PROJECT INFORMATION DOCUMENT (PID)
APPRAISAL STAGE

Report No.: PIDA65307

Project Name	MG ethanol clean cooking climate finance program (P154440)
Region	AFRICA
Country	Madagascar
Sector(s)	Other Renewable Energy (50%), Agro-industry, marketing, and trade (50%)
Theme(s)	Climate change (60%), Other rural development (20%), Pollution management and environmental health (20%)
Project ID	P154440
Borrower(s)	Government of Madagascar
Implementing Agency	Green Development A.S.
Environmental Category	B-Partial Assessment
Date PID Prepared/Updated	21-Apr-2016
Date PID Approved/Disclosed	18-Apr-2016
Estimated Date of Board Approval	31-Mar-2016
Appraisal Review Decision (from Decision Note)	The chair authorized the team to appraise and negotiate the project subject to the revision of the PAD to clarify the issues outlined above and the disclosure of safeguard instruments in the Infoshop and country.

I. Project Context

Country Context

With a population of about 23 million and per capita income of US$440 (Atlas method), Madagascar is a low-income country facing considerable development challenges. The country has showed chronic political instability and declining socioeconomic trends over the past few decades. Its annual growth in gross domestic product (GDP) averaged only 0.5 percent compared to a population growth of about 2.8 percent. Close to 80 percent of the Malagasy population lives in rural areas, where poverty is the most pronounced.

A new regime took office in January 2014, following the presidential and parliamentary election in December 2013 and putting an end to a five year political crisis. The new government faces the challenge to reverse the trend of the increasing poverty that was exacerbated by the crisis. The government's priorities are outlined in the National Development Plan covering the 2015-2019 period, relying on five pillars, one of which is the preservation of natural capital and enhancement of disaster risk resilience. Since 2014, development partners have resumed their support to complement the country's very scarce resource as Madagascar is among the countries with the lowest revenue to GDP ratio in the world.

In the last two years, the macroeconomic situation remained generally stable but growth has failed to get momentum. GDP growth estimate is revised down at 3.2% in 2015 from an initial projections

of 5% as economic activities were constrained by several exogenous shocks (lower commodity prices, cyclones and drought, political and social instability). Year-on-year inflation has risen slightly from an average of 6% in recent years to 7.6% at end-2015, mainly due to higher prices of food and charcoal.

Sectoral and institutional Context

Natural resources have the potential to generate substantial and tangible economic benefits in Madagascar, but a lack of sustainable management and the heavy burden of poverty are preventing this from happening. More than 90 percent of Madagascar's terrestrial species are endemic and Madagascar harbors 5 percent of the world's known biodiversity. With more than three-quarters of the population engaged in natural-resource-dependent livelihood activities, a precarious human-environment balance exists. Madagascar's natural resources contribute to the overall wealth of the country in a substantial manner. To date, however, the country has failed to optimize the potential of its natural resource base to not only 'pay its own way,' but also contribute more significantly to poverty reduction and economic development.

5. Increasing deforestation has been threatening the ecosystems of Madagascar. Calculations of deforestation rates vary due to differences in specificity across studies over time and differing definitions of forest, but have suggested a reduction at a national scale between 1990 and 2010 (0.83 percent loss per year between 1990 and 2000; 0.53 percent loss between 2000 and 2005; and 0.40 percent loss between 2005 and 2010). However, more recent calculations of the Eastern Humid Forest ecoregion are illustrative of a recent and swift increase in the rate of deforestation:

- 2005–2010: 22,771 ha/year (0.50 percent)
- 2010–2013: 41,899 ha/year (0.94 percent)

6. The main cause of the current anthropogenic deforestation in Madagascar is slash-and-burn or swidden agriculture, known in Malagasy as tavy. Nationwide, it is estimated that 80 to 95 percent of deforestation occurs as a result of the use of fire to convert forest to agricultural land through tavy. The extraction of wood, predominantly for fuel wood or charcoal production, accounts for the other 5 to 20 percent of deforestation, while logging has effects both on forest cover and individual species viability.

The use of woody biomass as the dominant household energy source in Madagascar has been imposing significant threats to forests. The nation's current structure of household energy consumption is highly skewed. Around 95 percent of households depend on woody biomass, primarily wood and charcoal, with an annual consumption of about 9 million cubic meters of firewood and 8.6 million cubic meters of wood as charcoal. Electricity, natural gas, and kerosene provide cooking fuel for only a small minority, with liquefied petroleum gas accounting for 11 percent in urban areas while being negligible elsewhere.

The United Nations Framework Convention on Climate Change (UNFCCC) Executive Board (EB) has approved Clean Development Mechanisms (CDM) methodologies that establish the linkage between the displacement of non-renewable biomass and positive impact of reduced deforestation (i.e., reduced carbon emissions and increased carbon sinks). The approved methodologies are used to quantify the reduction in Greenhouse Gas (GHG) emissions through the adoption of renewable biomass, such as ethanol, while displacing the use of non-renewable biomass. The adoption of renewable biomass also creates benefits by indirectly mitigating deforestation. The UNFCCC EB further approves conservative default values, including the fraction of non-renewable biomass, prioritizing Least Developed Countries and allowing for a reasonably accurate and cost-effective quantification of emission reductions. The approved default value of 72% for the non-renewable biomass fraction in Madagascar shows the percentage of total biomass removal each year that is

considered non-renewable as proxy. Please refer to annex 2 for details.
Using charcoal and fuel wood for cooking also implies a high incidence of acute respiratory infections due to household air pollution (HAP). Burning solid fuels (that is, charcoal and fuel wood) for cooking produces extremely high levels of HAP. Nearly 12,000 deaths per year in Madagascar are attributed to respiratory infections caused by inhalation of HAP from traditional cooking with biomass, of which over 10,000 involve children under five. About 20 percent of all deaths of children below the age of five are due to Acute Lower Respiratory Infections (ALRI) and 370,000 Disability Adjusted Life Years (DALY) are estimated to be lost every year due to HAP.
To reduce the use of firewood and charcoal and promote clean cooking, the government has developed a legal framework for the promotion of ethanol as a household cooking fuel. Following the recommendation of a World-Bank-funded feasibility study in 2011, the government set forth a decree in July 2014 to promote ethanol cooking through (a) exemption of heavy alcohol tax for ethanol fuel production and exemption of import tax on imported ethanol stoves; (b) setting performance and quality standards for ethanol fuel; and (c) designation of the Ministry of Industry (MoI) to be technically responsible for approving Ethanol Micro Distilleries (EMDs) and promoting ethanol clean cooking. This decree has boosted private sector interest in this emerging sector of economic development. The MoI received applications from four distilleries and 528 stoves have already been sold in the Malagasy market.
Efforts to increase the use of ethanol as a household cooking fuel complement the country's preparation of a national REDD+ strategy and Carbon Fund Emission Reduction program. In July 2014, a Readiness Preparation Proposal for a Reducing Emissions from Deforestation and Forest Degradation (REDD+) strategy was positively assessed by the Participants Committee of the Forest Carbon Partnership Facility (FCPF), which in May 2015 resulted in a REDD+ readiness grant agreement (P124655) to support the institutional framework for the design of the strategy. In October 2015 Madagascar was also accepted into the FCPF Carbon Fund pipeline, and the country is preparing an emission reductions program that, if accepted, can lead to an Emission Reductions Purchase Agreement (ERPA) up to US$50 million with the Carbon Fund. As the conversion of forest for slash-and-burn subsistence and the heavy reliance on wood (both fuel wood and charcoal) for energy needs are two of the five main and direct causes of deforestation and forest degradation, increased ethanol production and use for household cooking can provide diversification of income sources, offer alternatives to slash-and-burn practices, and provide an incentive for sustainable agricultural practices throughout the country (including in the economically disadvantaged areas close to protected forests), thus reducing pressure on forests. Use of ethanol as a household cooking fuel will also decrease the market demand for charcoal.

II. Proposed Development Objectives

The objective of the Madagascar Ethanol Clean Cooking Climate Finance Program is to increase household use of ethanol, demonstrate good practice of distillery design and operations, and establish an ethanol production safeguard system for future scale-up in Madagascar.

III. Project Description

Component Name

Component 1. Results-based Climate Finance Payment (estimated US$11.61 million - Ci-Dev Carbon Fund)

Comments (optional)

The program will make results-based climate finance payments against the contract CERs that are to be generated from Malagasy households adopting ethanol cooking solutions during the first five years of the program implementation period. Each household participating in this program is

expected to consume 220 liters of ethanol, which replaces two tons of charcoal consumption and eliminates five tons of GHG emissions. Each household participating in this program is expected to consume 220 liters of ethanol, which replaces two tons of charcoal consumption and eliminates five tons of GHG emissions. Green Development AS (GD), a Norwegian company acting as the Coordinating and Managing Entity (CME), will implement this program in partnership with Local Implementation Partners (LIPs).

Component Name

Component 2. TA to the GoM and GD (US$0.25 million - Ci-Dev Readiness Grant)

Comments (optional)

This component will be a Bank-executed grant that provides TA to support the implementation of the program, particularly on government capacity building and GD's demonstrative distillery setup. It will finance assistance to harmonize the policy and regulations and technical standards for ethanol cookstoves and ethanol production. The Ci-Dev will provide TA to GD to assist with the design, construction, and operation of the two pilot EMDs for future replication.

IV. Financing *(in USD Million)*

Total Project Cost:	28.20	Total Bank Financing:	0.00
Financing Gap:	0.00		

For Loans/Credits/Others	**Amount**
Borrower	16.34
Carbon Fund	11.86
Total	28.20

V. Implementation

The program will be implemented by GD, a private company that started its business in 2010 as a carbon aggregator by registering a multi-country program of activities for the reduction of emission from non-renewable fuel cooking at the household level in SSA. As the CME of the program, GD has already built a partnership with the LIPs organized by an industry trade association named Angovo Men' Eva. GD has signed Letters of Intent with 12 LIPs and will sign a Local Partnership Agreement after it enters into an ERPA with Ci-Dev.

A steering committee has been established under the office of the prime minister of Madagascar, comprising the MoI, Ministry of Finance (MoF), Ministry of Agriculture, and the Ministry of Environment to establish the strategic orientation of this program. The MoI is appointed as the lead technical agency for overseeing the development of the ethanol value chain, including setting up standards for ethanol stoves and fuel and reviewing and approving ethanol production and distribution. The government's vision for ethanol development is that it should be based on a free market and led by the private sector.

Green Development AS. GD is the leading implementing agency in the program. The company was set up in 2010 with equity and other contributions from its shareholders of about US$2 million. GD is part of a group, along with its main shareholder, Singita AS, in which the parent holding company, UNECO AS, a Norwegian company, has an equity of US$ 10.8 million. The shareholders have pledged to provide additional funds to GD if needed for the implementation of the Madagascar program. GD's program in Madagascar will be headed by Havard Norstebo, who holds a 34 percent stake in GD and has a proven track record in using a CDM Program of Activities to promote energy access in the Sub-Sahara African countries. GD recently signed an ERPA with Nordic Environment

Finance Corporation to sell Emission Reductions from the water filter programs in Nigeria and Malawi. GD plans to employ a team of 8 people to deliver the various TA activities foreseen in the program and three qualified staff are already on board. These have already provided high-quality support to the preparation of the safeguard instrument and the Operations Manual.

For this program, GD will take up responsibilities including but not limited to:

- Monitoring reporting and verifying Certified Emission Reductions to be issued under the Clean Development Mechanism (CDM);
- Engaging with the LIPs in Local Partnership Agreements;
- Ensuring timely distribution of carbon incentives to the LIPs after relevant provisions in the Local Partnership Agreement are fully satisfied;
- Investing and operating two demonstration EMDs;
- Providing technical guidance and support to the local EMDs and demonstrating the optimized operational experience from the two pilot EMDs;
- Conducting a customer awareness campaign for promoting ethanol cookstoves;
- Providing institutional support to the industry association;
- Monitoring and verifying the performance of the LIPs in the area of distribution of cookstoves and ethanol production in compliance with environmental and social safeguards requirements as well as ethanol control requirement and issuance of certifications to eligible EMDs to enter the market;
- Other general administrative work.

Local Implementation Partners. Under the coordination and supervision of GD, the LIPs will be responsible for program implementation, in particular the distribution of ethanol cookstoves and provision of uninterrupted fuel supplies to users of these stoves. Already two types of LIPs are emerging, with the first engaged only in the distributing of ethanol stoves and fuels, and the second in the distribution of stoves and fuels as well as in the production of ethanol. The first type of LIPs will purchase its ethanol for distribution from sugar plants or ethanol distilleries. To benefit from the incentive, each LIP can only sell qualified cookstoves as well as ethanol from certified ethanol producers.

Primary LIPs. Among the prospective LIPs, three (Safi international, FUNRECO, and Madagascar Energy Company (MEC)) have strong financial and business capacity and already have set up stove and ethanol distribution networks, or are ready to do so upon signing the ERPA. Their initial targeted area will include the cities of Antananarivo and Toamasina. It is envisaged that these three primary LIPs will each establish a strong ethanol distribution network which will become a cornerstone to ensure ethanol availability in the major urban and peri-urban area. During implementation, the task team will pursue more options to make ethanol distribution as widespread as possible, for example by encouraging the participation of large distributors such as gas stations and supermarkets. The task team also reached out to bilate ral donors and impact investors to facilitate upfront financing for the LIPs. With the task team's introduction, a London-based investment firm specialized in ecosystem and conservation project is in discussion with MEC to finance its ethanol production and sugarcane plantation to 9,000 liters per day, sufficient to meet the cooking needs of 15,000 ethanol cook stoves.

Secondary LIPs. Four additional LIPs, which are small entrepreneurs and local NGOs, have relatively weak financial capacity and would need extra help in raising funds for stove distribution and building ethanol production facility. Their small size will not allow these LIPs to take aggressive price strategies to promote the sales of ethanol stoves and the expansion of their stove distribution is expected to be gradual. All the secondary LIPs will have equal access to the carbon incentive and will sell qualified ethanol stoves in a competitive environment to the households.

To reach out to consumers and expand the program, the LIPs will use several approaches that are

not mutually exclusive. The overlap that exists will have a positive effect on increasing the potential customers' awareness of ethanol as a clean cooking solution. The models employed include:

- Coastal/urban model. Large urban populations live along the coastal area and near the capital city, and intensive marketing and awareness-building efforts will most likely start in these areas. The MEC will use this model and mainly focus on the urban area.
- Captive supplier/consumer model. Some export-oriented agri-business owners rely on large groups of farmers (in the order of thousands) as suppliers who can be tapped as captive ethanol consumers that have the income and affordability to use ethanol for household cooking.
- Corporate model. FUNRECO, Madagascar's largest pension fund, plans to distribute stoves to its employees and clients through its nationwide branches and kiosks.
- Church model. The representatives of several national churches confirmed that they have millions of members and that the ethanol program is an organizational priority for them. They are ready to invest in micro distilleries and distribute ethanol stoves to their members once the carbon incentive is confirmed.

Ethanol Cookstoves Manufacturers. Manufacturers of ethanol cookstoves need to produce cookstoves that meet the qualification standard set by the program, including:

- Minimum thermal efficiency of 50 percent;
- Minimum heat power of 1.5 kWthermal;
- Emissions of carbon monoxide (CO) and PM2.5 meeting Tier-4 stove standards as defined in the International Workshop Agreement (IWA) 11:2012 Guidelines for evaluating cookstove performance ;
- Stove meeting safety and durability requirements;
- Three-year product warranty provided by the manufacturer.

Certification of ethanol stoves. The stoves need to be tested in a third-party testing lab approved by the World Bank and GD to be certified by this program. So far, products from three stove manufacturers—CleanCook, Meca Green, and Safi International (with the Safi e-cooker)—were tested in the SeTAR center at the University of Johannesburg and met the qualification standards. Other stoves can enter the program once their performance passes the standard through a test conducted by a certified testing lab. The summary of the testing results for the three stoves and any future qualified stoves will be published on GD's website to inform the local partners and consumers of their purchase decision.

The GoM has been proactive to incentivize the sector and has made its development a priority. Identifying ethanol as a powerful substitution to charcoal and fuel wood, the government has enacted decree No. 2014–903 to promote ethanol-based cooking. Further coordination, however, is needed to set up a more consistent policy framework to ensure the effective implementation of the policies that support the industry. For example, collecting Toga Gasy from dispersed artisan breweries to distill ethanol is currently prohibited by the police department. However, this form of collection might be a very effective way to reduce transport cost and jump-start ethanol production. Quality of ethanol stoves and ethanol fuel also need to be enforced by government agencies. Currently, the MoI is appointed as the leading agency responsible for setting up standards for ethanol stove and fuel, reviewing and approving ethanol production, and distribution. The program allocated US$100,000 to provide up-front capacity building under component B and US$330,000 through ongoing carbon finance payment.

Local sugarcane growers, pre-registered with distillery owners, will supply the feedstock to the EMDs for ethanol production. While not receiving direct carbon payments under the program, the sugarcane growers are expected to provide sugarcane to certified EMDs through long-term sugarcane supply agreements, and they will play a critical role in securing the stable and sustainable provision of cost-competitive ethanol. In addition to training on planting techniques, the sugarcane

growers will be trained on relevant environmental and social safeguards requirements as part of the distillery certification process.

VI. Safeguard Policies (including public consultation)

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	×	
Natural Habitats OP/BP 4.04		×
Forests OP/BP 4.36	×	
Pest Management OP 4.09	×	
Physical Cultural Resources OP/BP 4.11		×
Indigenous Peoples OP/BP 4.10		×
Involuntary Resettlement OP/BP 4.12	×	
Safety of Dams OP/BP 4.37		×
Projects on International Waterways OP/BP 7.50		×
Projects in Disputed Areas OP/BP 7.60		×

Comments (optional)

VII. Contact point

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