



1. Project Data

Project ID P115763	Project Name ID-HCFC Phase-out in the PU Foam Sector	
Country Indonesia	Practice Area(Lead) Environment, Natural Resources & the Blue Economy	
L/C/TF Number(s) TF-14673	Closing Date (Original) 30-Jun-2016	Total Project Cost (USD) 6,375,259.68
Bank Approval Date 11-Jul-2013	Closing Date (Actual) 31-Dec-2023	
	IBRD/IDA (USD)	Grants (USD)
Original Commitment	6,969,350.00	6,969,350.00
Revised Commitment	6,389,888.00	6,375,259.68
Actual	6,389,888.00	6,375,259.68

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2. Project Objectives and Components

a. Objectives

According to the Project Appraisal Document (PAD) (p. 5) and the Financing Agreement of July 11, 2013 (p. 5) the objective of the project was “to reduce the consumption of HCFC-141b in the foam sector in Indonesia in order to contribute to the government’s effort to comply with Indonesia’s HCFC phase-out obligations under the Montreal Protocol”.



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

No

c. Will a split evaluation be undertaken?

No

d. Components

Note that the figures for planned and actual costs in this section deviate from the figures in the ICR. This is due to a cancellation and refund of US\$ 14,628.32 that was calculated and processed after the ICR was finalized (communication with the Bank team August 26th, 2024).

The project included three components:

Component 1: Investment in HCFC-141b Consumption Reductions in the Polyurethane (PU) Foam Sector (appraisal estimate US\$2.45 million, actual US\$5.83 million): This component was to finance financial incentives to about 26 foam producing companies in the refrigeration appliances, refrigerated trucks and integral skin foam sub-sectors, to phase out at least 360 metric tons (MTs) of HCFC-141b and introduce alternative, non-HCFC consuming production technologies.

The eligibility of these companies for the Multilateral Fund for the Implementation of Montreal Protocol (MLF) financial support was to be confirmed through a survey and was to be reconfirmed before Foam Technology Replacement Agreements (FTRA) can be signed with them. A financial incentive was to be provided to each company based on their HCFC-141b consumption in 2009 and 2010 and the costs of the technical alternative selected.

In 2017, the project received AF as a result the target for reductions was increased and an additional US\$4.01 million was allocated to this component.

Component 2: Technical Assistance and Policy Support (appraisal estimate US\$0.13 million, actual US\$0.29 million): This component was to finance technical assistance to support the government in developing and implementing: i) policies preventing establishment of new and expansion of existing PU foam manufacturing facilities using HCFC-141b to ensure that HCFC consumption levels for each HCFC stay below the agreed consumption limits,; and ii) guidelines, policies and regulations to support the introduction of new technologies that replace the use of HCFC-141b. Furthermore, this component was to finance technical assistance, including training and workshops for the benefit of selected foam producing companies, i) to inform them about the objective of the project and the implementation arrangements; and ii) to assist them with the preparation of conversion plans and proposals, equipment specifications, Project implementation and preparation of completion reports.

In 2017, the project received AF and an additional US\$0.12 million was allocated to this component.

Component 3: Project Management (appraisal estimate US\$0.13 million, actual US\$0.25 million): This component was to finance the establishment of a PMU, which was to be responsible for project implementation, including project management and monitoring and evaluation, and verification of implementation of the sub-projects under component.

In 2017, the project received AF and an additional US\$0.12 million was allocated to this component.



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

Project Cost: The project was estimated to cost US\$3.63 million. Actual cost was US\$6.37 million.

Financing: The project was financed by a Trust Fund (TF-14673) from the Multilateral Fund For the Implementation of the Montreal Protocol (MLF) in the amount of US\$2.71 million (of which US\$2.13 million disbursed) and an Additional Financing grant in the amount of US\$4.26 million (of which US\$4.24 million disbursed).

Borrower Contribution: The Borrower was to contribute US\$920,000 which did not materialize due to enterprises that had been identified at the beginning of the project, which were providing this counterpart financing, dropped out of the project.

Dates: The project was restructured three times:

- On June 29, 2016, the project was restructured to change the loan closing date from June 30, 2016 to June 30, 2018 to: i) ensure disbursement and use of the 3rd and 4th MLF tranche for the project; ii) complete the technology conversion in two system houses; and iii) allow for an orderly transition to Stage 2 of HCFC Foam Sector Plan, which was to be prepared in FY17. The project had experienced delays in the completion of component 1 due to government reorganization and slow decision making by the smaller targeted companies, as well as due to a delayed ExCom decision on the plan to support system houses under tranches 3 and 4.
- On December 28, 2017, the project received AF in the amount of US\$4.26 million to finance the HPMP Stage 2 and support Indonesia in completing the total phase-out of HCFC-141b1 consumption in the PU foam sector by 2023. The targets in the Results Framework were adjusted upwards accordingly. Furthermore, the project's closing date was extended from June 30, 2016, to June 30, 2023, to allow for the completion of phase 2. Also, the component costs and implementation schedule were adjusted accordingly.
- On June 12, 2023, the project was restructured to: i) extend the closing date from June 30, 2023 to December 30, 2023 to allow for the completion of on-going project activities, including evaluation of voucher distribution and continuation of the VS to cover more small enterprises, verification and site visits on voucher distribution in order to achieve the targets of a PDO indicator ("Avoided CO₂e emissions as result of conversion to low GWP technology for the PU foam sector") and two intermediate indicators ("HCFC-141b quantity covered by signed contract" and "HCFC141b quantity phase-out completed"); ii) cancel US\$579,462 in grant savings from Stage 1; and iii) reduce the end targets of one PDO indicator ("Avoided CO₂ emissions as a result of the conversion to low GWP technology for the PU foam sector" since the calculation methodology was updated per the MLF ExCom guidelines), and intermediate outcome indicator ("HCFC-141b quantity covered by signed contract" due to the non-participation or withdrawal of foam enterprises that were originally expected to be involved in the project. Even though the target was reduced at the restructuring, a split evaluation will not be undertaken since the target was revised due to the update of the calculation methodology per the MLF ExCom guidelines.



3. Relevance of Objectives

Rationale

Country and sector context. Indonesia committed to the Montreal Protocol on Substances that Deplete the Ozone Layer (MP) which required gradual phase-out of Hydrochlorofluorocarbons (HCFCs) starting from 2013. The MP aimed for developing countries to complete the phase-out of HCFC consumption and production by 2030. The MP encouraged countries to promote the selection of alternatives to HCFCs that minimize environmental impact, in particular impact on climate, as well as meeting other safety, health standards and economical consideration. At the time of appraisal, Indonesia did not produce Ozone Depleting Substances (ODS) but consumed them as refrigerants in refrigeration and air-conditioning equipment as well as blowing agents for producing polyurethane foam.

Since Indonesia was a party to the MP and operated under MP Article 5, it was eligible for financial and technical assistance (TA) from the Multilateral Fund for the Implementation of the MP (MLF) to meet its MP obligations. Since 1993, the government had undertaken a number of ODS phase-out projects under the MP, including the sector plans for the phase-out of chlorofluorocarbons (CFC-11) in the polyurethane foam sector and CFC-12 in the mobile air conditioning sector. By 1 January 2008, Indonesia had completed its phase-out of CFC-11 consumption in the foam sector, two years ahead of its MP obligations. Furthermore, by January 2010 Indonesia had completed the phase-out of CFC-12 consumption in the mobile air conditioning sector. However, further phasing out of ODS was necessary for Indonesia to comply with its commitments. The Government was committed to the phasing down of HCFC-141b in alignment with national priorities and fulfilling its obligations under the Montreal Protocol. According to the Bank team, this provided the basis for the Government's strong ownership and implementation of this project.

Alignment with the Government Strategy. The objective of the project supported Indonesia's voluntary target to reduce CO₂ emissions by 26 percent by 2020 to follow the Kyoto Protocol's request to limit the country's impact on climate change, save energy, promote green growth, and move toward a low-carbon economy. The PDO was also in line with Indonesia's nationally determined contribution commitment to reduce GHG emissions by 29 percent from the business-as-usual scenario by 2030 or by 41 percent, conditional on foreign assistance.

Alignment with the World Bank Strategy. At the time of appraisal, the objective of the project was in line with the World Bank's Country Partnership Strategy (2013-2014) which aimed to strengthen private sector development and environmental sustainability. The objective of the project was also in line with the World Bank's Country Partnership Framework (FY21-25) under engagement area IV (Sustain management of natural assets, natural resources -based livelihoods and disaster resilience) Objective 4.1 (Strengthen management of natural assets and environment).

The objective of the project was pitched at an appropriate level to address a critical development problem,

Overall, the relevance of objectives is rated as High.

Rating

High



4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To reduce the consumption of HCFC-141b in the foam sector in Indonesia in order to contribute to the government's effort to comply with Indonesia's HCFC phase-out obligations under the Montreal Protocol.

Rationale

Theory of Change: The theory of change stated that project inputs/activities such as providing financial investments to about 26 foam-producing companies in refrigeration appliances, refrigerated trucks, and integral skin foam subsectors based on their HCFC-141b consumption in 2009 and 2010, introducing alternative non-HCFC consuming production technologies and signing agreements with beneficiaries to use a reduced HCFC-245fa formulation as an alternative foam blowing agent was to result in several outputs. These outputs were to include at least 360 MT of HCFC-141b being reduced and that alternative, non-HCFC consuming production technologies would be introduced, and agreements with beneficiaries signed. These outputs were to result in the outcome of reduced consumption of HCFC-141b in the Indonesian foam sector.

Outputs:

- 26 agreements with beneficiaries were signed achieving the target of 26 agreements.
- Annual import quota was issued, achieving the target of issuing an annual import quota.
- 732.36 MT HCFC141b were phased out, exceeding the target of 666.92 MT.
- 76 TA activities were completed, exceeding the original target of 15 TA activities and the revised target of 50 TA activities. According to the World Bank team (August 26, 2024) these TA activities included the development of policies/bans and technical guidelines, hiring of technical experts, provision of training for different stakeholders (foam enterprises and government agencies), workshops/technical meetings, and awareness raising events and materials.
- All reporting requirements were complied with, achieving the target of fully complying with reporting requirements.
- All phaseout of HCFC-141b targets were achieved. The project was able to, through technical conversion and policy and regulatory activities, completely eliminate and ban the import and use of HCFC-141b in Indonesia.
- 671.8 tons of HCFC 141b quantity was covered by signed contract, achieving the original target of 666.92 tons and the revised target of 650 tons.

The following inputs/activities were not included in the Results Framework and lacked targets:

- A voucher system, which involved detailed steps to foam SMEs and the system house (chemical suppliers) to follow to achieve HCFC-141b phaseout by adopting non-flammable drop-in alternatives, was implemented. This allowed system houses to continue supplying SMEs and keep their share of the Indonesian market rather than competing with international system houses (which would have been too expensive for SMEs).
- Two foam system houses were financially supported in setting up cyclopentane mixing facilities.



- Financial incentives were provided to 26 foam producing companies in the refrigeration appliances, refrigerated trucks, and integral skin foam subsectors.

Outcomes:

- 496,760 CO₂e emissions were avoided as a result of the conversion to low Global Warming Potential (GWP) technology for the PU foam sector, exceeding both the original target of 290,000 MT and the revised target of 439,000 MT.
- HCFC-141b imports from the foam sector decreased from 90.61 MTs in 2010 to zero in 2023, surpassing the original target of 81.55 MTs and achieving the revised target of zero MTs.

The project was able to introduce non-HCFC consuming production technologies and sign agreements with beneficiaries to use a reduced HCFC-245fa formulation as an alternative foam blowing agent, which resulted in avoiding CO₂e emissions as a result of the conversion to low Global Warming Potential (GWP) technology for the PU foam sector as well as decreasing HCFC-141b imports from the foam sector.

Rating

Substantial

OVERALL EFFICACY

Rationale

The project was able to avoid the targeted CO₂e emissions as a result of the conversion to low Global Warming Potential (GWP) technology for the PU foam sector. Also, the project was able to reduce the HCFC-141b imports from the foam sector to zero. Thus, the overall efficacy is rated as Substantial.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic efficiency:

The PAD (p. 21) conducted a financial analysis to assess the financial impact of the project on the Indonesian PU foam industry. The financial analysis estimated the net incremental costs in terms of investments in foaming equipment based on the selected foaming technologies. Furthermore, the analysis estimated the additional cost of raw materials for foam production, particularly the higher cost of HFCs compared to HCFC-141b. The analysis compared the cost “with” and “without” the project over a 20-year time frame. The Net Present Value (NPV) of the net incremental cost “without” HCFC Phase-out was US\$11.90 million while it was US\$19.0 million for “with”



HCFC phase-out. The ICR (para. 44) compared the cost per kilogram of HCFC phased out (US\$/kg HCFC) with the project cost at appraisal. The project's cost-effectiveness was estimated at an average of US\$6.99/kg, with an MLF grant of US\$2.45 million and a total reduction of 360 MT. When the project received AF, the total financing was increased to US\$6.97 million, and the project was to reduce an additional 388.45 MT of HCFC-141b. Therefore, the average CE for stage 2 was US\$10.95/kg, and the total CE of the project was US\$9.31/kg.

When the project's financing was reduced to US\$6.39 million, 712 metric tons of HCFC-141b were phasing out. The CE increased accordingly, with US\$8.07/kg of HCFC-141b for component 1.

This analysis indicated that the project was a worthwhile investment.

Operational efficiency:

The project experienced several implementation delays. During the initial phase of implementation of component 1, due to government reorganization and slow decision-making by the smaller targeted companies, as well as due to a delayed ExCom decision on the plan to support system houses under tranches 3 and 4, requiring an extension of the project's closing date by 36 months. Also, during the restructuring in 2023, the closing date was extended by six months to allow for the completion of project activities, which had been delayed due to the COVID-19 pandemic.

Overall, the project's efficiency was rated as 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 the objective was High given its alignment with the World Bank's Country Partnership Framework (FY21-25) and national priorities. The project's efficacy and efficiency were Substantial, resulting in an overall Satisfactory outcome rating.

a. Outcome Rating



Satisfactory

7. Risk to Development Outcome

According to the World Bank team (August 26, 2024) no future risks to the project's development outcome are foreseen. The government is highly committed to the phaseout process of HCFC and has a solid technical team in place which has been working on similar projects since the phaseout of CFCs in the late 1990s/early 2000s. The new regulations from the MP on reduction of HFCs are also well monitored and the country is committed to meet all obligations to the protocol.

8. Assessment of Bank Performance

a. Quality-at-Entry

According to the ICR (para. 78) the World Bank team had the adequate expertise in key areas such as financial management, procurement, safeguards as well as technical issues to prepare the project. The PAD (para. 53) stated that the World Bank identified relevant risks to project implementation related to the relative safety of HC and HFC-245fa technology in foam blowing applications and the experience of the NOU with the earlier CFC phase-out project. Also, there was a risk of weak financial capacity of small foam producing companies in Indonesia to co-finance the project. Mitigation measures included implementing the World Bank's safeguard policies as well as a higher cost effectiveness for funding of the conversion measures for small companies. However, according to the ICR (para. 58) mitigation measures were not adequate. During stage 1, 17 out of 26 of companies dropped out of the project for various reasons and started to convert at their own cost or changed lines of business. Under stage 2, the project was able to mitigate this risk by working with system houses and polyol suppliers and implementing a voucher scheme to assist small medium enterprises in subsidizing the costs of chemical being used in foam. Overall, more small companies were reached out through the Voucher System support for HCFC-141 phaseout allowing the project to achieve its objective.

The project's Results Framework was adequate (see section 9a for more details).

Quality-at-Entry Rating

Satisfactory

b. Quality of supervision

The World Bank team conducted a total of 20 supervision missions throughout the 10-and-a-half-year implementation period. According to the ICR (para. 78) the World Bank team prepared detailed aide-memoires, identified implementation and addressed them appropriately. For example, when many companies dropped out under stage 1, the team and the government counterpart redirected the funding forward system houses, allowing for the project to achieve its objective. Furthermore, the World Bank team



processed stage 1 and stage 2 HPMPs in the foam sector under one project, which allowed for a smooth transition from stage 1 to 2 and include system houses to support more small medium enterprises in HCFC phaseout to mitigate against enterprises dropping out as was the case in stage 1.

According to the ICR (para. 80) the World Bank secured the approvals for each tranche of funds under stage 1 and stage 2 in a timely manner. Also, the World Bank team oversaw the preparation of the project's annual implementation plans, provided inputs, and submitted the plans on behalf of Indonesia to ExCom for approval

Quality of Supervision Rating

Satisfactory

Overall Bank Performance Rating

Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The project's objective was clearly specified. Also, the theory of change and how key activities and outputs were to lead to the intended outcomes was sound and appropriately reflected in the Results Framework. Furthermore, the intermediate outcome indicators were sufficiently specific, measurable, achievable, relevant and timebound to demonstrate the component's contribution towards achieving the project's objective.

According to the PAD (para. 48) monitoring and reporting was to be carried out on three levels: i) compliance with the MP and ExCom agreement; ii) implementation of the Foam Sector Plan; and iii) results of sub-project activities. The MOE, assisted by the PMU, was to monitor and report on Indonesia's compliance with the MP and the Agreement with ExCom.

According to the ICR (para. 56) the project established the national HCFC consumption in Indonesia through an analysis of 2009 and 2010 import data from several Indonesian sources. The baseline data was used to establish the reduction and phaseout schedule.

b. M&E Implementation

According to the ICR (para. 68) the PMU submitted reports including Tranche Implementation Reports and Plans, Financial Reports, Sub-Project Verification Reports, Progress Reports on a regular basis. In addition, project beneficiary enterprises reported on sub-projects through achieved milestones (which was required to release incentive payments), as well as preparing a sub-project completion report which was required by MLF to confirm the successful implementation of each sub-project.



After the first project restructuring in 2016, the project used data collected by the system houses, which was more accurate and detailed than the analysis of 2009 and 2010 import data on the national HCFC consumption in Indonesia.

During the 2017 and 2020 restructurings, the Results Framework was modified to first reflect the increase in project scope and then to reduce the targets of one PDO and one intermediate outcome indicator due to the non-participation or withdrawal of foam enterprises that were originally expected to be involved in the project.

c. M&E Utilization

According to the ICR (para. 70) M&E reports were used to report on MP compliance and to plan MP compliance at the national level. Also, M&E data were used to assess implementation progress towards achieving the project's objective. Furthermore, M&E data informed key decision making such as processing AF and reducing two indicator targets.

Overall, the quality of M&E is rated as Substantial.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

The project was classified as category B and triggered the World Bank's safeguard policy OP/BP 4.01 (Environmental Assessment). The project prepared an Environmental Management Framework which provided detailed checklists for risk mitigation, especially on safety issues. According to the ICR (para. 75) before any milestone payment was made, a joint supervision mission confirmed that beneficiaries had installed all equipment needed to ensure safety of the operation.

The project's safeguard compliance was Satisfactory throughout implementation.

b. Fiduciary Compliance

Financial Management:

According to the ICR (para. 73) the project complied with the World Bank's Financial Management policies and provided timely financial and audit reporting throughout project implementation. The project's internal control was adequate as demonstrated in the audit reports. Also, the project addressed implementation and audit recommendations that were identified during supervision missions. Furthermore, the external



auditor’s opinions were unqualified. At closing, the project’s Financial Management rating was Satisfactory.

Procurement:

According to the ICR (para. 74) the project complied with the World Bank’s procurement and consultant guidelines. The project did not encounter any procurement related implementation delays. At closing, the project’s procurement rating was Satisfactory.

c. Unintended impacts (Positive or Negative)

NA

d. Other

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	

12. Lessons

The ICR (p. 30) included several lessons learned, which were adapted by IEG:

- **Providing financial incentives to local foam system houses through a voucher system to invest in alternative technology can ensure that system houses as well as SMEs keep their share of the local market.** In this project, without the voucher system, it would have been unlikely the system houses would have formulated HFO polyol on their own, and SME beneficiaries were to continue to rely on HCFC-141b, especially given the high prices of HFOs by international system houses.
- **Combining financial investments in the private sector with regulatory control can allow for a sustainable phaseout of HCFC-141b.** In this project, the partially financing of the phasing out of the HCFC-141b, using the quota system as well as regulatory control to ban the import and use of HCFC-141b after completion of the technology conversion was critical for achieving HCFC-141b targets.



- **Collaboration among different entities involved in the subject area can be critical for a successful phasing out of HCFC-141b in the foam sector.** In this project, regular interministerial coordination meetings between the Ministry of Environment and Forestry, Ministry of Trade, Ministry of Industry, and Ministry of Finance around implementation progress and bottlenecks allowed for the development of a forward-looking approach to integrating policies and provisions that include both HCFCs and HFCs.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR provided an adequate overview of project preparation and implementation. Also, the ICR included a financial analysis, was internally consistent, concise, and sufficiently outcome driven. The lessons learned included in the ICR were useful for future World Bank operations in this area. The overall quality of the ICR was Substantial.

a. Quality of ICR Rating

Substantial