



1. Project Data

Project ID

P169538

Project Name

Lao PDR Clean Stove Initiative

Country

Lao People's Democratic Republic

Practice Area(Lead)

Energy & Extractives

L/C/TF Number(s)

TF-B0555,TF-B0599

Closing Date (Original)

31-Oct-2025

Total Project Cost (USD)

688,085.81

Bank Approval Date

26-Jun-2019

Closing Date (Actual)

31-Oct-2025

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	0.00	1,240,000.00
Revised Commitment	0.00	688,085.81
Actual	0.00	688,085.81

Prepared by

Maria Shkaratan

Reviewed by

Avjeet Singh

ICR Review Coordinator

Avjeet Singh

Group

IEGSD (Unit 4)

Project ID

P170644

Project Name

Lao PDR Clean Cook Stove Initiative (P170644)

L/C/TF Number(s)

Closing Date (Original)

Total Project Cost (USD)

0

Bank Approval Date

03-Nov-2019

Closing Date (Actual)



	IBRD/IDA (USD)	Grants (USD)
Original Commitment	0.00	2,000,001.10
Revised Commitment	0.00	0.00
Actual	0.00	0.00

2. Project Objectives and Components

a. Objectives

The Original Project Development Objective (PDO) was “to generate environment and gender benefits for targeted households through a switch to clean, energy efficient gasifier cookstoves using biomass pellets across selected provinces” (Project Appraisal Document (PAD), page 1).

The Project’s PDO was not revised during implementation.

For the purposes of this Implementation Completion and Results Report (ICR) review, the PDO will be assessed as a whole rather than parsed into separate objectives. Separating environmental and gender benefits’ objectives is not practical, as the Results Framework (RF) contains no gender-specific indicators.

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

No

c. Will a split evaluation be undertaken?

No

d. Components

1. Original components

Forced-draft gasifier cookstoves. The Project aimed to provide 50,000 forced-draft gasifier cookstoves using biomass pellets to households in Vientiane Capital, Savannakhet, and Champasack Provinces. These super clean cookstoves (“CSI cookstoves”) can reduce emissions by up to 99 percent compared to traditional wood- and charcoal-fueled stoves. The following innovations would be introduced: (i) a technology shift, (ii) a fuel shift, (iii) private sector-led implementation with the Implementing Entity (IE) assuming commercial risk, (iv) results-based financing (RBF) through a carbon finance mechanism, and (v) a community-based approach.

RBF mechanism. Households would pay US\$45 upfront for the CSI stove, with the remaining cost financed by a private sector IE with carbon finance experience, procured by the Ministry of Energy and Mines (MEM) and the Institute for Renewable Energy Promotion (IREP) to implement the project. The IE would be reimbursed through the sale of Certified Emissions Reductions (CERs), generated from reduced carbon



emissions achieved by replacing traditional cooking practices. Each beneficiary household was expected to reduce emissions by 3.1 tons annually, with the Project expected to generate 543,291 CERs.

Emission Reductions Purchase Agreement (ERPA) negotiations clearance. The Project received World Bank Carbon Fund donor clearance for ERPA negotiations prior to approval, and negotiations began upon effectiveness.

Component 1: Carbon Finance Capacity Building (cost at appraisal: US\$0.38 million; actual amount at closure: US\$0.35 million) aimed to build MEM/IREP capacity to prepare and implement the carbon finance operation. Activities were to include Clean Development Mechanism (CDM) registration, Project Management Unit's (PMU's) capacity building on carbon finance management, and awareness and communications campaign on forced-draft gasifier cookstoves for urban population in the target provinces/districts.

Component 2: Project Management and Implementation Technical Assistance (cost at appraisal: US\$0.86 million; actual amount at closure: US\$0.34 million) aimed to finance MEM's operational expenses to hire a firm as the IE and covered IE's contractual activities: communications and marketing, management of cookstoves and pellet supply, implementation of the Project's monitoring plan, and collaborating on the Impact Evaluation.

Component 3: Carbon Emission Reduction Program (cost at appraisal: US\$5.2 million; actual amount at closure: US\$0 million) aimed to support: (i) up-front private sector investment to pre-finance the cookstoves and pellet supply; and (ii) monitoring and reporting of carbon emission reductions from the 50,000 cookstoves.

Revision of components: No revisions were made to the Project components.

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

Project Cost: The appraisal estimate was US\$6.44 million, while the actual disbursement at closure was US\$0.688 million (ICR, page ii). The difference was due to the termination of the ERPA in March 2023 and a related cancelation of Project activities.

Project Financing: The Project was financed through a Carbon Initiative for Development (Ci-Dev) trust fund (appraisal estimate: US\$5.58 million; disbursement at closure: US\$0.351 million) and the Energy Sector Management Assistance Program (appraisal estimate: US\$0.86 million; disbursement at closure: US\$0.337 million), both administered by the World Bank.

Borrower/Recipient (WAPP's) contribution: There was no such contribution.

Project Dates: The Project was approved on June 25, 2019, and became effective on July 15, 2019. The mid-term review (MTR) was completed on March 29, 2024. The Project was restructured once, on March 21, 2024. The original closing date was December 31, 2025, but the Project closed early, on June 30, 2025, due to the termination of ERPA and cancellation of activities.



There was one Restructuring (March 21, 2024), which changed the Project closing date from June 30, 2025, to March 15, 2024 (later extended to June 30, 2025), due to the termination of ERPA.

Split evaluation. A split evaluation is not applicable, as there was no reduction in the Project's scope and ambition.

3. Relevance of Objectives

Rationale

Country and Sector Context. At Project appraisal, Lao PDR was the second fastest growing economy in the East Asia and Pacific (EAP) region and the 13th fastest globally. Poverty incidence declined from 34 percent to 23 percent between 2002 and 2012. Eighty percent of Lao PDR's energy usage came from renewable energy (RE) - mostly hydropower, but also biomass, wind and solar. Hydropower development significantly supported economic growth and helped raise the national electrification rate to 93 percent. Despite this progress, over 90 percent of the population continued to rely on solid biomass (fuelwood and charcoal) for cooking, causing pollution and severe health impacts. By 2017, household air pollution (HAP) was the third leading risk factor for premature death. The World Bank had been engaged in the clean cookstove sector since 2012, and the Project was designed to advance this agenda by promoting the adoption of clean, energy-efficient gasifier cookstoves (PAD, pages 8-9; ICR, pages 1-2).

Relevance to Government Strategies at closure. The Project remained aligned with national priorities at closure. It supported the National Strategy on Climate Change, which calls for low-carbon growth and the implementation of more energy efficient appliances, and the Renewable Energy Development Strategy (REDS), which aims to reduce energy consumption by 10 percent by 2030. HAP-related premature deaths and productivity losses - estimated at 3.5 percent of GDP annually - underscore the importance of clean cooking for health, environmental sustainability, and gender outcomes (ICR, pages 1, 7).

Relevance to the WBG's Assistance Strategies at closure. The Project aligned with the 2023-2026 Country Partnership Framework (CPF), particularly its focus on supporting vulnerable households and sustainable livelihoods, and promoting inclusive access to nutrition and health services, particularly for women and children. It also aligned with CPF themes on reducing deforestation, improving health and nutrition outcomes, and prioritizing women and children. Clean cooking is specifically referenced within the CPF as part of the green growth agenda. (ICR, page 7)

Previous sector experience. The Project design was built on positive results from the *Lao PDR Health Governance and Nutrition Development Project (HGNDP, P151425, approved in FY2015)*, which - with World Food Program's (WFP's) support - distributed 200 forced-draft gasifier cookstoves in the northern Lao PDR. It was also informed by RBF clean cooking initiatives in other countries, including Madagascar's *MG Ethanol Clean Cooking Climate Finance program (P154440)*, Rwanda's *Inyenyeri Improved Cookstove Project (P158411)*, and Uganda's *Clean Cooking Supply Chain Expansion (P153679)*. (ICR, pages 2, 14)

The PDO was aligned with national needs, government priorities, and the WBG's assistant strategy at closure, and it built on successful earlier experience with advanced cookstoves in Lao PDR. However, as noted in the ICR (p. 20), combining advanced stove/pellet technology with a results-based carbon finance model was highly ambitious in a low-capacity environment, where small and nascent markets face difficulty



attracting qualified carbon-finance operators and investors. Taking these factors into account, the Relevance of Objectives is rated Substantial.

Rating

Substantial

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To generate environment and gender benefits for targeted households through a switch to clean, energy efficient gasifier cookstoves using biomass pellets across selected provinces.

Rationale

A Theory of Change (ToC) was included in the PAD and replicated in the ICR. It outlined the Project's inputs, outputs, outcomes, and long-term objectives. To achieve the PDO, the Project supported the following inputs: (i) provision of forced-draft gasifier cookstoves; (ii) supply of pellets; and (iii) an awareness raising campaign. Expected outputs included: (i) distribution of 50,000 cookstoves to replace charcoal stoves; (ii) pellet supply to targeted households; and (iii) increased awareness. The intermediate outcome was household adoption of forced-draft gasifier cookstoves, leading to three PDO-level outcomes: (i) reduced GHG emissions; (ii) reduced HAP; and (iii) increased cookstove energy efficiency. The ToC also identified several critical assumptions: (i) cookstoves are affordable, become the primary cooking method, meet ISO-verified environmental performance standards, and remain durable for 4-5 years; (ii) pellets are affordable and accessible; and (iii) key benefits – such as improved air quality – can be adequately assessed. Overall, the ToC was logical, clear, and succinct, with relevant assumptions.

The RF included three PDO indicators – GHG emissions reductions; reduced time spent on cooking and cleaning utensils; and reduced eye irritation and headaches from HAP. The ten Intermediate Results Indicators (IRIs) covered capacity building (program registration and CDM manual preparation), stove and pellet distribution, and the awareness campaign. The M&E plan provided clear indicator definitions and data collection methods. The RF was well aligned with the clearly defined PDO and ToC, technical and logical, and supported efficient monitoring. PDO indicators were at the outcome level, underpinned by output- or input-level IRIs.

Although the PDO included a gender sub-target, there were no explicit gender indicators in the RF. While women perform most cooking and cleaning tasks, the indicators on time savings and health outcomes could have been disaggregated by sex for clarity. Nonetheless, a separate gender-focused Impact Evaluation was designed to capture gender-disaggregated results related to women's time use and acute health symptoms of primary cooks.

IRI results:



1. "Registration of the Programme of Activities (PoA) (Yes/No)". The target was achieved.
2. "CDM Operations Manual developed (Yes/No)". The target was achieved.
3. "Implementing entity contracted (Yes/No)". The target was achieved.
4. "Forced-draft gasifier stoves distributed in Vientiane Capital (Number)" (baseline: zero, target: 26,000). The achievement was 300; the target was 1 percent (negligibly) achieved.
5. "Forced-draft gasifier stoves distributed in Savannakhet (Number)" (baseline: zero, target: 12,000). The achievement was zero stoves; the target was not met.
6. "Forced-draft gasifier stoves distributed in Champasack (Number)" (baseline: zero, target: 12,000). The achievement was zero stoves; the target was not met.
7. "Awareness campaign on clean cookstoves launched (Yes/No)" The target was achieved.
8. "Pellets distributed in Vientiane Capital (Tons/year)" (baseline: zero, target: 10,530 tons/year). The achievement was 34 tons/year; the target was less than one percent (negligibly) achieved.
9. "Pellets distributed in Savanakheth (Tons/year)" (baseline: zero, target: 4,860). The achievement was zero stoves; the target was not met.
10. "Pellets distributed in Champasack (Tons/year)" (baseline: zero, target: 4,860). The achievement was zero stoves; the target was not met.

PDO results:

1. "Emissions Reductions from avoided use of charcoal (measured in ton of carbon dioxide equivalent or tCO₂e) (Number)" (baseline: zero, target: 558,648 tCO₂e). No measurement was conducted before ERPA termination in March 2023. With only 300 of 50,000 planned stoves in operation, achievement is considered negligible.
2. "Time savings for direct beneficiaries (days per year)" (baseline: zero, target: 7 days). This indicator measured time saved on cooking and cleaning cooking utensils. The endline survey (Nov. 2022) showed no statistically significant time savings, possibly due to measurement error; achievement considered negligible, given limited stove distribution and inconclusive data.
3. "Lowered occurrences of eye irritation and headaches (Percentage)" baseline: zero, target: 50 percent). This indicator was based on beneficiary surveys. The achievement was 44.6 percent; target was 89.2 percent (substantially) achieved.

Overall, the Project barely achieved its PDO. Two of the three PDO indicator targets were negligibly met, and the one partially achieved indicator reflected results among a very small number of households. Most IRIs were not achieved or negligibly met. Only initial preparatory outputs - the PoA registration, CDM manual, contracting the IE, and launching the awareness campaign - were delivered.



The ICR reported that the ERPA became invalid because effectiveness conditions were not fully met within fifteen months from the conclusion of negotiations (October 31, 2022). The IE failed to submit a satisfactory Business Plan and did not secure upfront financing - two of the five conditions of the ERPA effectiveness. Ci-Dev donors therefore voted against ERPA effectiveness for the purchase of CERs and terminated the agreement. The Project failed to demonstrate a viable business case for scaling to 50,000 stoves due to limited evidence of household behavior changes in using the stoves as projected, and stove and pellet costs were higher than projected. COVID-19 restrictions further constrained implementation MEM submitted an alternative business plan, but Ci-Dev donors rejected it as concerns on cost and commercial rollout remained unresolved. As a result, ERPA was terminated in March 2023. Because ERPA effectiveness was critical to achieving the PDO, the Project was closed early.

Rating. The efficacy rating is Negligible, as the PDO was not achieved and only early-stage preparatory outputs were delivered.

Rating
Negligible

OVERALL EFFICACY

Rationale

Efficacy is rated Negligible. Two of the three PDO indicator targets were negligibly met, while the third was substantially met only because it measured percentage among a very small subset of the originally targeted households. Most IRIs were either not achieved or only negligibly met, with progress limited to early preparatory outputs. The ERPA became invalid when key effectiveness conditions were not met within fifteen months of the October 31, 2022 negotiation conclusion. Ci-Dev donors subsequently voted against ERPA effectiveness, effectively terminating the CER purchase agreement. With ERPA no longer available, the Project closed earlier than planned.

Overall Efficacy Rating
Negligible

Primary Reason
Low achievement

5. Efficiency

a. Economic Analysis (PAD, pages 33-35; ICR, page 12):

At appraisal:

A cost-benefit analysis (CBA) was conducted using a 10.7 percent discount rate and a 5-year Project life. Net economic benefits were estimated by comparing the use of forced-draft gasifier cookstoves with traditional charcoal stoves. Costs considered included capital costs (import price of gasifier stoves and local price of charcoal stoves), fuel costs (import price of pellets and local price of charcoal), stove replacement parts and



operations and maintenance (O&M), taxes, pellet storage and distribution, and cost of CER verification and certification. Benefits included CER revenues and World Bank grant financing. Avoided CO₂ emissions were included only in the net present value (NPV) calculation, not in the economic internal rate of return (EIRR).

The analysis showed an EIRR of 38.8 percent and an NPV of US\$1.83 million excluding CO₂ benefits). When CO₂ reductions were valued, NPV increased to US\$20 million (low-cost scenario) and US\$35.3 million (high-cost scenario). Financial Internal Rate of Return (FIRR) was 76.3 percent for households and 15.8 percent for the IE. In addition, households were expected to benefit from improved health and reduced medical expenses.

At closure:

The ICR noted that no economic analysis was conducted at closure since the ERPA was terminated in March 2023, eliminating the main revenue stream and leading to early Project closure. However, some results (negligible) were achieved, therefore, economic analysis could have been done.

Overall, appraisal estimates suggested strong economic viability; however, these projections were not realized due to the termination of the ERPA and incomplete implementation. Also, no economic analysis was conducted at closure; therefore, a quantified comparison of economic efficiency between appraisal and closure cannot be conducted.

b. Administrative Efficiency (ICR, pages 12-13, 15-16; PAD, pages 38-39):

The ICR reported that the Project was adequately designed and well-structured, with a clear PDO and an RF that supported effective monitoring of expected outcomes. It drew on lessons from previous World Bank support through similar projects in the country and globally. Key risks – including reliance on hiring an IE after appraisal, reliance on carbon finance and pellet sales to repay the initial investment, and limited institutional and fiduciary capacity – were correctly recognized and mitigated through careful IE procurement planning, capacity building, and detailed procurement arrangements. The ICR noted that the Project was implemented diligently, at a reasonable cost relative to initial projections, and with close Bank supervision. It was supported by strong government commitment throughout implementation.

However, efficiency was undermined by increased costs and significant delays. Procuring the IE took more than a year (until May 2021) due to a complex process, a non-responsive bid, extended negotiations, and administrative delays on the IE's side. COVID-19 restrictions further contributed to delays and higher costs. These issues were compounded when the IE failed to submit an adequate Business Plan, provide reliable financial projections, and did not provide required upfront investment. Given that ERPA funding was scheduled to expire at the end of 2024, these delays were detrimental to the achievement of the PDO. As a result, the ERPA was terminated in March 2023 and the commercial phase of the project did not proceed.

While the Project benefited from sound design, prior experience, close supervision, and government commitment, the substantial delays - primarily related to IE procurement and performance (internal factors) - significantly reduced operational efficiency. While economic analysis was not conducted at closure, limiting information needed for proper evaluation, it is clear the results would have shown negligible economic viability. Accordingly, the efficiency rating is Negligible.

Efficiency Rating



Negligible

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	✓	38.80	80.70 ☐ Not Applicable
ICR Estimate		0	0 ☐ Not Applicable

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

6. Outcome

The Project was grounded in positive results from earlier clean-cooking initiatives in Lao PDR and similar operations globally and was well aligned with government priorities and World Bank strategies. However, implementing advanced stove/pellet technology alongside a results-based carbon finance model proved highly ambitious in a low-capacity environment. The PDO was not achieved: only initial preparatory outputs were delivered, as the ERPA component was terminated when effectiveness conditions were not met within fifteen months of negotiation, leading to early Project closure. Efficiency was also weakened by increased costs and significant delays, largely driven by internal factors - the prolonged IE procurement process and the IE's failure to adequately support implementation.

Accordingly, relevance of objectives is rated Substantial, and both efficacy and efficiency are Negligible, resulting in an Overall Outcome rating of Highly Unsatisfactory.

a. Outcome Rating

Highly Unsatisfactory

7. Risk to Development Outcome

The ICR noted that the Project's limited achievements are unlikely to be reversed after closure and provides no further discussion of risks to the development outcome (ICR, page 19). However, negligible achievements do not imply negligible sustainability risk. In fact, the implementation setbacks discussed elsewhere in this Review undermine the durability of even the modest results and pose a high risk that partial gains will not be sustained without alternative financing or institutional uptake. Key risks include:

Market readiness. Market-related risks affect both continued stove use and any potential scale-up. In this Project, securing reliable carbon financing and establishing a viable fuel and technology market proved difficult. A 2019 Market Research Survey (MRS) conducted soon after effectiveness found the target of 50,000 CSI stoves overambitious, and after the Proof-of-Concept (PoC) phase roll-out of 300 stoves, the IE



asserted that results did not yet demonstrate a viable business model for a rollout at scale. Although the PoC had some positive findings (verified by an independent impact evaluation), the flagged issues signal risks to sustained use and upscale. Mitigating would include stronger awareness raising, affordability analysis, comprehensive market assessment (including demand estimation), further business model testing, and pellet supply chain analysis. (based on: ICR, page 15).

Financing. Carbon finance was the core mechanism to make stoves affordable and attract investment. Termination of the ERPA collapsed this model, creating substantial financial risk. Without stable carbon revenues, households may revert to traditional fuels and private sector participation may weaken.

Behavioral. Household uptake is uncertain. The 2019 MRS cited low awareness of charcoal-related health hazards, perceived low affordability of cleaner technologies, and unfamiliarity with CSI stoves. Without further demand assessments, it remains unclear whether CSI stoves meet user preferences.

8. Assessment of Bank Performance

a. Quality-at-Entry

The Project was well structured, with a clear PDO and a technically sound RF that adequately covered expected outcomes and aligned with the PDO. The design was based on previous Bank experience with similar projects, including in the country. Most risks were correctly identified, and the overall risk was assessed as Substantial due to reliance on carbon finance and pellet sales to repay the initial investment, introduction of a new technology and fuel, reliance on an IE that had yet to be hired, limited institutional capacity, and fiduciary risk including procurement. Although some risk mitigation measures were implemented - such as a thorough preparation of the IE bidding process, capacity building, and a detailed procurement plan – they were insufficient, leading to procurement gaps and significant delays. Exposure to other risks, including low market readiness and household behavior, was also inadequately mitigated. (ICR, pages 12, 15-16, 18-19)

Quality-at-Entry Rating

Moderately Satisfactory

b. Quality of supervision

The ICR noted that the Project was diligently implemented, with close supervision and cost comparable to appraisal estimates. The Bank team demonstrated consistent engagement, with regular supervision missions, and the Task Team Leader (TTL) remained involved throughout the Project (and also had experience with earlier cookstove pilots in Lao PDR). Implementation benefited from strong government commitment.

However, increased costs and significant delays turned out to be detrimental to the planned outcomes. Hiring the IE took over a year due to complex procurement, non-responsive bids, lengthy negotiations, and administrative bottlenecks. The IE also failed to submit an adequate Business Plan or secure the upfront



investment needed to implement the ERPA. COVID-19 restrictions further contributed to delays and cost increases. As a result, CSI stoves could not be deployed at scale, and CER sales under the ERPA could not materialize on time (before its originally scheduled closure at the end of 2024). Therefore, ERPA was terminated early, in March 2023, and the commercial phase did not proceed. (ICR, pages 13, 15-16, 19)

Overall, Bank performance is rated Moderately Satisfactory. While the Project was well-structured and closely supervised, risk mitigation at appraisal was insufficient, and implementation experienced delays - largely because significant risk was passed to the IE and because the objectives and design were overambitious given existing capacity - significantly affected PDO achievement, particularly given the time-sensitive nature of ERPA funding.

Quality of Supervision Rating

Moderately Satisfactory

Overall Bank Performance Rating

Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The RF at design was aligned with the PDO and included time-bound, specific, objective, and Project-attributable indicators, both quantitative and qualitative, with established baselines and targets. It was technical and clear, adequately covering most expected outcomes and outputs. PDO indicators were at the outcome level, underpinned by the output- or input-level IRIs.

However, the RF had a shortcoming: although the PDO included a gender sub-target, there were no explicit gender indicators. While women are primarily responsible for cooking and cleaning, reductions in time spent or health impacts were not captured as specific gender outcomes. Nevertheless, a separate gender-focused Impact Evaluation complemented the RF, measuring household expenditures, women's time spent cooking and cleaning, and acute health symptoms of primary cooks (ICR, page 17). The evaluation included: (i) a market research study on households' willingness to pay, which also served as a listing exercise of potential beneficiaries; (ii) a baseline survey for potential beneficiaries (of which 300 received stoves during the PoC phase) and a control group; and (iii) an endline survey which was to take place following stove deployment.

b. M&E Implementation

Prior to Project termination, M&E was implemented as planned, with regular reporting through nine ISRs. M&E data was used in regular implementation reporting, including thorough and detailed Aide Memoires and high quality ISRs (ICR, page 13). However, since the IE did not proceed beyond the PoC phase, M&E activities were severely curtailed. A separate gender-focused Impact Evaluation provided detailed results that were used to assess Project outcomes. (ICR, page 17)



c. M&E Utilization

The ICR noted that although M&E utilization was limited due to early Project termination, the separate gender-focused impact evaluation remains a valuable stand-alone document, offering useful insights for future clean cookstove initiatives. (ICR, page 17)

The quality of M&E is rated Substantial. The M&E design was adequate, and while implementation and utilization were curtailed, the lessons - particularly from the gender-focused study - can inform future operations.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

Environmental and Social (E&S) Safeguards. At appraisal, the Project was classified as Environmental Category B (Moderate), reflecting the need to ensure sustainable sourcing of cookstoves and pellets, as well as proper end-of-life disposal of batteries and solar panels as hazardous waste. A waste management plan was to be developed and implemented by IREP to manage these materials until a national hazardous waste system becomes operational. Additional environmental risks included the safe transport and storage of cookstoves and pellets; IREP and the project entity were to prepare and implement a transportation and storage plan to ensure road and warehouse safety. The applicable environmental standards were: (i) Assessment and Management of Environmental and Social Risks and Impacts, and (ii) Resource Efficiency and Pollution Prevention and Management (ICR, p. 18; Environmental and Social Review Summary – Appraisal Stage, pp. 3–4).

Social risks were classified as Category A (Low). Applicable standards included: (i) Stakeholder Engagement and Information Disclosure, (ii) Labor and Working Conditions, (iii) Community Health and Safety, and (iv) Indigenous Peoples and Underserved Traditional Local Communities. Risks related to labor and working conditions were mitigated through sustainable procurement or labor management procedures to address gaps between national requirements and World Bank standards. (ICR, page 18; PAD, page 37)

The ICR reported full compliance with all applicable E&S safeguard policies, and safeguards ratings were Satisfactory in the last six ISRs.

b. Fiduciary Compliance

Financial management (FM). The ICR reported that FM performance was overall adequate. The FM team consistently reviewed expenditures and documentation to ensure compliance with Bank policies, as



required. All financial audit requirements were met, and FM ratings were Satisfactory in the final five ISRs. (ICR, page 18)

Procurement. The ICR highlighted substantial procurement challenges throughout implementation, resulting in major delays in critical activities. Contributing factors included complex procurement procedures, a non-responsive bid submission, protracted negotiations with the selected bidder, and administrative delays on the IE's side. The procurement arrangement was innovative and unprecedented globally, and the PAD had flagged the IE procurement as "high risk," given the difficulty of attracting qualified bidders. The IE was expected to pre-finance a substantial share of stove costs and manage multiple responsibilities, including household identification; procurement and distribution of stoves and pellets; inventory management; monitoring and verification for CER generation; CDM documentation; and safeguards implementation. The ICR noted that a market-sounding exercise prior to finalizing the IE's TOR could have helped attract qualified international firms. Procurement ratings were Satisfactory in the last six ISRs. (ICR, pages 15-16)

c. Unintended impacts (Positive or Negative)

There were no unintended impacts.

d. Other

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Unsatisfactory	Highly Unsatisfactory	Both efficacy and efficiency were rated as Negligible
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	
Quality of M&E	Substantial	Substantial	
Quality of ICR	---	Substantial	

12. Lessons

The following lessons were derived from the ICR (ICR, pages 19-20):

1. Combining advanced stove technology with results-based carbon finance is highly ambitious in low-capacity environments. The Project showed that small, undeveloped markets - such as in Lao PDR - struggle to attract qualified carbon-finance operators and investors. Introducing new technology while relying on complex RBF carbon mechanisms requires institutional,



market, and private-sector capacity that was not sufficiently present to support Project implementation.

2. Carbon finance can make clean-cookstove projects viable, but only when reliable upfront investment is secured early. The Project's failure to implement the carbon-finance component was largely due to the absence of upfront investment. Households were expected to pay about US\$45 per stove, with the private IE financing the remaining upfront cost and recovering it later through CER sales once carbon emission savings are generated through the usage of the CSI stoves. However, the IE was hired almost two years after effectiveness, then requested a Proof-of-Concept (PoC) phase to test key assumptions, including household behavior change. The PoC results were insufficiently convincing for the IE to assume commercial risk, and it requested a PoC extension until June 2023 to test additional households. This was incompatible with the fixed ERPA funding deadline (December 2024). When the IE failed to mobilize the required investment by the deadline, the ERPA was terminated in March 2023, triggering early Project closure. This highlights the importance of securing upfront investment and conducting robust market analysis before implementation, as well as the heightened risks created by fixed ERPA end-dates.

3. In IDA countries with weak or undeveloped carbon markets, simpler IDA- and grant-financed approaches may be more appropriate than complex carbon-finance models. Clean cookstove projects may benefit from IDA credits and grants that enable more straightforward designs suited to low-capacity contexts, avoiding the complexity and risks of RBF carbon finance. Instruments such as the US\$100 million Clean Cooking Fund, managed by ESMAP - providing US\$1 of grant funding for each US\$1 of IDA funding - could provide a more reliable funding structure for future operations in Lao PDR.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR provides sufficient technical information and analysis on main aspects of Project implementation, including relevance of objectives, efficacy, administrative efficiency, economic analysis, and key factors affecting preparation and implementation. It is internally consistent, clearly written, and offers lessons that are well grounded in the ICR's analysis and useful for similar operations. The shortcomings are: limited detail in the sections on risk to development outcome, M&E implementation and utilization, safeguards, and Bank performance.

On balance, given the sufficient information in the main sections, reliable analysis, and logical presentation, but also factoring in the gaps noted above, the quality of ICR is rated Substantial.

a. Quality of ICR Rating



Substantial