyclopentane technology can be effective through the participation of system houses in the supply of cyclopentane pre-blended polyol.** In this project, the public-private partnership between FECO and system houses allowed for the transfer of technical assistance and technology to a large amount of smaller foam enterprises through existing market networks.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR provided a detailed overview of project preparation and implementation and was sufficiently candid. The ICR included an adequate economic analysis, was internally consistent and sufficiently outcome driven. Also, the ToC was logical and well explained. The ICR included useful lessons learned Overall, the ICR's outcome rating is Substantial.

a. Quality of ICR Rating

Substantial

