



Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 12-Feb-2019 | Report No: PIDC26421

**BASIC INFORMATION****A. Basic Project Data**

Country Lao People's Democratic Republic	Project ID P169538	Parent Project ID (if any)	Project Name Lao PDR Clean Cook Stove Initiative (P169538)
Region EAST ASIA AND PACIFIC	Estimated Appraisal Date Apr 01, 2019	Estimated Board Date Apr 30, 2019	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing	Borrower(s) Ministry of Finance	Implementing Agency The Ministry of Energy and Mines (MEM)	

Proposed Development Objective(s)

Enhance energy efficiency in cook stoves and reduce carbon emissions from households across three provinces in Lao PDR

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	6.06
Total Financing	6.06
of which IBRD/IDA	0.00
Financing Gap	0.00

DETAILS**Non-World Bank Group Financing**

Trust Funds	6.06
Carbon Initiative for Development	5.20
Energy Sector Management Assistance Program	0.86

Environmental and Social Risk Classification

Concept Review Decision



Moderate

Track II-The review did authorize the preparation to continue

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **A rapidly growing economy in Lao PDR has benefitted the population, but the individual household economic situation remains volatile.** With gross national income (GNI) up from US\$320 in 2002 to \$2,270 in 2017, Lao PDR for the first time met the criteria for Least Developed Country (LDC) Graduation in 2018.¹ Average annual Gross Domestic Product (GDP) growth during the last decade has been around 7-8 percent and GDP per capita growth at 6 percent. This makes it the second fastest growing economy in the East Asia and Pacific (EAP) region.² However, urban and rural populations have not benefitted from economic growth to the same degree. Even though the percentage of people living below the national poverty line declined from 34 percent in 2002 to 23 percent in 2012,³ urban poverty rates are only 10 percent while rural poverty rates are nearly three times as much. Furthermore, a significant number of households continue to shift in and out of poverty; more than half the poor in both 2008 and 2013 were previously non-poor.⁴ Inequality has also widened, with the Gini coefficient increasing from 32.5 to 36.2, reflecting lower gains for the bottom 40 percent than for the rest of the population.

Sectoral and Institutional Context

2. **Given wide-spread traditional cookstove use, the residential sector is the largest energy consumer in Lao PDR accounting for nearly half of the country's energy consumption.**⁵ Although more than 90 percent of the population has access to electricity, about 91 percent continue to use solid biomass for cooking and heating purposes;⁶ with fuelwood (67 percent) and charcoal (24 percent) being the predominant sources of fuel.⁷ Nationally, a family on average consumes as much as 5 kilograms (kg) a day of fuelwood for cooking, which amounts to almost 2 million tons per year. Families using charcoal, use about 1.86kg a day in rural areas and 2.33 kg per day in urban areas; however, it takes as much as 6-10 kg of wood to produce 1 kg of charcoal making it a much larger culprit in terms of emissions and rapid deforestation. Despite being significantly more efficient as a heating agent, charcoal consumption will result in more CO₂ emissions than fuelwood at each household level. In addition, it emits Carbon Monoxide (CO), SO₂, NO₂ and Particulate Matter (PM_{2.5}), all of which can cause significant health and environmental issues. In 2017, Household Air Pollution (HAP) was the third leading health risk factor for

¹ World Bank Economic Monitoring Report, 2017

² World Bank. 2016. Green Growth Development Policy Financing Program Document.

³ World Bank Country Data. Available at <http://data.worldbank.org/country/lao-pdr>. Accessed March 24, 2017.

⁴ World Bank. 2015. Lao PDR Poverty Policy Note: Drivers of Poverty Reduction in Lao PDR.

⁵ Ministry of Energy and Mines, PPT presentation, Energy Policy Training Program, Course Period in Japan, June/July 2015.

⁶ The rest use LPG or electricity. (Lao PDR 2015 Population Census)

⁷ Lao PDR Population Census, 2015.



premature deaths in Lao PDR. The use of charcoal as a cooking fuel is rapidly increasing in Lao PDR – from a low of 6 percent in 2012 to 24 percent in 2015. With the economic expansion and migration to cities, charcoal use is likely to become more widespread, which can pose significant complications for Lao PDR’s green growth development agenda.

3. **Despite the steady rise in electricity service coverage, the transition to electricity for residential cooking energy has been slow.** The relatively high price of both electricity and retail costs of imported Liquid Petroleum Gas (LPG) have been determining factors in the continued use of charcoal for household cooking and heating needs. Previously, the electricity tariff was significantly lower than the overall cost of production (i.e., generation, transmission, and distribution) and urban households took advantage of the low tariff rates using electricity for cooking. However, the gradual rise in tariffs has caused households to return to using fuelwood and charcoal as their main source for cooking.⁸ Social behavior and preferences such as the taste of food and tradition also play a role. The Lao PDR menu is largely grill-based, which gives it a specific smoky flavor. Switching to electric stoves will ultimately change the taste of food and not fit the demand.
4. **Lao PDR National Determined Contribution to the United Nations Framework Convention on Climate Change (UNFCCC) notes the country’s ambitious plans to lower energy consumption and reduce GHG emissions.** The Lao PDR Renewable Energy Development Strategy states a commitment to reduce energy consumption by 10 percent by 2030. In addition, the country’s National Strategy on Climate Change sets a goal to achieve low-carbon economic growth. Specifically, within the energy sector, the policy calls for the implementation of more energy efficient appliances. In addition to contributing to the country’s climate change goals, the project also impacts seven Sustainable Development Goals (SDGs) in its design (SDG 3, 5, 7, 11, 13, 15, and 17),⁹. This is high priority as outlined in the 8th National Socio-Economic Development plan (NSEDP), the National Strategy, and the Vision 2030.
5. **The energy sector institutional framework is well-defined.** The Ministry of Energy and Mines (MEM) is the focal point for overall energy policy. Under MEM, the Institute for Renewable Energy Promotion (IREP) is the main agency responsible for the promotion of renewable energy in Lao PDR. Its mandate is to promote and manage technical aspects within the organizational system of the MEM and assist the MEM in the implementation of the country’s Renewable Energy Development Strategy. IREP has worked closely with the World Bank since 2012 to lay a foundation that can spur cleaner cooking solutions that save energy and lower GHG emissions. In 2015, MEM convened a high-level inter-ministerial cookstove taskforce to manage government participation in multi-sectoral cookstove activities.¹⁰ The taskforce

⁸ *Pathways to Cleaner Household Cooking in Lao PDR. An Intervention Strategy.* The International Bank for Reconstruction and Development/ The World Bank Group, May 2013.

⁹ These are (SDG3) Good Health and Well-being, (SDG5) Gender Equality, (SDG7) Affordable and Clean Energy, (SDG11) Sustainable Communities, (SDG13) Climate Action, (SDG15) Life on Land, (SDG17) Partnerships for the goals.

¹⁰ Members include the Ministry of Science and Technology, Ministry of Agriculture and Forestry, Ministry of Industry and Commerce, Ministry of Natural Resources and Environment, Ministry of Finance, Ministry of Health, The Lao Women’s Union (LWU), the National University of Lao, Ministry of Information, Culture and Tourism, and the PRF.



established Lao PDR's first national cookstove testing laboratory and released the country's first Cookstove Guidelines in 2016.

Relationship to CPF

6. **The project is aligned with the 2017-2022 Country Partnership Framework¹¹.** It promotes environmental protection and sustainable natural resource management by decreasing emissions as well as promoting a shift from charcoal to pellets.¹² Sustainably sourced pellets will help decrease the amount of wood used for producing charcoal as well as significantly lower ambient air pollution and carbon emissions (focus area 3). The project also compliments the agenda to reduce vulnerability through improved health and end malnutrition. The use of the cookstoves will significantly help reduce HAP which causes a range of chronic lung disease in the Lao population. The project also supports the National School Feeding program in conjunction with the World Food Program to keep children in school and provide supplement nutrition for the children. Included in this is the provision of clean cook stoves as well as a behavior change element to support improved nutrition outcomes (focus area 2). Finally, the project is aligned with the CPF's objective to support sustainable and inclusive green growth, for women. The project has integrated gender considerations throughout its entire design, from planning to implementation and project impact thereby supporting the CPFs aim to ensure close gender gaps (focus area 1).**C. Proposed Development Objective(s)**
7. Enhance energy efficiency in cook stoves and reduce carbon emissions from households across three provinces in Lao PDR

Key Results (From PCN)

8. The expected key results from the project intervention will be:
 1. Lowered Greenhouse Gas (GHG) emissions from cookstoves within households where charcoal stoves are replaced.
 2. Improved household energy efficiency, including economic benefits, due to change from charcoal-based stoves to gasifier stoves.
 3. Gender outcomes ascertained.
9. The proposed results indicators are:
 1. Emissions Reductions from avoided use of woody biomass (measured in ton of carbon dioxide equivalent or tCO₂e) (calculated)
 2. Cost savings for direct beneficiaries (survey sample) and fuel savings for direct beneficiaries (survey sample).
 3. The timely completion of an impact evaluation, covering time savings for direct beneficiaries (survey sample); and lowered occurrences of eye irritation and headaches (survey sample).

¹¹ Report Number 110813-LA, March 2, 2017

¹² The project will require all biomass biproduct to be sustainably sourced and accredited when possible. For example, by the Forest Stewardship Council (FSC).



D. Concept Description

10. **This project builds on technical assistance provided to the Government of Lao PDR on improving the cookstove sector under the Health Governance Nutrition Development Program (P151425).** The project will distribute 50,000 forced draft gasifier cookstoves across eight to ten districts in three different provinces: Vientiane Capital, Savannakhet Province, and Champasack Province (Table 1). These three areas are urban to peri-urban areas and were chosen in collaboration with the Ministry of Energy and Mines based on their high charcoal consumption, carbon emission reduction potential, characteristics of the charcoal market, and the availability of agricultural waste for pellet production. The project design is informed by two pilots implemented under the Health Governance and Nutrition Development Project (HGNDP, P151425). One pilot was implemented in the Savannakhet province during 2014/15 in 72 households to inform the development of the results-based finance (RBF) scheme as well as measure exposure to emissions and the benefits of forced draft gasifier cookstoves. The second pilot in 2017 focused more heavily on uptake and gender impacts and was carried out in collaboration with the World Food Programme (WFP) and the Poverty Reduction Fund (PRF) in the Northern parts of Lao PDR.¹³ The pilot findings showed positive stove uptake and revealed strong links to primary and secondary outcomes of shifts in the time and labor burden for women due to more efficient stoves, possible household savings, lowered emissions, and some immediate health benefits such as decreased coughing and headaches. The pilots have also helped inform risk mitigation considerations in relation to stove affordability and the need to adapt to local preferences and traditions.
11. **The project is being implemented as a results-based finance (RBF), public-private partnership (PPP) that links public support to the achievement of demonstrated benefits, which in turn mobilizes private sector investments.** The theory of change is driven by the revenues from a future sale of carbon credits (and potentially gender outcomes), which serves as collateral for private social impact funds, such as base-of-pyramid (BOP) funds. This model will help bring down the price of the stove to an affordable level¹⁴ for the Lao population, as well as promote the establishment of a market where sales can flourish in the long-term, thereby improving the energy efficiency in the cooking sector and lowering GHG emissions.

Table 1. Project Characteristics			
Project Locations	Vientiane Capital	Savannakhet	Champasack
Population	820,900	969,697	694,023
No. of HH (calculated based on 5 people per HH)	127,920	83,059	36,089
Annual income per capita (US\$)	1,642	1,300	1,300
HH annual Income (calculated) (US\$)	2,463	1,950	1,950
Monthly income (charcoal HH) (US\$)	166.39	159.07	206.14
Monthly Income (everyone) (US\$)	159.16	152.16	183.22
Charcoal use %	51.8	32.1	55.8

¹³ The WFP introduced 150 stoves across their school meal program in the Nalae District of the Luang Namtha Province while the PRF selected 50 households across their villages in the Houaphan Province.

¹⁴ From new, the price of a forced-draft gasifier stove is between \$85-100 depending on import costs, transportation etc. However, this price point is too high for the average Lao citizen.



No. of HH using charcoal	66,262	25,914	20,137
Charcoal usage per HH/year (tonnes)	0.90	0.74	0.74
Price of charcoal (US\$/kg)	0.17	0.15	0.15
HH expenses for charcoal (US\$/year)	154	108	108
% of income spent on charcoal/year	6%	6%	6%
Traditional stove replaced	26000	12000	12000
Penetration rate	39%	46%	60%

12. **Carbon finance plays an indispensable role in making the project financially viable.** It will function as leverage and security for potential investors such as BOP investors to pre-finance the distribution of the forced draft gasifier cookstoves. The promise of the carbon revenues will secure the up-front debt financing, and the carbon revenues can be used to pay back the repayment of the loan. With carbon revenues, the project implementer will be able to not only pay back the interest payment but also achieve a rate of return of 15 percent¹⁵. Each household provided with a super clean cookstove is expected to reduce CO₂ emissions by 3.1 ton per year assuming one forced draft gasifier cookstove will replace one existing charcoal cookstove. The project will generate a total of 558,648 Certified Emission Reductions (CERs) assuming 75 percent stove usage. A 2-year roll-out plan has been considered taking into account the time horizon needed for clean and efficient cookstove market development.

	2019	2020	2021	2022	2023	2024	2025	Total
Stove distribution	16,000	34,000	0					
Annual ER generation (tCO ₂)	0	18,544	76,495	115,902	115,902	115,902	115,902	558,648
Cumulative ER generation (tCO ₂)	0	18,544	95,040	210,942	326,844	442,746	558,648	

Note: Calculated based on the UNFCCC methodology AMS-II.G. ver. 10 – Energy efficiency measures in thermal applications of non-renewable biomass.

13. **The implementation of forced draft gasifier cookstoves can produce significant positive impacts on the lives of women.** The burden of disease as well as the drudgery of cooking lies primarily on women and children. In Lao PDR, women are responsible for daily meal preparation in about 98 percent of the households.¹⁶ Nearly half of women spend at least 1-3 hours cooking while a quarter spends as much as 6 hours in the kitchen area. Incidence of virtually all health outcomes is more than triple for women living in dwellings with higher NO₂ concentrations.¹⁷ The two previous pilots run using forced draft gasifier cookstoves both revealed strong links to primary and secondary outcomes of shifts in the time and labor burden, immediate health improvements (and, possible household finances).

14. **Establishing a sufficient supply of pellets will ensure the sustainability of the project intervention beyond the project period.** While there is an emerging pellet production market in Lao PDR, the production capacity remains inadequate to satisfy the demand of the 50,000 stoves. The project will import pellets from Indonesia, through Thailand, to secure the supply for the 50,000 forced draft gasifier cookstoves. This was done effortlessly and at a

¹⁵ Calculated in accordance with the Guidance Note on Financial Reviews and Determination of Commercial Terms. A weighted average cost of capital (WACC) is calculated to yield the expected financial internal rate of return (FIRR). Debt equity ratio is based on the proposal project financing structure. An ROE of 25% was justified for assessed high risk of the program. The cost of debt is based on the term sheet of BIX funds. The corporate tax rate in Lao was also considered (i.e. 28%).

¹⁶ Lao Expenditure and Consumption Survey (LECS), conducted in 2007–08,

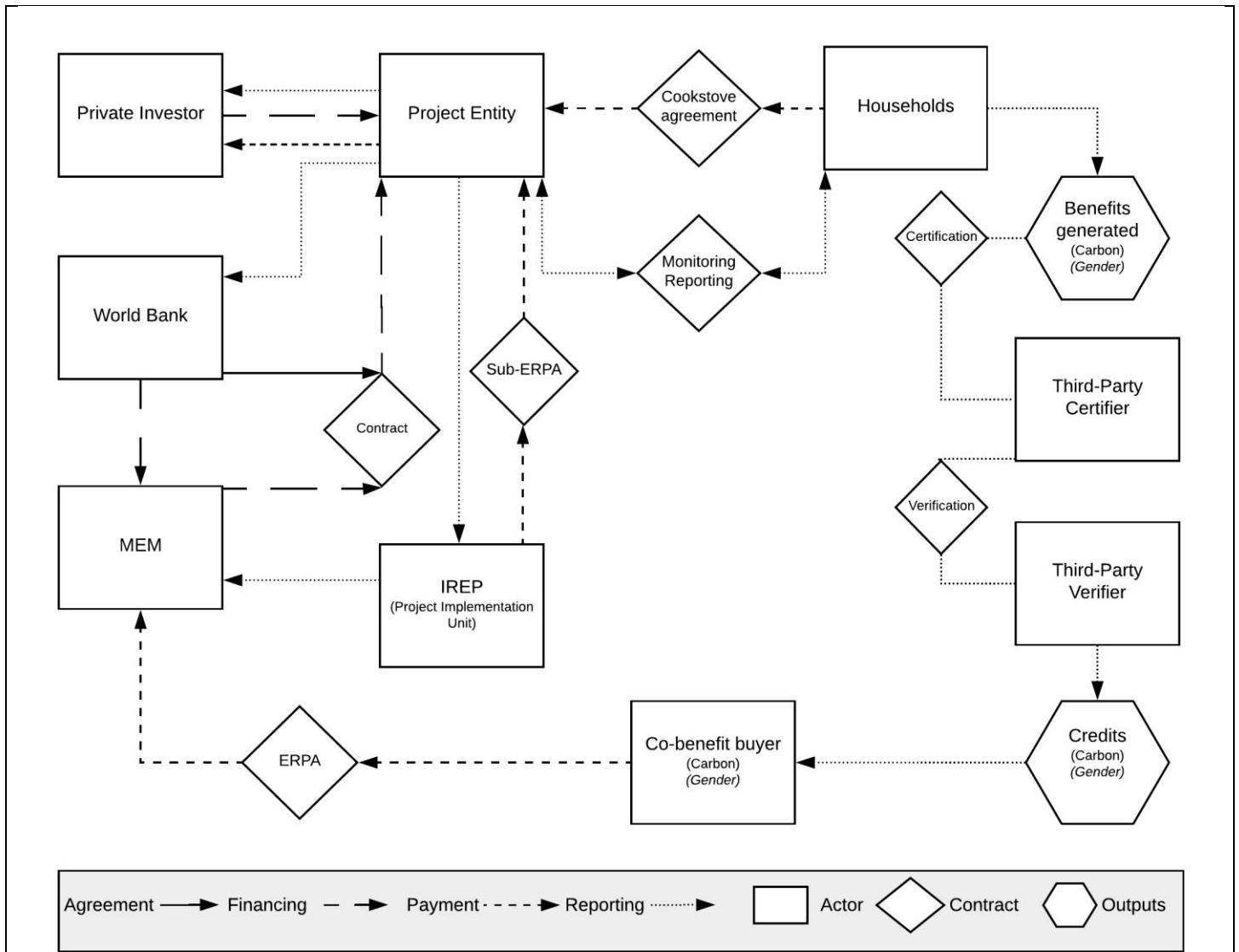
¹⁷ *Pathways to Cleaner Household Cooking in Lao PDR. An Intervention Strategy.* The International Bank for Reconstruction and Development/ The World Bank Group, May 2013. As obtained from Mengersen et al. 2007, along with supporting statistical data from recent national surveys and other studies (Lao Department of Statistics 2009; LWU 2001).



competitive price for the pilot carried out by WFP/PRF. The route to bring pellets into Lao PDR is simple as the First and the Second Thai–Lao Friendship Bridge over the Mekong connects Mukdahan Province in Thailand with Savannakhet in Lao PDR as well as to Vientiane capital. This will bring pellets straight into the project area in Savannakhet and from there the Project Entity (PE) will be able to set up distribution routes to neighboring Champasak. There are no import restrictions as both countries are members of the Association of Southeast Asian Nations (ASEAN). To ensure social and environmental safeguards are met, pellets for import will need to meet strict certification standards to ensure that the biomass used for the pellets is sustainably sourced and labor conditions at pellet-producing plants are satisfactory to World Bank standards.¹⁸ The government is independently of this project working to establish a pelletization business to expand the market. The Ministry of Industry and Commerce (MOIC) manages a United Nations Industrial Development Organization (UNIDO) and Global Environment Facility (GEF)-funded program that aims to reduce GHG in the Industrial Sector through pelletization technology. Under the HGNDP, the project the team and MOIC worked via the Cook Stove Task Force with a common goal to promote a local pellet production. Although not supported under this project, these efforts will continue during this project as a local market would be beneficial to the project and future penetration of more forced draft gasifier cookstoves.

Figure 1. Flowchart of Results-Based Financing

¹⁸ The pellets imported from Indonesia for the WFP/WB pilot was FSC certified and the Environmental and Social Safeguards team at the World bank has reviewed the distributor.



Note: A private investor finances the cookstoves through a project entity (PE), which is responsible for overall implementation of the project. The PE procures the cookstoves, which are distributed to households at a decreased price of \$45 per cookstove. A credit agreement (i.e. for carbon finance, and Emission Reduction Purchase Agreement (ERPA)) is signed between the Co-benefit buyer and MEM for the purchase of credits (CERs for carbon finance). The PE is responsible for monitoring and reporting, while certification and verification are carried out by third parties; in the case of carbon finance it is the Clean Development mechanism (CDM) Executive Board and a designated operational entity (DOE) per CDM rules. Since the PE is responsible for the generation of credits, a sub-credit agreement will be signed with MEM/IREP that specifies the transfer of funding to repay the investment through the PE. The PE reports to the World Bank and the Project Implementation Unit (PIU) put in place at IREP.

15. The project aims to ensure the cookstoves are the most energy efficient on the market and meet the World Health Organization (WHO) guidelines on HAP. Therefore, the cookstove must at a minimum satisfy the requirements for tier 4¹⁹ ratings across all indicators of the Organization for Standardization (ISO) International

¹⁹ Cookstoves are rated based on their performance against five indicators (Thermal efficiency, carbon monoxide emissions, Particulate Matter emissions, safety, and durability) across six tiers from 0-5 (5 being the best rating).



Workshop Agreement on the voluntary performance targets for the performance of cookstoves.²⁰ The forced draft gasifier cookstove decreases emissions by 99 percent, thereby emitting little or no GHG, PM_{2.5}, black carbon, and CO. It uses no charcoal and burns most efficiently using pellets, which can be produced from a variety of biomass available in Lao PDR including wood chippings, rice husk, coconut husk etc. Comparably, all other cookstoves on the market in Lao PDR can either not be rated due to excessive pollution levels or are rated tier 2 and below such as the two most popular stoves: The Tao Payat (tier 2) and Tao Dam (not rated).

16. The proposed project will comprise the following components:

- 1. Recruitment of Project Entity (PE) (estimated cost US\$ 0.86 million, ESMAP).** IREP will contract a company to act as the project entity (PE) which will implement the project (under the guidance of IREP as well as the World Bank). Funding has been committed through the Energy Sector Management Assistance Program (ESMAP) to the project from the Government of Luxembourg to recruit a PE to implement the project on the ground. This PE will be contracted based on its experience with carbon finance, cookstoves and existing gender work. Oversight will be provided from IREP, who will ensure mobilization of the cookstove taskforce, and the World Bank whose primary purpose is to supervise, help guide ideas, and assist with building relations. IREP takes overall responsibility for registering the Programme of Activities (PoA) under Clean Development mechanism (CDM) and subsequent the verification, with technical support from the PE. A sub-ERPA will be signed between IREP and the PE to lay out the cooperation protocol.
- 2. Household identification, procurement, management and distribution of stoves in target districts in the three provinces (estimated cost US\$ 5.2 million, Ci-Dev).** In addition to securing upfront financing (see section 17.1), the PE will be responsible for procuring the stoves, ensuring sufficient supply of biomass pellets, establishing distribution networks for stoves and fuels, managing after-sales services and setting up and managing the monitoring, results and verification (MRV) process in compliance with relevant CDM requirements. The PE will work closely with the PIU to identify the most suitable method for rallying local support and interest in the cookstoves and the project. The main criteria for household identification are: (1) household must be willing to pay for the stove, (2) the households' source of fuel has to be charcoal, (3) the household must commit to use the stove 75 percent of the time for cooking and heating, and (4) the household must agree to the rigorous monitoring by the PE.
- 3. Monitoring, Reporting and Verification (estimated cost US\$ 140K annually (included in the Ci-Dev envelope)).** While the carbon finance cycle will follow standard CDM or equivalent procedures²¹, the gender outcomes model will be using a combination of methods to ensure a solid MRV process. The PE will be responsible for monitoring and reporting on the achievement of the carbon emissions as well as

²⁰ The ISO approved a new tiers framework in October which changed the categories from four to five and the tiers from 0-4 to 0-5. There are currently no stoves that has been rated or re-rated according to the new standards. However, the performance report for the forced draft gasifier stove that rated it tier 4 according to the previous ISO standards, shows that it would satisfy the new ISO performance targets for biomass cookstoves as well.

²¹ In case the Kyoto Protocol is not extended beyond 2020, Ci-Dev and MEM will agree on a standard which is comparable to the CDM so that the project entity has the right to continue deliver CERs.



gender outcomes. Certification will be done by the CDM Executive Board and verified by a Designated Operational Entity (DOE) for the carbon emission reductions.

17. The proposed project will also comprise the following activities:

- 4. Securing Funding.** A BOP investor has been identified for the project and the carbon finance process has commenced with Ci-Dev whose donors approved the project on July 11th, 2018. Once the PE is selected, it will work with MEM to register the project as a PoA under CDM. MEM will serve as the coordinating and managing entity (CME) overseeing the PoA while the PE will serve as the implementer. A cooperation agreement between the MEM and the selected PE (e.g. sub-ERPA agreement) will be signed.

Additionally, the project will need to identify a buyer for the gender outcomes, however discussions with interested buyers have commenced.

- 5. Impact evaluation.** The World Bank East Asia and Pacific Gender Innovation Lab (EAP-GIL)²² will, in parallel, run an impact evaluation (IE) on *Evaluating the Impacts of Clean Cooking Technology on Women's Domestic Burden in Laos* (P168062) will form part of the work under the project. The PE and the World Bank will support the work of EAP-GIL in terms of offering input to the IE design when needed as well as to facilitate contacts in Lao PDR. The IE will measure how access to modern cooking technology impacts women's time use, labor market activities, health, bargaining power and household consumption patterns. Besides the two pilots run under the TA work for the HGNDP, there is limited evidence about the impacts of forced draft gasifier stoves when used in a household setting. Therefore, this IE is important to inform future clean cookstoves initiatives in Lao PDR and elsewhere. In collaboration with EAP-GIL, the project will monitor the cookstoves' effects on the daily lives of members of the households receiving them across the three provinces. The IE data will be used to quantify the positive impacts of a shift to the forced-draft gasifier cookstoves. The monetary value of these impacts can then be assessed and sold to buyers who agree to provide results-based financing when these outcomes are achieved. The demonstration impact of this gender outcomes financing model could lead to widespread replication, thereby unlocking new sources of much needed financing for a wide range of development projects. The project may choose to also apply either the Women Organizing for Change in Agriculture and Natural Resource Management (WOCAN) W+ methodology or the Gold Standard's Gender Equality Framework to accredit the gender outcomes.

2. Overall Risk and Explanation

18. The following are key risks facing the project:

- 1. Deployment of PE:** The experience and capacity of the PE is essential to the success of the project. The TORs for the PE will require eligible companies to have strong capacity and long-term experience with cookstoves,

²² <http://www.worldbank.org/en/programs/east-asia-and-pacific-gender-innovation-lab>



carbon finance, gender issues and the gender methodologies for quantifying and certifying gender co-benefits. The company is also required to have previous experience in Lao PDR and the capability to deploy a local office. The company will go through a rigorous competitive bidding selection process.

- 2. **Coordination and collaboration between institutions:** Collaboration between different actors and institutions including that between the PE, the PIU and the World Bank is always at risk from miscommunication. The operational manual should clearly state the roles and responsibilities of each party to the project and be discussed in detail with the lead persons from each involved agency. Given the cross-sectoral nature of the project cross-ministerial collaboration within the Government is also necessary. The taskforce headed by MEM includes other relevant ministries like the MOIC, MOH, MONRE etc. It is important to keep the taskforce strong and continue bi-annual meetings to keep all ministries informed and engaged in the project.
- 3. **Stove affordability:** The cookstove will be distributed at a \$30-45 price point,²³ which may be considered too expensive for the average Lao PDR citizen. However, in the long run, the forced-draft gasifier will be more cost efficient due to less breakage and need to replace the stove. It is imperative for the project to advertise the stove as a cost-efficient option in the long run to raise understanding of the potential cost savings. Not only in terms of the cookstove, but also the fuel.

Table 3. Estimated cost savings from using a Tier-4 Forced-draft gasifier cookstove over the project period

Cookstove	Cost of stove: First year	Cost of stove subsequent years: up-keep or replacements for 4 years*	Annual fuel cost	Total HH cost over 5 years
Traditional	\$60	\$240	\$132**	\$960
Forced Draft	\$30-45	\$40	\$97-108***	\$555 - 625
Total Savings	\$15-30	\$200	\$24 – 35	\$335 - 405

* Traditional stoves cost about \$4-10, but are replaced every few months, or at least once a year. The forced-draft gasifier stove will need some up-keep but will only need replacement parts over the years.
 ** For charcoal. Only about 5 percent of rural households make their own. Those that purchase charcoal typically buy it in 20–30 kg bags retailing at 15,000–20,000 LAK for a small bag and 37,000 – 45,000 LAK for a large bag.²⁴
 *** Based on pellet price from US\$ 0.18-0.20 per kg.
 Source: Field research by the World Bank and Lao PDR Social Indicator Survey

- 4. **Access to fuel:** Given there is no present pellet sales in Lao PDR, households may be concerned about their access to fuel. The PE will be requested to integrate ways to ensure a steady fuel supply to the households as part of the program mainly focusing on import. Careful review of the fuel supply plan by the World Bank will help mitigate the risk.
- 5. **Stacking:** The continued use of a traditional cookstove alongside the forced-draft gasifier is a common issue related to cookstove problems. Preventing stacking is essential to achieve the carbon benefits. Randomized

²³ The \$30-45 price point has been determined based on discussions with the government of Lao PDR in addition to information gathered from field trials, where the majority of respondents showed interest and were willing to pay on average \$30 for the stove in a one-lump-sum payment. In addition, the price tag is established based on Lao PDRs Household Final Consumption Expenditure per capita which is US\$1171 or about US\$98 on average a month and set based on the cost of similar appliances that households in urban and peri-urban areas own like a refrigerator (US\$ 160-800) or a luxury item like a TV (US\$150-1200).

²⁴ South Pole, W+ methodology



follow-up could help ensure no stacking takes place; however, some stacking is likely to occur, which have been taken into account in the carbon calculations.

- 6. **Behavior change:** Cooking is deeply ingrained in people’s daily habits and culture, and to change its traditions requires compelling and sustained advocacy, as well as cooking products that people will want to have in their homes. Behavior change one household at a time is both time-consuming and costly. The PE will focus on changing behavior and build momentum, support peer learning and sharing, and add pressure within the community, spurring further demand and up-take of the new technology.
- 7. **Local needs and preference:** To satisfy local needs and preferences, the super clean cookstoves are designed and sold with attachment grills, and solar panels. The use of the cookstove as a heater is also possible with the right accessory.

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

Summary of Screening of Environmental and Social Risks and Impacts

The Bank considered the capacity to manage its environmental, social, and health and safety and performance. While the capacity of IREP is known, the capacities of the Project Entity and other agencies are not known. Based on this and discussions with task team at this concept stage, the client’s environmental and social management system and procedures will need to be complemented/enhanced to meet ESF requirements. The overall risk is considered moderate. It is expected that pellets will be sources from Indonesia and Thailand through sustainable procurement. If pellets are produced in Lao PDR and depending on the technology used, key risks relating will relate to labour and working conditions, and resource efficiency and pollution. Community health and safety risks from pellets and stoves, while they exist, are minimal. The project will address identified gaps through the Environmental and Social Commitment Plan (ESCP) to be prepared by the client together during the preparation stage of the project. This is a second phase of the project and stoves are already being distributed as part of the other WB investments in Laos. The project has the potential to benefit and individual people and their households including ethnic groups' households. Benefits include better health outcomes for the households that benefit from the project and better gender outcomes including that of health.

Note To view the Environmental and Social Risks and Impacts, please refer to the Concept Stage ESRS Document.



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