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Regional

SUSTAINABILITY ENERGY FACILITY FOR THE EASTERN CARIBBEAN

**(RG-L1071)**

MONITORING AND EVALUATION PLAN

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# Abbreviations

CBA Cost Benefit Analysis

CDB Caribbean Development bank

CTF Clean Technology Fund

EA Executing Agency

EC eastern caribbean

EE Energy Efficiency

IDB Inter-American Development Bank

JICA Japanese International Cooperation Agency

MW MegaWatt

MWh MegaWatt hour

PCR Project Completion Report

PBL Policy-Based Loan

POD Proposal for Operation Development

RE Renewable Energy

SEF Sustainable Energy Facility

# Introduction

This document presents the Monitoring and Evaluation Plan for the Sustainable Energy Facility Program (‘the Program’). The purpose of this document is to establish the framework, processes, and institutional arrangements that will be used to monitor and evaluate the Program.

The Program’s general objective is to reduce the Eastern Caribbean’s (‘EC’) dependency on fossil fuels and the cost of power generation and electricity tariffs. The Program seeks to achieve these objective by: (i) reducing the demand of and expenditures in electricity for street lighting; ii) implementing a regulatory framework and developing the institutional capacity necessary for sustainable energy development; and iii) diversifying the energy matrix.

The specific objectives of the Program are to: (i) promote energy efficiency interventions such as installing efficient streetlights or retrofitting government buildings, ii) develop the institutional and regulatory framework necessary to enable sustainable energy development, and iii) push forward the development of geothermal and other renewable energies.

The Program consists of the following components:

* **Component I. Energy Efficiency.** Component I will provide loans to public sector actors to promote EE measures such as: (i) retrofitting government buildings; (ii) installing new or replacing existing streetlights with more efficient ones; (iii) increasing power generation efficiency; and (iv) implementing EE programs for small and medium enterprises (SMEs) and housing projects.
* **Component II. Regulatory Framework, Institutional Strengthening, and Capacity Building.** Component II will provide technical assistance to the Executing Agency (‘the EA’) to strengthen its capacity to implement the Sustainable Energy Fund (‘the SEF’), particularly for lending to private sponsors, and to EC countries for: (i) developing an effective legal, policy, and regulatory framework for the implementation of sustainable energy (‘SE’) projects in the region; (ii) strengthen their technical, institutional, environmental, and regulatory capacity; and (iii) acquiring the skills to enable SE development
* **Component III. Renewable Energy.** Component III will provide loans to implement RE projects. **Sub-component 3A** will finance intermittent RE public sector projects such as wind power and solar PV. **Sub-component 3B** will finance base-load projects such as GE, hydro and waste to energy projects. Funds for geothermal projects will be made available through a facility called the **GeoSmart Facility** to address the specific challenges that GE development faces given its risk profile.[[1]](#footnote-2) The GeoSmart Facility will provide a range of financial products to public sector actors and/or public-private partnerships (PPP)[[2]](#footnote-3), customized for each stage of geothermal development: **(i) Pre-investment activities** for which a mix of grants and concessional lending are best suited to unlock investments will include: (a) surface studies (3Gs), including social and environmental impact assessment, and their integration; and (b) drilling of early exploration wells (slim holes); **(ii) exploration activities** for which risk mitigation instruments such as contingent recovery grants are essential will include: (a) exploration drilling program (full size wells); and (b) feasibility studies for targeted reservoirs, including social and environmental impact assessment; and **(iii) field and power plant development activities** for which concessional lending is called for will include: (a) production drilling (production and reinjection wells); (b) engineering and construction of power plants; and (c) substations and transmission lines.

This Monitoring and Evaluation (M&E) Plan is organized in two main sections:

* the **Monitoring Plan** (Section 2)—presents the indicators used to monitor the Program’s outputs, assigns the responsibility for collecting data, defines the instruments used to monitor the Program, and establishes the work plan and budget for monitoring the Program
* the **Evaluation Plan** (Section 3)—presents the main questions the Evaluation Plan addresses, mentions the studies that the Evaluation Plan builds upon, identifies the indicators used to evaluate the Program, and describes the methodology and instruments used to evaluate the results of the Program.

# Monitoring

The Program will be monitored by tracking a set of indicators that measure performance. The monitoring plan defines these indicators and establishes the process and institutional arrangements to monitor these indicators. Specifically, the monitoring plan describes the instruments used to track these indicators, defines the tasks, assigns responsibilities, and defines budget necessary for preparing these instruments.

## Output Indicators

Table 2.1 presents the indicators that will be used to measure whether the Program’s outputs are fulfilled. The Program’s outputs are not fixed in advance as they will depend on the actual demand of SEF resources from the Governments and private sponsors from EC countries. For example, the exact number of streetlights installed will depend on the street lighting projects defined and resources requested by the Governments in EC countries. As such, the indicators are designed to be flexible enough to allow for this variability in quantity of outputs. The CDB will be the Executing Agency (‘EA) of the Program and therefore the main party responsible for providing inputs to monitor the Program.

Table 2.: Output Indicators

| **Indicator** | **Description** | **Frequency of Measurement** | **Source of Verification** |
| --- | --- | --- | --- |
| **Component I: Energy Efficiency** | | | |
| Loans provided to energy efficiency projects with resources form the Program. | Measures the number of loans provided for energy efficiency projects | Semi-annually and at completion of the execution period | Reports from CDB |
| **Component II: Regulatory Framework, Institutional Strengthening, and Capacity Building** | | | |
| Energy policy reforms or recommendations for energy policy reform provided to and implemented by governments in ECC. | Measures the number of ECC receiving and/or implementing policy reforms | Semi-annually and at completion of the execution period | Reports from CDB |
| Trainings provided to the EA and/or government employees with resources from the Program | Measures the number of trainings provided to the EA and/or government employees | Semi-annually and at completion of the execution period | Reports from CDB |
| Grants provided for technical assistance to Governments in EC countries with resources from the Program | Measures the number of EC countries receiving grants | Semi-annually and at completion of the execution period | Reports from CDB |
| **Component III – Renewable Energy** | | | |
| Loans provided to geothermal projects at any stage of development with resources from the Program | Measures the number of loans granted for geothermal projects | Semi-annually and at completion of the execution period | Reports from CDB |
| Loans provided to finance transmission lines required for connecting geothermal plants to the power grid | Number of loans for transmission and distribution projects | Semi-annually and at completion of the execution period | Program report from EA with information from the projects, the utilities, and the Governments in the EC countries |

Table 2.2 presents the planned annual disbursements from the Program for each of the outputs. The disbursements are based on the indicative pipeline of projects to be financed by the Program and the indicative allocations of Program resources between projects.[[3]](#footnote-4) The table shows that the Program’s largest disbursements are estimated to occur in the first two years of Program operation. The IDB and the EA will refine these planned financial disbursements at the start of the Program when the project pipeline has been advanced. The IDB will include these planned disbursements as targets in the Project Monitoring Report (PMR) and will track actual disbursements against these targets to monitor the progress of financial disbursements during implementation.

Table 2.: Annual Costs by Output (US$ millions)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Outputs** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** | **Target** |
| **Component I: Energy Efficiency** | | | | | | | | | |
| Loans provided to energy efficiency projects with resources form the Program. | - | 8.0 | - | 0.3 | - | - | - | - | 8.3 |
| **Component II: Regulatory Framework, Institutional Strengthening, and Capacity Building** | | | | | | | | | |
| Policy Based Loans (PBL) provided to Governments in EC countries | - | - | 10.0 | - | - | - | - | - | 10.0 |
| Trainings provided to the EA and/or government employees with resources from the Program | 0.2 | 0.3 | 0.1 | 0.1 | 0.1 | - | - | - | 0.9 |
| Grants provided for technical assistance to Governments in EC countries with resources from the Program | 0.6 | 1.3 | 0.6 | 0.5 | 0.4 | - | - | - | 3.5 |
| **Sub-total Component II** | **0.8** | **1.7** | **10.7** | **0.6** | **0.5** | **-** | **-** | **-** | **14.3** |
| **Component III: Renewable Energy** | | | | | | | | | |
| Loans provided to geothermal projects  at any stage of development with resources from the Program | - | - | 24.8 | 24.8 | 5.2 | 5.2 | - | - | 60.0 |
| Loans provided to finance transmission lines required for connecting geothermal plants to the power grid | - | - | - | 10.0 | - | - | - | - | 10.0 |
| Loans provided to finance other RE projects | - | - | 0.2 | 0.2 | - | - | - | - | 0.3 |
| Grants (in the form of loan guarantees or grants convertible to loans) provided to geothermal projects with resources from the Program | - | 12.7 | - | 6.4 | - | - | - | - | 19.1 |
| **Sub-total Component III** | **-** | **12.7** | **25.0** | **41.3** | **5.2** | **5.2** | **-** | **-** | **89.4** |
| **Total SEF** | **0.8** | **22.4** | **35.7** | **42.3** | **5.7** | **5.2** | **-** | **-** | **112.1** |

Notes: The US$19.05 million in grants to geothermal projects are contingent grants provided with CTF resources.

Additional grant resources from other donors might be added to the SEF and disbursed to projects.

## Data Collection and Instruments

The EA (the CDB) will be responsible for reporting on the results of the Program, based on information collected from the EC Governments and private sponsors and on information from its own systems. The EA will be responsible for reporting progress and results to the IDB. The EA will collect, store, and retain all information to assist the IDB in monitoring performance of the Program.

The INE/ENE Division of the IDB will be responsible for overseeing the execution of the Monitoring and Evaluation Plan for the complete Program, including the funds provided by other donors. As such, they must report annually to the Clean Technology Fund Trust Fund Committee (CTF TFC) and the Japan International Cooperation Agency (‘JICA’) on progress towards achieving the results of the Program and estimations of results (in case of plants in state of construction and non-operational as of reporting date).

The project team composed by specialists from INE/ENE and IFD/CMF, with support from the country office in Barbados, will be in charge of following up the execution, monitoring and evaluation of the program. The EA and the IDB have committed to carry out field visits according to a regular schedule to be agreed upon between the two parts (see Table 2.2 Monitoring Work Plan for an indicative schedule).

Sources of information for monitoring the Program include EA semi-annual reports, IDB’s field inspections, and EA administrative records and financial statements. The EA will be responsible for providing administrative records, financial statements, and reports, and will participate in the IDB’s field inspections.

## Reporting Monitoring Results

The IDB will use four instruments to monitor the Program’s progress in completing the expected outputs:

* Semi-annual Reports
* Due Diligence and Annual Supervision Missions
* Field Inspections
* Audited Financial Statements.

For each instrument, the remainder of this section describes the instrument, and explains who is responsible for preparing it, when it should be submitted or carried out, its purpose, and its content.

### Semi-Annual Reports

Semi-Annual Reports are designed to monitor the progress in implementing the energy efficiency (‘EE’) and renewable energy (‘RE’) projects and the technical assistances funded, and measure their impact through various indicators. The EA is responsible for preparing them, with input from the Governments, private sponsors, utilities, and projects in EC countries. The IDB is responsible for reviewing the Semi-Annual Reports and giving its non-objection. As their name suggests, these reports are due every six months. The EA will deliver the reports within 60 calendar days after the end of each semester.

Purpose

The purpose of the Semi-Annual Reports is to track the Program’s progress towards the targets established for the output indicator described in Section 2.1 and the results indicators included Section 3.3. The Semiannual reports will serve as inputs to completing the Project Monitoring Report (PMR), which is the IDB’s main tool for monitoring progress towards meeting the indicator targets.

Content

Semi-Annual Reports contain four components:

* **Execution Plans**—present Gantt charts that show the Program’s progress towards completing the tasks for fulfilling outputs. The Gantt charts present updated timelines that show any planned changes in carrying out the tasks within each Component. Two execution plans are presented: the Pluri-annual Execution Plan (PEP) which covers the complete execution period and the Annual Operation Plan (POA) which covers the following twelve-month period. The execution plans should assign costs to each task to track the financial progress of the Program. In addition, the EA should attach a bank statement with the execution plans, which the IDB will use to validate the progress reported in the execution plans against actual disbursements
* **Financial and Procurement Plans**—show the planned disbursements and procurement activities for the following twelve-month period. The Financial Plan presents a financial projection of the planned disbursements that should coincide with the planned tasks included in the execution plans. The Procurement Plan shows procurement activities the EA will carry out directly. Generally, the EA’s procurement activities will take place at the beginning and towards the end of the Program’s execution period. The EA would only need to submit Procurement Plans when there are procurement activities planned for the following year
* **Updated Risk Matrix**—shows the status of risks identified in the Risk Matrix of the Program, as well as proposed actions or mitigation measures. It also identifies any new issues, risks, and events that affect or may potentially affect the future implementation of the Project
* **Updated Results Matrix**—shows the progress towards the targets listed for each indicator in the Results Matrix of the Program.
* **Lessons Learned**—presents the lessons learned and any other information required to ensure the successful implementation of the Project.

### Due Diligence and Annual Supervision Missions

There will be due diligence for each Category A proposed renewable energy project. There will be one due diligence mission at the beginning of the projects. Following that, there will be annual supervision missions for the following five years, ending in year six of the Program.

The IDB will be responsible for hiring external consultants to carry out the due diligence and supervisions missions for the renewable energy projects financed through the Program. The due diligence missions should occur during year 1 of the Program, prior to the first disbursements made to the projects. The supervision missions will occur on an annual basis, starting in year two and until program completion.

Purpose

The purpose of the due diligence missions is to provide an independent opinion about the viability of the projects and their progress. Specifically, the due diligence will verify the financial and technical information included in the loan applications and inform the IDB and other donors of the risks. The supervision missions will provide an unbiased technical opinion about the projects’ progress.

Content

The IDB will develop the TOR of the due diligence and supervision missions and will hire the consultants that will carry out the due diligence. Once completed, the IDB must review and approve the consultant’s reports.

### Field Inspections

Field Inspections are designed to monitor the progress in implementing the EE and RE projects and the technical assistances funded. Field Inspections provide an opportunity for the IDB to validate in the field the progress reported in the Semi-Annual Reports. The IDB is responsible for coordinating them with support from the EA, EC Governments and private sponsors. Other donors of the SEF that may want to participate in the field inspections will coordinate it with the IDB. Field inspections are to be carried out semiannually, within a 60 day period after the Semi-Annual Reports are submitted.

Purpose

The purpose of the Field Inspections is to track and confirm the Program’s progress towards targets listed for each indicator included in the Results Matrix.

Content

Field Inspections include field visits and meetings between the IDB, the EA, and the EC Governments and/or private sponsors that signed project agreements with the EA.

### Audited Financial Statements

The EA will submit to the IDB:

(a) Annual Audited Financial Statements (AFS) of the CDB. These reports are to be presented to the Bank within 180 days following the end of CDB’s fiscal year end, December 31st;

(b) Assurance Reports on the Process of Preparation and Submission of Disbursement Requests (Assurance Reports) to be conducted by an independent audit firm that is eligible to the Bank, and the report submitted within 180 days following the end of CDB’s fiscal year end, December 31st and should be audited by a firm of independent public accountants.

(c) Semi‐annual Unaudited Financial Reports of the project, including financial status reports on sub‐loans. These statements should be submitted within 60 days after the close of each semester. These statements are intended to supplement the information in CDB’s AFS since the AFS does not include project specific information.

Purpose

The purpose of the Audited Financial Statements, Assurance Reports on the Process of Preparation and Submission of Disbursement Requests and Semi‐annual Unaudited Financial Reports of the project is to assess the financial performance of the Program.

## Monitoring Coordination, Work Plan, and Budget

The IDB will be responsible for overseeing the execution of the Monitoring and Evaluation Plan for the complete Program, including the funds provided by other donors. The IDB will also be responsible for reporting to the other Donors on the execution and results of the Program. The project team at the IDB responsible for carrying out these tasks will be composed by specialists from the INE/ENE and IFD/CMF divisions, with support from the country office in Barbados.

The EA (the CDB) will be responsible for executing the SEF and reporting on the results of the Program. The EA will create a Project Management Unit that will be responsible for carrying out these tasks (see Operating Manual). The Project Management Unit will be responsible for reporting the Program’s progress and results to the IDB and the other donors (CTF and JICA).

Table 2.3 shows the timing of the tasks for monitoring the Program, including the cost and entity responsible for carrying out each task.

Table 2.: Monitoring Work Plan

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Activity** | **2016** | | **2017** | | **2018** | | **2019** | | **2020** | | **2021** | | **2022** | | **2023** | | **2024** | | **Resp.** | **Fund.** | **US$** |
| **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** |
| Semi-Annual Reports |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | EA | Prog. | 0 |
| Field Inspections |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | IDB & EA | Prog. | 120,000 |
| Audited Financial Statements |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | EA | Prog. | 140,000 |
| Assurance Reports |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | EA | Prog. | 195,000 |
| ESG Due Diligence and Annual Supervision Missions by External Consultant |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | IDB | Prog. | 150,000 |
| **Total** |  | | | | | | | | | | | | | | | | | | | | **605,000** |
|  |

# Evaluation

The Program will be evaluated by measuring compliance with targets for a set of indicators. The Evaluation Plan first defines what questions the indicators address. Then it mentions the studies that the Evaluation Plan builds upon and describes the indicators that will be used to evaluate the results of the Program. It also explains the before and after evaluation methodology and the instruments that will be used to evaluate the Program. Lastly, it describes the institutional arrangements, work plan, and budget to carry out the Evaluation Plan. In addition to this, an impact evaluation of the SEF will be conducted using synthetic control method. This method will be used to compare units (ECC) exposed to the intervention of interest (the SEF) to one or more unexposed units.

## Main Evaluation Questions

The purpose of the evaluation is to assess the outcomes of the Project. The main evaluation questions are as follows:

* Did electricity demand from streetlights decrease where energy efficiency projects were financed by the Program?
* How many geothermal projects financed by the program moved or are projected to move from the current to the next stage of development?
* What is the electricity generation from geothermal projects financed at some stage by the Program?
* What was the impact of the Program towards decreasing the amount of greenhouse gas emissions, the cost of electricity service, and the amount of fuel oil imports?
* How much additional public and private resources was the Program able to leverage in the development of energy efficiency and renewable projects financed at some stage by the program?

## Existing Knowledge

An ex ante Cost Benefit Analysis (CBA) and financial analysis of the geothermal projects that may be funded by the Program have been prepared. The CBA is an economic analysis that presents the net economic benefits to the EC region and to each country from implementing the Components I and III of the Program. The financial analysis estimates the rate that the geothermal projects would charge to utilities and its impact on the tariff in the countries, as well as the cost of debt of the projects. The financial analysis includes projected financial statements for each of the geothermal projects.

The CBA, financial analysis, and a description of the methodology used in their preparation and their main conclusions are explained in further detail in the [Cost Benefit Analysis Report](http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39683421) which is an Optional Electronic Link of the Proposal for Operation Development (POD). A summary of the methodology, assumptions, and main results of the ex-ante CBA are discussed below.

Cost Benefit Analysis

The objective of the CBA methodology is to determine whether or not Component I and Component III of the Program are economically viable. To do so, a CBA is carried out for the street light retrofitting and geothermal power projects included in the indicative project pipeline. The IDB and Castalia identified the indicative project pipeline in meetings with local Governments, the Caribbean Development Bank, and potential private project sponsors during a mission to the EC in June 2015. As such, the indicative project pipeline is the current forecast of the potential demand for Program funds from the EC countries.

The results of the CBA indicate that the projects are economically viable when a 12 percent discount rate is used. Specifically, the results of the CBA show that the present value (PV) of the net economic benefits of each project is positive and their internal rates of return exceed the cost of capital (12 percent). Similarly, the PV of the aggregate net economic benefit of all projects combined is also positive and exceeds the cost of capital. This means that implementing the projects will result in a net economic gain for the Governments in each of the countries and for the region as a whole, and so, the Governments, multilateral institutions, and private sponsors should proceed with implementing them.

To carry out the CBA, a methodology that complies with the IDB Guidelines for Economic Analysis was used. Specifically, the PVs of the projects’ net benefits were estimated. To do so the PV of the projects’ benefits and costs were estimated. For calculating the projects’ benefits, the savings in electricity expenditures and the monetary value of greenhouse gas emissions displaced by the projects were estimated. For calculating the projects’ costs, the full economic costs of implementing the projects were included, including the costs not financed by the Program. Then the difference between these two values was calculated and the present value of that difference was found. That PV is the result of the CBA. If the PV is positive, the project is economically viable.

To determine the projects’ net benefits, the annual economic costs and benefits were estimated for a period of 40 years and a period of 15 years for geothermal projects and energy efficiency projects, respectively. Table 3.1 presents the assumptions used to calculate the economic costs and benefits of the projects.

Table 3.: Assumptions Used to Determine the Indicative Projects’ Economic Costs and Benefits

| **Variable** | **All Projects** | **Dom.** | **Gren.** | **Nevis** | **SL** | **SVG** |
| --- | --- | --- | --- | --- | --- | --- |
| **General Assumptions** | | | | | | |
| Social Cost of one ton of CO₂ emissions (US$/tCO₂) | 10[[4]](#footnote-5) | | | | | |
| Pounds of CO₂ emissions per kWh of electricity produced from fuel oil (No.2) (tCO₂/MWh) | 0.76[[5]](#footnote-6) | | | | | |
| Discount rate (%) | 0.12 | | | | | |
| **Assumptions for Geothermal Projects** | | | | | | |
| Plant size (MW) | 60 | 10 | 10 | 10 | 20 | 10 |
| Plant availability (%) | 85 | | | | | |
| Total Capex (US$ million) | 531.5 | 68.3 | 102.3 | 96.3 | 168.3 | 96.3 |
| Pre-investment  Exploration  Production Drilling  Power Plant Construction  T&D and Access Roads | 12  56  112  270  81.5 | 0  0  7  45  16.3 | 6  14  21  45  16.3 | 0  14  21  45  16.3 | 6  14  42  90  16.3 | 0  14  21  45  16.3 |
| Operating cost of electricity from geothermal generation (US$/kWh) | 0.02[[6]](#footnote-7) | | | | | |
| Avoided cost of fuel oil generation (US$) |  | 0.174 | 0.205 | 0.192 | 0.20 | 0.189 |
| **Assumptions for Energy Efficiency Projects** | | | | | | |
| Lamps retrofitted per technology (Number) :   * HPS Lamp, 400W * HPS Lamp, 250 W * HPS Lamp, 100 W * HPS Lamp, 50 W | * 2900 * 2400 * 2200 * 0 | * 1400 * 700 * 0 * 0 |  |  | * 1500 * 1700 * 2200 * 0 |  |
| Capex per technology (US$/unit):   * HPS Lamp, 400W * HPS Lamp, 250 W * HPS Lamp, 100 W * HPS Lamp, 50 W | * 1000 * 900 * 500 * 300 | | | | | |
| Yearly O&M cost equipment cost (US$/unit/year):   * HPS Lamp, 400W * HPS Lamp, 250 W * HPS Lamp, 100 W * HPS Lamp, 50 W | * 20 * 18 * 10 * 6 | | | | | |
| Baseline Consumption per year (kWh/year/unit):   * HPS Lamp, 400W * HPS Lamp, 250 W * HPS Lamp, 100 W * HPS Lamp, 50 W | * 2032 * 1314 * 517 * 263 | | | | | |
| Project Consumption per year per technology (kWh/year/unit):   * HPS Lamp, 400W * HPS Lamp, 250 W * HPS Lamp, 100 W * HPS Lamp, 50 W | * 1016 * 657 * 258 * 131 | | | | | |
| Life time of lamps (years) | 11.42 | | | | | |
| Avoided cost of electricity expenditures (US$) |  | 0.26[[7]](#footnote-8) |  |  | 0.39[[8]](#footnote-9) |  |

The results of the CBA and the financial analysis were used to establish the targets for measuring the results of the Program. This ensures the targets set in the Evaluation Plan coincide with the goals established during the design and approval of the Program. Specifically, the targets for percentage decrease in CO2 emissions and savings in electricity consumption and expenditure are based on the estimates used to calculate the CBA. The targets for the percentage decrease in cost of electricity service will be based on the projected cost of electricity service calculated in the financial model.

## Outcome Indicators

Table 3.1 presents the indicators that will be used to measure whether the Program achieved its intended outcomes. Due to the long maturities associated to these projects, projects financed from early exploration may not be fully operational until past the timeframe of evaluation. Therefore, for those cases, some indicators will be estimated based on expected future outcomes A note is included signaling the indicators for which this is the case. The basis for estimating indicator values is included in the source description.

Table 3.: Key Results Indictors

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Results Indicator** | **Unit**  **/Description** | **Frequency of Measurement** | **Source of Verification** | |
| **Component I: Energy Efficiency** | | | | |
| Reduction in electricity consumption from Public Lighting sectors with EE projects financed by the Program | GWh/year  Electricity saved by EE applications, measures and programs | Semiannually and at the end of the execution period | EA report based on utility sales reports | |
| Reduction in imports of fossil fuels for electricity generation in EC countries due to EE projects financed at any stage by the Program | Thousand barrels of oil  Reduction in imports of fossil fuels for electricity generation | Semiannually and at the end of the execution period | IDB estimations made based on number and efficiency levels of installed lamps. Figures to be checked with the utilities and the Governments in the EC countries  (ex-post CBA) | |
| Greenhouse gas (GHG) emissions avoided by EE projects financed at any stage by the Program | ktCO2e/yr  Greenhouse gas (GHG) emissions avoided | Semiannually and at the end of the execution period | IDB estimations made following IDB methodology, based on number and efficiency levels of installed lamps and an average conversion factor of 0.76  (ex-post CBA) | |
| EE projects appraised by the CDB | Number of EE projects | Semiannually and at the end of the execution period | Report from CDB. | |
| **Component II: Regulatory Framework, Institutional Strengthening, and Capacity Building** | | | | |
| ECC with legal and regulatory frameworks that enable GE development | Number of countries that have GE legal and regulatory frameworks | Semiannually and at the end of the execution period | EA report based on information from Governments | |
| Women trained in construction, operation and/or maintenance of RE and EE infrastructure and projects | %  Measures the percentage of women trained, out of the total trainees, in construction, management and/or maintenance of SE infrastructure/projects | At the completion of the execution period | EA report based on information from Governments and private project sponsors | |
| **Component III – Renewable Energy** | | | | |
| Greenhouse gas (GHG) emissions avoided by geothermal projects financed at any stage by the Program | ktCO2e/yr  Greenhouse gas (GHG) emissions avoided | Annually, and at the end of the execution period | IDB estimations made following IDB methodology, based on installed capacity, electricity generation, and an average conversion factor of 0.84  (ex-post CBA) | |
| Reduction in imports of fossil fuels for electricity generation in EC countries with geothermal projects financed at any stage by the Program | Thousand barrels of oil  Measures the reduction in imports of fossil fuels for electricity generation | Annually, and at the end of the execution period | IDB estimations made based on estimated installed capacity and electricity generation. Figures to be checked with the utilities and the Governments in the EC countries  (ex-post CBA) | |
| Geothermal power generation capacity installed in projects facilitated or financed at some stage by the Program | MW  Measures the MW of geothermal capacity that is ready to be generating electricity in the year | Once, at the end of the SEF execution period (Yr 8). | EA report with info from the projects in the EC countries | |
| Geothermal projects financed at any stage by the Program that moved on from early exploration to production drilling or from early exploration or production drilling to construction of plants and/or electricity generation | Number of geothermal projects  Measures the number of geothermal projects financed that moved to the following stage of development | Annually, and at the end of the execution period | EA report with info from the projects in the EC countries | |
| Women participate in consultation processes related to the projects. | %  Measures the percentage of women who participate in consultations | At the completion of the execution period | EA report based on information from Governments and private project sponsors | |
| RE projects appraised by the CDB. | Number of RE projects | Semiannually, and at the end of the execution period | Report from CDB. | |
|  | | | | |

## Evaluation Methodology

The IDB will follow a before-completion and after-completion methodology to evaluate the results of the Program. Specifically, for a group of indicators, the IDB will compare baseline values against the values after the Program is completed. This is the same methodology that is used for monitoring the Program. The only difference is the point in time when the methodology is applied. For monitoring the Program, the methodology is applied while the Program is being executed. For evaluating the Program, the methodology is used after the Program is completed.

By measuring baseline values in year 0 (2015), the IDB will simulate a counterfactual of what the performance for these indicators would be if the Program would not be implemented. This methodology assumes that if the Program were not implemented, indicator values would remain at their baseline values.

The main instrument the IDB will use to evaluate the Program will be the Project Completion Report (‘PCR’), which compares the Program results against baseline values. The IDB will base the PCR on mid-term and final evaluations and an ex-post CBA. These instruments are described in more detail in the following section.

Also, in addition to the evaluation described in this section, the IDB Oversight Evaluation Office (OVE) may also separately evaluate the impact of the Program.

## Reporting Results

The EA will be responsible for reporting on the results of the Program, based on information collected from the EC Governments and private sponsors and on information from its own systems. The EA will be responsible for reporting progress and results to the IDB. The EA will collect, store, and retain all information to assist the IDB in monitoring performance of the Program.

The INE/ENE Division of the IDB will be responsible for overseeing the execution of the Monitoring and Evaluation Plan for the complete Program, including the funds provided by other donors. As such, they must report annually to the Clean Technology Fund Trust Fund Committee (CTF TFC) and the Japan International Cooperation Agency (‘JICA’) on progress towards achieving the results of the Program and estimations of results (in case of plants in state of construction and non-operational as of reporting date).

The project team composed by specialists from INE/ENE and IFD/CMF, with support from the country office in Barbados, will be in charge of following up the execution, monitoring and evaluation of the program.

There are five instruments that the IDB will use to evaluate the Program’s results. The instruments are as follows:

* Baseline Values Study
* Mid-Term Evaluation and Final Evaluation – GEF
* Mid-Term Evaluation
* Ex-post Cost Benefit Analysis (‘CBA’)
* Project Completion Report

For each instrument, the remainder of this section describes its purpose, the entities responsible for preparing it, and, when applicable, the methodology used in its preparation.

Baseline Values Study

The Baseline Values Study will establish the baseline values of the indicators that will be used to evaluate the Program. This study is a key input of the Evaluation Plan and so must be measured at the start of the Program. The IDB is responsible for carrying out the Baseline Values Study with support from the EA, and the Governments, utilities, private sponsors, and projects in EC countries.

Midterm and Terminal evaluation - GEF

A mid-term and a terminal evaluation will be conducted according to GEF guidelines to review and evaluate the achievements attained during the implementation of the GEF grant as regards the fulfillment of its objectives, outputs, results framework and work plan.

Mid Term Evaluation

The Mid-term Evaluation is designed to assess the performance of the Program, by reviewing whether the Program has met the targets set for the evaluation indicators. Specifically, the evaluation will verify the reported progress of the Program, assess Program’s performance against the planned results, and assess the EA’s performance in coordinating and executing the Program. These evaluation will also identify ways that the Program’s operations could be improved and will identify lessons learned. A Final Evaluation will be completed as part of the Project Completion Report discussed in further detail below and presented in Paragraph 3.12 of the Proposal for Development.

The EA is responsible for hiring the independent consultant that will prepare the Mid Term Evaluation. In addition, the EA is responsible for providing the independent consultant the information needed to complete it. Once completed, the EA must submit the Mid-term Evaluation to the IDB for its review and non-objection. The Mid-term Evaluation is due once 50% of loan resources are disbursed, or after 4 years from the eligibility of disbursements, whichever is earlier.

Expost Cost Benefit Analysis

The ex-post Cost Benefit Analysis (‘ex-post CBA’) is designed to measure the economic impact of the Program. The ex-post CBA will measure whether the actual economic benefits of the Program exceeded its actual economic costs and how these compared to estimations made when the Program was designed. It will also assess the financial costs and benefits of the geothermal projects to private investors or PPP. Comparing the ex-post CBA with the ex-ante CBA will identify what factors led to discrepancies between the estimated costs and benefits included in the ex-ante CBA and the actual costs and benefits observed at the Program’s completion. For this reason, the ex-post CBA will follow the same methodology used for preparing the ex-ante CBA presented in Section 3.2 and in the [Cost Benefit Analysis Report](http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39683421) which is an Optional Electronic Link of the POD.

In assessing the financial costs and benefits of the geothermal projects to the investors, the ex-post CBA will determine the cost of electricity service with the new geothermal capacity. Due to the long maturities associated to these projects, projects financed from early exploration may not be fully operational until past the timeframe of evaluation. As such, indicator values that depend on when power plants are commissioned will be estimated. The ex-post CBA will be the instrument to estimate the estimated decrease in cost of service based on up to date information about resource quality, estimated installed capacity, and the estimated timelines for the geothermal power plants to come on line.

To carry out the ex-post CBA, a methodology that complies with the IDB Guidelines for Economic Analysis will be used. Specifically, the PVs of the projects’ net benefits will be estimated based on current information for the EA, Governments, and private project sponsors. To do so the PV of the projects’ benefits and costs will be estimated. For calculating the projects’ benefits, the savings in electricity expenditures and the monetary value of greenhouse gas emissions displaced by the projects will be estimated. For calculating the projects’ costs, the full economic costs incurred during the implementation of the projects will be included, including the costs that were not financed by the Program. Then the difference between these two values will be calculated and the present value of that difference will be found. That PV is the result of the ex-post CBA. If the PV is positive, the projects will have been economically viable. To determine the projects’ net benefits, we estimate the annual economic costs and benefits for a period of 40 years and a period of 15 years for geothermal projects and energy efficiency projects, respectively. Section 3.2 contains the main assumptions used.

The CDB is responsible for hiring the independent consultant that will prepare the ex-post CBA, and reviewing and approving the final draft of the ex-post CBA. The EA is responsible for providing the independent consultant with the information needed to complete the ex-post CBA. In addition, the EA will coordinate with local authorities in EC countries to obtain any information that the external consultant may require to complete the ex-post CBA.

The ex-post CBA will be developed as part of the Project Completion Report completed for the Program.

Project Completion Report for the Program

The Project Completion Report (PCR) is designed to assess and document the performance of the Program. A PCR will be completed for the Program as a whole including the results of each sub-project financed through the Program. The PCR evaluates three main areas: whether the Program and sub-projects met their targets for results indicators, whether the results are sustainable, and the issues that affected how successful the Program and sub-projects were in achieving their intended results.

In evaluating whether the Program and sub-projects met the targets for results indicators, the PCR uses a before and after methodology that compares the baseline values of the results indicators against the indicator values after the Program and/or Project is completed. As part of the PCR completed for the Program, an ex-post Cost Benefit Analysis (CBA) will be developed.

The evaluation of the sustainability of the results and the issues that affected the Program’s and/or projects’ implementation is focused on evaluating risks. In evaluating whether the results are sustainable, the PCR identifies the risks that could affect the sustainability of the Program’s and/or projects’ results, and their likelihood and severity. The four main kinds of risks that should be considered include: financial risks, sociopolitical risks, institutional framework and governance risks, and environmental risks. In evaluating issues, the PCR considers the risks that were not properly mitigated against and turned into issues that affected the implementation of the Program and sub-projects. Examples can include poor local implementation capacities and delays and effects thereof on the Program’s and/or projects’ results.

## Evaluation Coordination, Work Plan, and Budget

The budget for completing the Evaluation Plan is US$90,000. The tasks of the Evaluation Plan will be carried out at the start, at the halfway point, and at the completion of the Program. For each evaluation instrument, the remainder of this section describes when it should be prepared, who prepares it, and how it will be funded.

* **Baseline Values Study**—will be the responsibility of the IDB and will potentially be procured to an external consultant. The Baseline Values Study will be prepared within the last quarter before the Program starts. The study will cost an estimated US$10,000
* **Midterm Evaluation and Terminal evaluation for GEF**—will be procured by the IDB and prepared by an external consultant. The Mid-term and Terminal Evaluation will be financed with Program funds (GEF) and will cost an estimated value of US$70,000.
* **Midterm Evaluation**—will be procured by the EA and prepared by an external consultant. The Mid-term Evaluation will will cost an estimated value of US$40,000.
* **Ex post Cost Benefit Analysis**—will be procured by the EA and prepared by an external consultant. The Ex-post CBA will be financed by the CDB and will cost approximately US$40,000. The Ex-post CBA will be prepared as part of the PCR.
* **Project Completion Report**—will be prepared by the EA and conducted up to 2 years after the final disbursement of SEF resources to the individual projects.

Table 3.: Evaluation Work Plan

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Activity** | **2015** | **2016** | | **2017** | | **2018** | | **2019** | | **2020** | | **2021** | | **2022** | | **2023** | | **2024** | | **Res.** | **Fund** | **US$** |
| **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** | **S1** | **S2** |
| Baseline Values Study |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | IDB | IDB | 10,000 |
| Mid-term and terminal evaluation - GEF |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | IDB | GEF | 70,000 |
| Mid-term Eval. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | EA | IDB | 40,000 |
| Ex-post CBA |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | EA | EA | 40,000 |
| PCR |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | EA | IDB | 0 |
| **Total** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 160,000 |

#### Results Matrix

The description and source of verification of the results indicators are included after the table with the targets.

The targets in the results matrix are targets for each year, as opposite to cumulative targets up to the year. All targets are set taking into account the projects in the indicative pipeline of the SEF. If the projects financed by the SEF change over time, then the targets would need to be adjusted to reflect the expected results of the actual projects funded.

Table A.1: Results Framework - Matrix of Indicators

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Impact Indicators** | **Units** | **Base Level 2015** | **Target Level** | | **Source of Verification** | | | | | | | |
| Average electricity tariff for customers in EC countries | US$/KWh | 0.33 | 0.30 | | CARILEC Average Tariffs for EC countries | | | | | | | |
| **Component 1** | **Indicator** | **Units** | **Base 2015** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** | **Target** |
| **Results** |  |  |  |  |  |  |  |  |  |  |  |  |
| Reduction in electricity consumption from Public Lighting sectors with EE projects financed by the Program | Electricity saved by EE applications, measures & programs | GWh/year | 0 | 0 | 0 | 0 | 9.3 | 28.0 | 31.1 | 31.1 | 31.1 | 130.6 |
| Reduction in imports of fossil fuels for electricity generation in EC countries due to EE projects financed at any stage by the Program | Reduction in imports of fossil fuels for electricity generation | Thousand barrels of oil | 0 | 0 | 0 | 0 | 15 | 30 | 45 | 50 | 50 | 191 |
| Greenhouse gas (GHG) emissions avoided by EE projects financed at any stage by the Program | Greenhouse gas (GHG) emissions avoided | ktCO2e/yr | 0 | 0 | 0 | 0 | 39.2 | 78.4 | 117.5 | 130.6 | 130.6 | 496.3 |
| **Outputs** |  |  |  |  |  |  |  |  |  |  |  |  |
| Loans provided to energy efficiency projects with resources form the Program. | Loans provided for EE projects | Number of loans | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| EE projects appraised by the CDB | EE projects appraised | Number of EE projects | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| **Component 2** | **Indicator** | **Units** | **Base** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** | **Target** |
| **Results** |  |  |  |  |  |  |  |  |  |  |  |  |
| ECC with legal and regulatory frameworks that enable GE development | # countries that have complete GE legal and regulatory frameworks | # countries | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 3 |
| Women trained in construction, operation and/or maintenance of RE and EE infrastructure and projects | % of women trained, out of the total trainees, in construction, management and/or maintenance of SE infrastructure/projects | % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 |
| **Outputs** |  |  |  |  |  |  |  |  |  |  |  |  |
| Energy policy reforms or recommendations for energy policy reform provided to and implemented by Governments in EC countries | Number of ECC | Number of countries | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Trainings provided to the EA and/or government employees with resources from the Program | Number of trainings provided | Number of trainings | 0 | 0 | 2 | 3 | 2 | 3 | 3 | 2 | 0 | 15 |
| Grants provided for technical assistance to Governments in EC countries with resources from the Program | Number of EC countries receiving grants | Number of countries | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 4 |
| **Component 3** | **Indicator** | **Units** | **Base** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** | **Target** |
| **Results** |  |  |  |  |  |  |  |  |  |  |  |  |
| Greenhouse gas (GHG) emissions avoided by geothermal projects financed at any stage by the Program | Greenhouse gas (GHG) emissions avoided | ktCO2e/yr | 0 | 0 | 0 | 0 | 0 | 375 | 375 | 375 | 375 | 1,501 |
| Reduction in imports of fossil fuels for electricity generation in EC countries with geothermal projects financed at any stage by the Program | Reduction in imports of fossil fuels for electricity generation | Thousand barrels of oil | - | - | - | - | - | 722 | 722 | 722 | 722 | 2,889 |
| Geothermal power generation capacity installed in projects financed at some stage by the program | MW of geothermal capacity | MW | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 60 |
| Geothermal projects financed at any stage by the Program that moved on from early exploration to production drilling or from early exploration or production drilling to construction of plants and/or electricity generation | Number of GE projects financed that moved to the following stage of development | Number of GE projects | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 4 |
| Women participate in consultation processes related to GE projects. | % of women who participate in consultations | % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 |
| **Outputs** |  |  |  |  |  |  |  |  |  |  |  |  |
| Loans provided to geothermal projects at any stage of development with resources from the Program | Number of loans to GE projects | Number of loans | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 3 |
| Loans provided to finance transmission lines required for connecting GE plants to the power grid | Number of loans for transmission and distribution projects | Number of loans | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| RE projects appraised by the CDB | RE projects appraised | Number of RE projects | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 3 |

**Table A.2: Description/Source of Verification for Results Indicators**

|  |  |  |  |
| --- | --- | --- | --- |
| **Component 1** | **Indicator** | **Units** | **Source of Verification/ Comments** |
| **Results** |  |  |  |
| Reduction in electricity consumption from Public Lighting sectors with EE projects financed by the Program | Electricity saved by EE applications, measures & programs | GWh/year | Measures the percentage decrease of electricity unit sales to Public Lighting in EC countries with EE projects financed by the Program. Calculated based on following formula: (Y-X)  Where: Y= Units of Electricity Sold in kwh for Public Lighting in the year  X=Units of Electricity in kwh that would have been consumed for Public Lighting without Program   Note: If the projects are not operational for the entire year in the first year of operation, the annual target for that year need to be adjusted proportionally to the time the project are actually in operation.  Source: Report from CDB based on utility sales reports. |
| Reduction in imports of fossil fuels for electricity generation in EC countries due to EE projects financed at any stage by the Program | Reduction in imports of fossil fuels for electricity generation | Thousand barrels of oil | Measures the estimated reduction in barrels of oil imported once the lamps are retrofitted. It is calculated based on following formula:  a\*c  Where:  a= electricity savings from the retrofitted lamps (kWh)  c=average conversion factor= heat rate \* oil energy content  Source: Variable “a” is an IDB estimation made based on efficiency levels and number of retrofitted lamps. Figures to be checked with the utilities and the Governments in the EC countries (ex-post CBA).  Variable “c” is based on a heat rate of 10,200 kj/kWh, and an oil energy content of 6.311532\*10^6 kj/barrel of oil. |
| Greenhouse gas (GHG) emissions avoided by EE projects financed at any stage by the Program | Greenhouse gas (GHG) emissions avoided | ktCO2e/yr | Tons of GHG emissions be reduced or avoided through displaced electricity generation once the lamps are retrofitted.  Calculated based on following formula:  a\*e  Where:  a=electricity savings from the retrofitted lamps (kWh)  e=average conversion factor (tCO₂/Mwh)  Source: IDB estimations made following IDB methodology, based on number of lamps installed, efficiency levels of lamps, and an average conversion factor of 0.84 (ex-post CBA)  ktCO2e = Thousands of tons of CO2 equivalent |
| EE projects appraised by the CDB | EE projects appraised | Number of EE projects | Values based on number of EE sub-project appraisals completed.  Source: Report from CDB |
| **Outputs** |  |  |  |
| Loans provided to energy efficiency projects with resources form the Program. | Loans provided for EE projects | Number of loans | Values based on number of loan agreements.  Source: Report from CDB |
| **Component 2** | **Indicator** | **Units** |  |
| **Results** |  |  |  |
| EC countries with legal and regulatory frameworks that enable GE development | # countries that have GE legal and regulatory frameworks | # countries | Measures the number of countries that have complete GE legal and regulatory framework at Program completion.   Source: Report from CDB   Nevis has a Geothermal Bill but not regulations. SK and Nevis have separate regulations and laws. |
| Women trained in construction, operation and/or maintenance of RE and EE infrastructure and projects | % of women trained, out of the total trainees, in construction, management and/or maintenance of SE infrastructure/projects | % | Measures the percentage of women trained, out of the total trainees, in construction, management and/or maintenance of RE and EE infrastructure and projects.  Source: Reports from the CDB based on information from Governments and private project sponsors |
| **Outputs** |  |  |  |
| Energy policy reforms or recommendations for energy policy reform provided to and implemented by Governments in EC countries | Number of ECC | Number of countries | Measures the number of countries that implemented energy policy reforms or recommendations for energy policy reform as provided by with resources of the program.  Source: Report from CDB |
| Trainings provided to the EA and/or government employees with resources from the Program | Number of trainings provided | Number of trainings | Measures the number of trainings provided to the EA and/or government employees in EC countries   Source: Report from CDB |
| Grants provided for technical assistance to Governments in EC countries with resources from the Program | Number of EC countries receiving grants | Number of countries | Values based on number grant agreements.  Source: Report from CDB |
| **Component 3** | **Indicator** | **Units** |  |
| **Results** |  |  |  |
| Greenhouse gas (GHG) emissions avoided by geothermal projects financed at any stage by the Program | Greenhouse gas (GHG) emissions avoided | ktCO2e/yr | Tons of GHG emissions be reduced (avoided) once the plants of geothermal projects financed at any stage by the Program are commissioned.(1)  f\*e  Where:  f= electricity produced through geothermal power plants (kWh)  e=average conversion factor (tCO₂/Mwh)  Source: IDB estimations made following IDB methodology, based on installed capacity, electricity generation, and an average conversion factor of 0.84 (ex-post CBA)  ktCO2e = Thousands of tons of CO2 equivalent  Note: If the plants are not operational for the entire year in the first year of operation, the annual target for that year need to be adjusted proportionally to the time the plants are actually in operation. |
| Reduction in imports of fossil fuels for electricity generation in EC countries with geothermal projects financed at any stage by the Program | Reduction in imports of fossil fuels for electricity generation | Thousand barrels of oil | Measures the estimated reduction in barrels of oil imported (displaced oil) once the geothermal projects come on line. Calculated based on following formula:  f\*c  Where:  f= electricity produced through geothermal power plants (kWh)  c=conversion factor  Source: Variable “a” is an IDB estimation made based on estimated installed capacity and electricity generation. Figures to be checked with the utilities and the Governments in the EC countries (ex-post CBA) Variable “c” is based on a heat rate of 10,200 kj/kWh, and an oil energy content of 6.311532\*10^6 kj/barrel of oil.  Note: If the plants are not operational for the entire year in the first year of operation, the annual target for that year need to be adjusted proportionally to the time the plants are actually in operation. |
| Geothermal power generation capacity installed in projects facilitated or financed at some stage by the program | MW of geothermal capacity | MW | Includes the installed capacity that is expected to be operational at completion of Program (1).  Source: Report from CDB . Estimations of expected installed capacity based on quality of resource confirmed once exploration wells are drilled |
| Geothermal projects financed at any stage by the Program that moved on from early exploration to production drilling or from early exploration or production drilling to construction of plants and/or electricity generation | Number of GE projects financed that moved to the following stage of development | Number of GE projects | Measures the number of geotehrmal projects that moved on from early exploration to production drilling or from early exploration or production drilling to construction of plants and/or electricity generation. Includes all five GE projects in EC.  Source: Report from CDB with information from EC countries and private project sponsors. |
| Women participate in consultation processes related to GE projects. | % of women who participate in consultations | % | Measures the percentage of women of the total population that are consulted in the localities where projects are implemented   Source: Reports from the CDB based on information from Governments and private project sponsors |
| RE projects appraised by the CDB | RE projects appraised | Number of RE projects | Values based on number of RE sub-project appraisals completed.  Source: Report from CDB |
| **Outputs** |  |  |  |
| Loans provided to geothermal projects at any stage of development with resources from the Program | Number of loans to GE projects | Number of loans | Values based on loan agreements for financing funded with resources from the Program. Target includes loans at any stage of development.   Target includes all projects supported, both successful and failed.  Source: Report from CDB |
| Loans provided to finance transmission lines required for connecting GE plants to the power grid | Number of loans for transmission and distribution projects | Number of loans | Measures the number of loans to finance transmission lines required to connect GE plants to the power grid.   Source: Program report from EA with information from the projects, the utilities, and the Governments in the EC countries |

1. Concessional financing terms are required to reduce the exploration risk and therefore attract private sponsors who are expected to be the sub-borrowers. [↑](#footnote-ref-2)
2. Including in the form of Special Purpose Vehicles (SPVs) that may be led by a government or by the private sector [↑](#footnote-ref-3)
3. The projects in the indicative pipeline were identified in the mission to the six EC countries in June 2015 based on conversations with government officials and utilities. The indicative pipeline is included in a separate document. [↑](#footnote-ref-4)
4. The Department of Energy assigns a range for the social cost of CO₂ from $0 to $20 per ton of CO₂. We use the median value of this range. See following source:

   Department of Energy. Chapter 9: Emissions Monetization. Pg. 2 <https://www1.eere.energy.gov/buildings/appliance_standards/commercial/pdfs/ch_9_ashrae_nopr_tsd.pdf>. (accessed on 4 December 2014) [↑](#footnote-ref-5)
5. U.S. Energy Information Administration. “Frequently Asked Questions: How much carbon dioxide is produced per kilowatt-hour when generating electricity with fossil fuels?” <http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11>. Accessed on 4 December 2014. [↑](#footnote-ref-6)
6. Office of Energy Efficiency & Renewable Energy. U.S. Department of Energy. “Geothermal FAQS.” <http://www1.eere.energy.gov/geothermal/faqs.html> (accessed on 9 December 2014). [↑](#footnote-ref-7)
7. 2014 Dominica Street Lighting Tariff (71 cents per unit converted to US dollars). Source: DOMLEC. “DOMLEC Tariff Sheet effective as of September 2007” <http://www.domlec.dm/index.php/our-company/news/24-domlec-tariff-sheet>. Accessed on 28 June 2015. [↑](#footnote-ref-8)
8. 2014 St. Lucia Basic Energy Rate for Street Lighting converted to US Dollar. Source: LUCELEC "Basic Energy Rates" <https://www.lucelec.com/content/energy-rates>. Accessed on 28 June 2015. [↑](#footnote-ref-9)