Funding Proposal

FP020: Sustainable Energy Facility for the Eastern Caribbean

Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines | Inter-American Development Bank (IDB) | Decision B.14/17

27 September 2016

GREEN CLIMATE FUND

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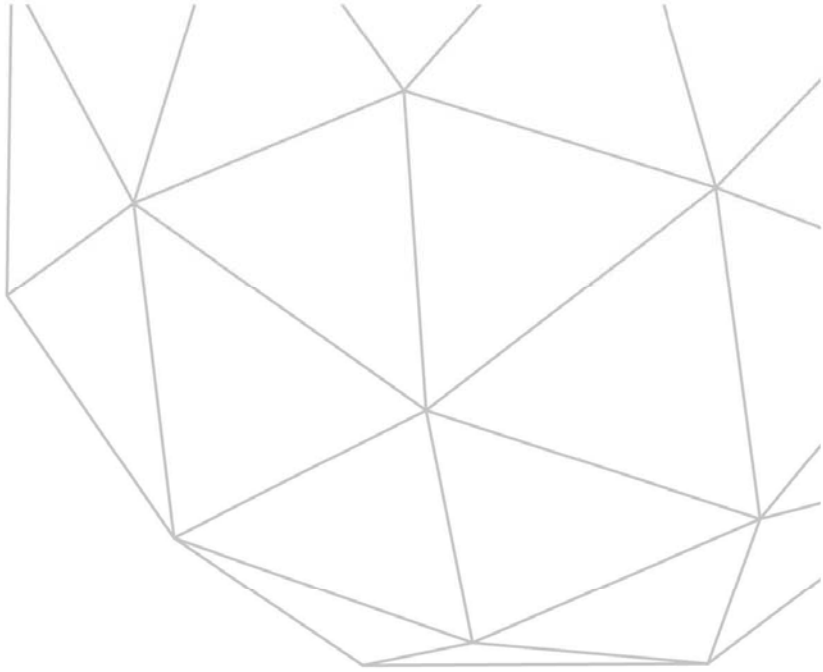
FUND



Funding Proposal

Version 1.0

The Green Climate Fund (GCF) is seeking high-quality funding proposals.

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

GREEN CLIMATE FUND

Contents

Note to accredited entities on the use of the funding proposal template

- Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document.
- The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.

Please submit the completed form to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:
"[FP]-[Agency Short Name]-[Date]-[Serial Number]"

Abbreviations

AFS	*Audited Financial Statements*
CDB	*Caribbean Development Bank*
CORE	*Co-financing Mechanism for Renewable Energy and Energy Efficiency*
CTF	*Clean Technology Fund*
DOM	*Dominica*
DPSP	*Dedicated Private Sector Program*
EA	*Executing Agency*
5ECC	*Eastern Caribbean Countries (Dominica, Saint Lucia, Saint Vincent and the Grenadines, Grenada, Saint Kitts and Nevis)*
ECC	*Eastern Caribbean Countries (Antigua & Barbuda, Dominica, Saint Lucia, Saint Vincent and the Grenadines , Grenada, Saint Kitts and Nevis)*
ECERA	*Eastern Caribbean Energy Regulatory Authority*
EIRR	*Economic Internal Rate of Return*
ENPV	*Economic Net Present Value*
ESA	*Electricity Supply Acts*
ESA	*Environmental and Social Due Diligence*
E&S	*Environmental and Social*
ESIA	*Environmental and Social Impact Assessment*
ESMR	*Environmental and Social Management Report*
FI	*Financial Intermediary*
GDP	*Gross Domestic Product*
GE	*Geothermal Energy*
GEF	*Global Environmental Facility*
GRE	*Grenada*
IAMC	*Independent Assessment of Macroeconomic Conditions*
IPP	*Independent Power Producers*
JICA	*Japan International Cooperation Agency*
LCOE	*Levelized Cost of Energy*
OECS	*Organization of Eastern Caribbean States*
OCR	*Ordinary Capital Resources*
OM	*Operating Manual*
OSF	*Other Special Funds*
PBL	*Policy-Based Loans*
PCR	*Project Completion Report*
PMU	*Programme Management Unit*
PPP	*Public Private Partnerships*
PV	*Photovoltaics*
RE	*Renewable Energy*
SAI	*Caribbean Strategic Agenda on Integration*
SEF	*Sustainable Energy Facility*
SE	*Sustainable Energy*
SEEC	*Sustainable Energy for the Eastern Caribbean Program*
SFR	*Special Funds Resources*
SKN	*Saint Kitts and Nevis*
SL	*Saint Lucia*
SSF	*Safeguard and Screening Form for Screening and Classification of Projects*
SVG	*Saint Vincent and the Grenadines*

A.1. Brief Project / Programme Information

A.1.1. Project / programme title		**Sustainable Energy Facility for the Eastern Caribbean**
A.1.2. Project or programme		programme
A.1.3. Country (ies) / region		**Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines**
A.1.4. National designated authority (ies)		**Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines**
A.1.5. Accredited entity		**Inter-American Development Bank (IDB)**
A.1.5.a. Access modality		☐ Direct ☒ International
A.1.6. Executing entity / beneficiary		Executing Entity: Caribbean Development Bank (CDB) Beneficiary: Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines
A.1.7. Project size category (Total investment, million USD)		☐ Micro (≤10) x Medium (50<x≤250) ☐ Small (10<x≤50) ☐ Large (>250)
A.1.8. Mitigation / adaptation focus		☒ Mitigation ☐ Adaptation ☐ Cross-cutting
A.1.9. Date of submission		31 July 2015
A.1.10. Project contact details	Contact person, position	Gloria Visconti; Christiaan Gischler
	Organization	Inter-American Development Bank (IDB)
	Email address	GloriaV@iadb.org; christiaang@iadb.org
	Telephone number	+1 (202) 623-3360; +1 (202) 623-3411
	Mailing address	1300 New York Avenue, N.W. Washington, D.C. 20577; USA

A.1.11. Results areas *(mark all that apply)*

Reduced emissions from:

- ☒ Energy access and power generation
  (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)
- ☐ Low emission transport
  (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)
- ☐ Buildings, cities and industries and appliances
  (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)
- ☐ Forestry and land use
  (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)

Increased resilience of:

- ☐ Most vulnerable people and communities
  (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.)
- ☐ Health and well-being, and food and water security
  (E.g. climate-resilient crops, efficient irrigation systems, etc.)
- ☐ Infrastructure and built environment
  (E.g. sea walls, resilient road networks, etc.)
- ☐ Ecosystem and ecosystem services
  (E.g. ecosystem conservation and management, ecotourism, etc.)

A.2. Project / Programme Executive Summary (max 300 words)

Dominica (DOM), Grenada (GRE), Saint Kitts & Nevis (SKN), Saint Lucia (SL) and Saint Vincent & Grenadines (SVG), are Small Island Developing States (SIDS) located in the Eastern Caribbean region, with small and isolated electricity markets, highly dependent on imported liquid fossil fuels for electricity generation. In 2013, the average electricity tariff was very high, at US$0.39 per kWh. Despite the decrease in world oil prices since mid-2014, electricity prices in this region remain relatively high compared with those in USA and other territories.

Geothermal Energy (GE) presents the largest available renewable energy (RE) resource and could provide the lowest electricity generation cost in addition to being the most reliable. To date, there is however no operating GE plant in any of the five Eastern Caribbean countries (ECC) of DOM, GRE, SKN, SL, and SVG, due to barriers such as: (i) very high cost of undertaking projects; (ii) lack of access to capital at appropriate terms;
(iii) inadequate legislative, regulatory and policy frameworks; (iv) limited fiscal space for governments to acquire new public debt; (v) insufficient specialized technical skills; (vi) lack of economies of scale; and (vii) high uncertainty during early development stages that the private sector is unable to bear due to GE resource risk.

The Sustainable Energy Facility (SEF) for the Eastern Caribbean regional programme proposed to the GCF aims to address the financial, technical and institutional barriers which GE encounters in DOM, GRE, SKN, SL and SVG and to provide institutional strengthening and capacity building to the governments of these Small Island States and to the Caribbean Development Bank (CDB) to develop GE.

The proposed GCF regional programme will be part of IDB's Sustainable Energy Facility (SEF) for the Eastern Caribbean approved in October, 2015. To differentiate both operations, the proposed GCF regional programme will be referred to as the programme and IDB's Sustainable Energy Facility (SEF) for the Eastern Caribbean, hereinafter will be called IDB-SEF. IDB-SEF aims to address barriers for energy efficiency (EE) and RE, including GE, in the six ECC (including Antigua and Barbuda which does not have GE potential). However the IDB's request of funding from the GCF is only for DOM, GRE, SKN, SL and SVG and only for the development of GE projects.

The proposed regional programme for the GCF includes the following two components:

Component 1: GeoSmart Initiative: This initiative, initiated by the CDB, is a partnership for supporting geothermal energy development.. Given the inherent risk at each stage of GE development, the programme will offer timely and tailored financial instruments to enable sub-projects to advance step by step, through plant construction. CDB will mobilize appropriate resources (price and other terms) such as grants, contingent grants and concessional loan resources to Governments and Special Purpose Vehicles, established as Public Private Partnerships, for the purpose of addressing the specific challenges that GE development faces,.

Component 2: Regulatory framework, institutional strengthening and capacity building: Technical assistance for strengthening capacity building will be provided to the CDB[1]. Support to improve regulatory frameworks and institutional capacity will also be provided to DOM, GRE, SKN, SL and SVG (5ECC), including to ministries responsible for energy and electric utilities. .

The programme anticipates the following five main **impacts in the 5ECC**:

1. 60MW of Geothermal power generation capacity installed in projects facilitated or financed at some stage;
2. GHG Emission Reductions of 313,421 TCO2e/year and 9,402,621 TCO2e during the lifetime of the programme;
3. Reduction of 722 Thousand barrels of oil imported for electricity generation;
4. USD 50 million reduced spending on Oil imports (at a fuel price of US$70 per barrel);
5. Reduction of the average electricity generation cost and, if generation cost reductions are passed on to customers, this should lead to an average decrease in tariffs from US$0.35/kWh in 2015 (at a fuel price of US$70 per barrel) to US$0.28/kWh.

[1] This support will strengthen also the capacity of CDB to access directly GCF resources in a near future as potential regional accredited entity.

A.3. Project/Programme Milestone	
Expected approval from accredited entity's Board (if applicable)	Date: 15/02/2017 (Depending on the finalization of the negotiation of the AMA)
Expected financial close (if applicable)	NA
Estimated implementation start and end date	Start: 15/05/2017 End: 15/05/2025
Project/programme lifespan (execution period)	8 years

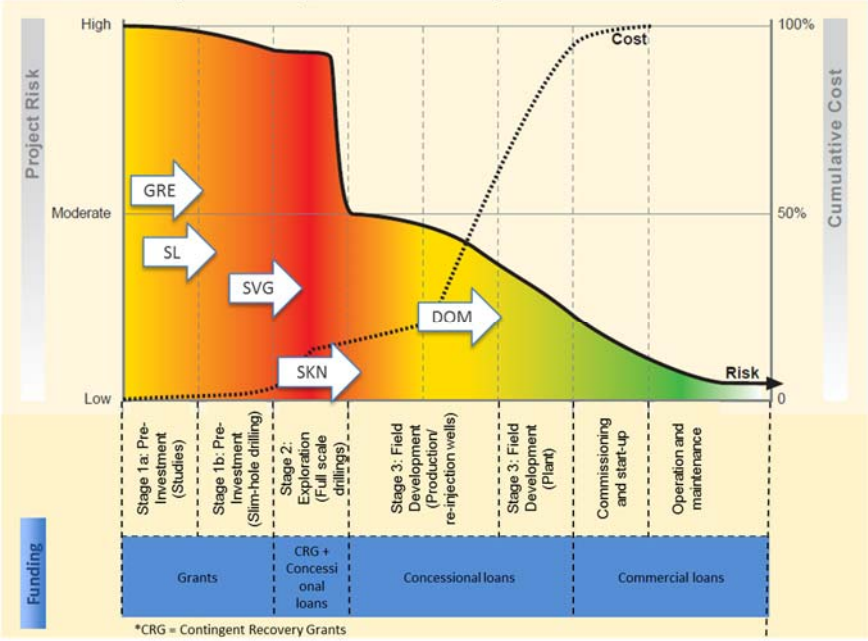
B.1. Description of Financial Elements of the Project / Programme

GE development is hindered by, (i) high capital costs; (ii) lack of access to credit at appropriate terms (e.g. affordable rates); (iii) inadequate regulatory and policy frameworks; (iv) limited fiscal space for governments to acquire new public debt; (v) lack of economies of scale; (vi) high resource risk in early exploration phases for GE and (vii) insufficient specialized technical skills like structuring public private partnerships (PPPs), negotiating PPP structures with private sector counterparts, project financing, financial modelling and analysis and managing and coordinating the implementation of GE projects.

These barriers will be addressed by the Programme through: (i) contingent grants for drilling exploration which will help reducing early exploration risk and unlocking investments in the subsequent stages of production drilling, field development and plant construction; (ii) concessional loans which will help to reduce funding costs lowering overall capital costs so as to reduce the cost of energy for final users; the implementation of GE projects through PPP structures which will help limit new public debt and bring in the private sector; and (iv) technical assistance to improve the regulatory framework and capacity building will provide the necessary base for successful implementation of GE projects.

The following figure shows the comparative level of progress in GE project development of the 5ECC. Not all countries are at the same stage of development. While GRE and SL, are in the early stages of pre-investment studies, SVG and SKN are in the exploratory drilling stage and DOM is ready to advance to the plant construction phase. Funding sources under this programme will be used and adjusted according to the countries' specific needs and program development stage

Figure 1: Stages of GE development for the 5ECC



Funding for exploration and production drilling in the form of contingent grants is required for SVG, GRE, SKN and SL. GCF will provide funding for drilling exploration and production drilling in SL and SKN where no other funding sources with the required risk profile (i.e. contingent grants) have been identified yet. CTF contingent grants (IDB-SEF was approved in October 2015 and funds are already available to be on-lent to GE projects) will be used to fund drilling exploration and production drilling in SVG and GRE.

Funding for field development and plant construction is required in DOM, the only island to have gone through exploration drilling already and to have proved its GE resources can provide enough steam for a 10MW plant. Hence, GCF funding (senior loans) is required for DOM to continue to the next stage of GE development: plant construction.

Once SVG and GRE have moved past exploration drilling and GCF funding (senior loans) will be used for field development/plant construction.

A breakdown of the GCF Funds requested for the Programme is provided in Table 1. More details with the breakdown of all assigned funding can be found in the attached Excel worksheet "GCF-Geothermal Development Facility-Budget and Timeline-IDB-April2016".

Table 1. Breakdown of the GCF Funds per output

Components	Outputs	GCF	CTF	JICA	DFID	IDB	GEF	CDB	Total
Component 1: GeoSmart Facility	*Output 1.1: Exploration drilling*								**-**
	Slim holes				12				**12.00**
	Full size exploration wells	16	19.05		6				**41.05**
	Output 1.2: Production drilling								
	Production/reinjection wells	28.5		19		9.5			**57.00**
	Output 1.3: Power plant, Steam gathering	31.5		21		10.5		10	**73.00**
Component 2: Regulatory framework, institutional strengthening, capacity building	Output 2.1: Regulatory framework	3				0.4	1.005	0	**4.405**
	Output 2.2: Institutional strengthening, capacity building	1		1		0.1	0.913		**3.013**
Total		**80**	**19.05**	**41**	**18**	**20.5**	**1.918**	**10**	**190.468**

Table 2. Breakdown of the GCF Funds per country

Description		**SVG**	**GRE**	**SKN**	**DOM**	**SL**	**CDB Capacity Building**	**TOTAL**
IADB	Loan	6.883	2.450	2.450	6.067	2.150		20.000
	Grant	0.200	-	0.200	-	-	0.100	0.500
GCF	Loan	20.650	7.350	7.350	18.200	6.450		60.000
	Contingent Grant	-	-	8.000	-	8.000		16.000
	Grant	0.500	0.500	1.000	0.500	0.500	1.000	4.000
JICA	Loan	13.767	4.900	4.900	12.133	4.300		40.000
	Grant	0.500	0.500	-	-	-		1.000
DFID	Grant	6.000	6.000	-	-	6.000		18.000
CTF	Loan	-	-	-	-	-		-

	Contingent Grant	9.525	9.525	-	-	-		19.050
CDB	Loan	-	-	-	10.000	-		10.000
	Grant	-	-	-	-	-		-
GEF	Loan	-	-	-	-	-		-
	Grant	1.005	0.913	-	-	-		1.918
TOTAL		**59.030**	**32.138**	**23.900**	**46.900**	**27.400**	**1.100**	**190.468**

B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing[2]
(a) Total project financing	**(a) = (b) + (c)**	190.468	million USD ($)		
(b) Requested GCF amount	(i) Senior Loans (ii) Subordinated Loans (iii) Equity (iv) Guarantees (v) Reimbursable Grants * (vi) Grants **	60 - - - 16 4.0	million USD ($) Options Options Options Options million USD ($)	20 years	0.75%
	* These are essentially *Contingent grants* of (USD16 million) which are required to cover the high risk stage of exploration of GE resources. These grants are essential to trigger the investments in GE. These grants would become a loan in case a successful GE resource is obtained after exploring and certified by a professional third party firm. After exploratory drilling and during the testing of the wells (production and/or reinjection test), a consulting firm will be hired to conduct the analysis of well testing results and to certify final electrical output in MWe "under the 'well-head' actually achieved by the well(s). ** USD4 million of grants will also be required to revise the regulatory framework for PPP and GE and to provide capacity building to CDB.				
	Total requested (i+ii+iii+iv+v+vi)	80	million USD ($)		

	Financial Instrument	Amount	Currency	Name of Institution	Tenor	Pricing	Seniority

[2] Pricing is to CDB, the programme Borrower

(c) Co-financing	Senior Loans	20	million USD ($)	IDB	22 years	LIBOR	pari passu
	Reimbursable Grants	19.05	million USD ($)	IDB-CTF[3]	30 years	0.75%	pari passu
	Senior Loans	40	million USD ($)	JICA	40 years	0.55%	pari passu
	Senior Loans	10	million USD ($)	CDB	20 years	2.97%[8]	pari passu
	Grant	1.918	million USD ($)	GEF[4]			
	Grant	0.5	million USD ($)	IDB[5]			
	Grant	1	million USD ($)	JICA[6]			
	Grant	18	million USD ($)	DFID[7]			
	Lead financing institution: IDB for the GCF, CTF and GEF.						

B.3. Fee Arrangement

The requested Accredited Entity Fee is eight per cent (8%) of the total amount committed by GCF to this Progremme, subject to finalization of the AMA and FAA between the two parties. The GCF interim policy on fees indicates the cap is eight per cent (8%) of the GCF funding for {medium} scale public sector projects/programmes.

B.4. Financial Market Overview (if applicable)

[3] The CTF Trust Fund Committee endorsed in June 26, 2014 the scaling up of the Dedicated Private Sector Program (DPSP) I, utility-scale RE with a focus on GE. US$19.05 million DPSP were approved in tandem and as part of the IDB-SEF loan in October 2015.
[4] CEO Endorsement was obtained on September 16th, 2015, so that US$1,917,808 will be available for the programme (US$1,004,566 for SVG, and US$913,242 for GRE). These resources were approved in tandem and as part of the IDB-SEF loan in October 2015.
[5] IDB technical assistance in kind to be provided directly to beneficiary countries
[6] JICA technical assistance in kind to be provided directly to beneficiary countries
[7] The Department for International Development (DFID) has approved grant resources to be provided directly to the governments of SL, SVG and GRE.
[8] As of January 2016

The countries Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, St Kitts-Nevis, St Lucia, and St Vincent and the Grenadines have constituted a monetary union, termed the Eastern Caribbean Currency Union (ECCU). These eight countries share a common central bank and a common currency.

The Eastern Caribbean Central Bank performs an opinion survey with commercial banks on conditions in the ECCU (the latest available covers the period July to December 2013). Expectations are an overall tightening of lending terms and conditions, based on sluggish economic conditions and percentage of non-performing loans to total loans and the creditworthiness of customers. In Grenada, Non-performing loans reached 14.6 percent of total loans as of end-2014, up from 13.8 percent in 2013. Because of this banks have reduced credit supply, resulting in a 5.1% contraction in 2014.

Credit conditions are reflected in high interest rates from the commercial banks with an average prime rate of 14% in the ECCU.

Table 3. Selected Commercial Bank Interest

(Sept. 2014)

Country	Prime Rate	Average Weighted Lending Rate	Average Weighted Deposit Rate	Mortgage Rates (Range)	Interbank Rate
DOM	10.00	8.76	2.61	6:75 – 12:50	
GRE	10.00	9.18	2.25	6:99 - 12:50	
SKN	14.00	8.69	2.56	5:50 - 13:00	
SL	13.00	8.45	2.64	6:00 – 14:00	
SVG	11.00	9.35	2.59	7:00 - 14:00	
ECCU	14.00	8.96	2.62	5:50 - 15:00	6.13

Source: Eastern Caribbean Central Bank

ECCU countries have high debt to GDP ratios, increasing the cost of finance and creating difficulty to access international capital markets.

Grenada public debt has peaked in 2013 reaching approximately 107.5% of the GDP. To restore debt sustainability the Government has undertaken a debt restructuration process which initiated at the end of 2014.

Saint Vincent and the Grenadines debt-to-GDP ratio increased by about 15 percent of GDP over 2008-2013, reaching 74 percent of GDP in 2013. This ratio is expected to continue to increase until 2017. In December 2014, a strong climatic event, causing flooding and massive economic losses reaching 15% of the GDP has further exacerbated the country's economic conditions on top of contraction from the global slowdown, increase in commodities prices as well as two previous climatic events in 2010 and 2011.

St. Kitts and Nevis high public debt-to-GDP ratio of 159.3% in 2010 fell significantly to 103.1 percent at the end of 2013, after the requirement in 2012 to restructure the sovereign debt and an event of payments default on government debt. The economy has started to recover in 2013 with a positive growth of 3.8% sustained in 2014.

St. Lucia economy is starting to recover after a recession in 2012 and an almost zero growth in 2013. The tourism sector is contributing strongly to this recovery and in 2014 GDP growth reached 0.5%. Debt-to-GDP ratio has risen and reached almost 80% in 2014.[9]

In 2015 the tropical storm Erika hit Dominica resulting in loss of life and significant economic damage estimated to have reach 96% of the GDP further exacerbating the fiscal and economic situation of the island. Debt-to-GDP ratio almost reached 80% in 2014.[10]

The economic and fiscal situation in the ECCU makes access to international capital market costly and the development of renewable energy projects such as GE difficult. The limited borrowing capacity as implied by the Debt-to-GDP ratios averaging 86% limits the governments' ability to invest in Sustainable Energy (SE), and particularly in GE, technologies thus perpetuating dependency on imported fossil fuels and its tightening effect on fiscal space.

Table 4: The weighted average interest rate by ECCU Governments:

Weighted Average Interest Rate by ECCU Governments as at 30 September 2014												
Issuing Country	91-Day T-Bill	180-Day T-Bill	365-Day T-Bill	2-Year Treasury Note	3-Year Treasury Note	4-Year Treasury Note	5-Year Treasury Note	6-Year Treasury Note	7-Year Treasury Note	8-Year Treasury Note	10-Year Treasury Note	15-Year Treasury Note
Antigua and Barbuda		6.00	6.50		6.75		7.32		7.50		7.75	
Dominica	1.24						6.99					
Grenada	6.00		6.00									
Saint Lucia	2.55	4.95		4.50		6.00	6.61	7.10	7.00	7.30	7.36	7.95
St Vincent and the Grenadines	1.77				5.25				7.74		7.40	

Source: Eastern Caribbean Central Bank

To overcome the barrier of high capital cost external support is necessary, in particular climate finance, combined with private financing and government funding. Hence, programme funds for GE projects will be made available to PPPs. The access to concessional financing from the GCF and other co-financiers of the programme will crowd in private sector capital to develop and implement GE initiatives supported through the GeoSmart Initiative.

[9] Source: IMF
[10] Source: IMF

C.1. Strategic Context

The independent ECC, DOM, GRE, SKN, SL and SVG participating in the Sustainable Energy Facility for the Eastern Caribbean ("The programme), are small island developing states with small and isolated electricity markets. The fact that these countries have small and isolated grids, lack the scale necessary to import cheaper and cleaner fossil fuels, such as natural gas, and have not yet fully developed their RE endowments, makes them dependent on costly imported liquid fossil fuels for electricity generation and results in high electricity costs.

Electricity tariffs in the ECC are indexed to fuel prices, or include a fuel surcharge with a direct pass through to end consumers. Hence, customers often see high electricity tariffs and high volatility in their monthly bills. In 2013, the average electricity tariff was US$0.39/kWh (with lower oil prices of US$70/barrel the tariff is estimated at US$0.33/kWh). By comparison, in the State of Florida in the United States (US), the average tariff was US$0.11/kWh. On average, in 2014 the fuel cost represented 53% of the total cost to end users.

Fiscal implications of liquid fossil fuel dependency. Ever since the first oil shock of 1973, oil dependence has become a heavy burden on the ECC economies. High electricity prices both hinder economic growth, and a high public sector energy bill drains public resources that could be used to provide more social services. Governments in the region face fiscal constraints partly due to their fossil fuel import bills. As presented in Table 5 oil imports as a percentage of Gross Domestic Product (GDP) exceed 7% for all ECC. Limited borrowing capacity as implied by the Debt-to-GDP ratios averaging 86% limits the governments' ability to invest in SE technologies thus perpetuating dependency on imported fossil fuels and its tightening effect on fiscal space.

Table 5. Key Information on the Energy Sector in the Eastern Caribbean

Country/ Island	Average Fuel Cost (US$/kWh sold) (2014)	Oil Imports as a % of GDP	Fossil Fuel Imports (US$ Million)	Debt to GDP ratio	Fossil fuel used for electricity generation
DOM	0.18	7% (2012)	41.5 (2012)	73.7% (2013)	75%
GRE	0.21	10% (2012)	101.1 (2012)	105.5% (2014)	41%
St. Kitts		9% (2010)	22.6 (2010)	80.0% (2015)	59%
Nevis					
SL	0.18	9% (2011)	116 (2011)	84.8% (2013)	100%
SVG	0.20 (2013)	11% (2011)	91 (2011)	74.7% (2013)	34%

Sources: World Bank – World Development Indicators; CARILEC for DOMLEC (2014), Financial Statements and CARILEC for GRENLEC (2014), CARILEC for LUCELEC (2014); Financial Statistics provided by the General Manager of VINLEC in December 2014; Email from General Manager of NEVLEC on 5 November 2014; Farrell Cartwright (Nevis Geothermal Project and Power Take-off Presentation 2012); CARILEC and Request for Proposal Renewable Energy Infusion Study 2013 for SKELEC

Lessons learned from international experience. Among RE solutions, GE development in particular necessitates significant public sector support to move forward. The factors that enabled GE development in countries such as El Salvador, Costa Rica, Nicaragua, Kenya, US, Iceland and Guadaloupe were analyzed and lessons were extracted to as part of the design of the programme. The main factors are: (i) the existence of high quality GE resources; (ii) availability of grant support and risk mitigation mechanisms for exploratory activities; (iii) strong government commitment to develop GE; (iv) an enabling legal and regulatory framework that sets incentives to develop RE technologies and provides clear rules for the development of geothermal resources; and (v) development of early geothermal projects by government-owned agencies with support of international donors.

C.2. Project / Programme Objective against Baseline

The Sustainable Energy Facility for the Eastern Caribbean regional programme proposed to the GCF aims to address the financial barriers which GE encounter in DOM, GRE, SKN, SL and SVG and to provide institutional strengthening and capacity building to the governments of these three Small Island States and to the CDB to develop GE.

The proposed GCF regional programme will be part of IDB-SEF which aims to address barriers for EE and RE, including GE, in the six ECC (A&B, DOM, SL, GRE, SKN, and SVG). However the IDB's request of funding from the GCF is only for DOM, GRE, SKN, SL and SVG.

Baseline Scenario. Until now the ECC have not used a coordinated approach for GE project development. This resulted in very different project development stages in each country (e.g. some countries have only done surface studies, while others have already finished exploratory drillings) and difficult access to finance, mainly due to lack of economies of scale. There were some uncoordinated, nevertheless important, efforts to promote GE, with partial funding for the early stage studies and exploratory drilling.

Fossil fuel based power generation units in the ECC have been in operation on average for over 13 years, power service is reliable, the ECC have almost reached universal electricity access and in general, electricity tariffs reflect the full cost of service. There are no fossil fuel sources available domestically in any of the ECC. Although Independent Power Producers (IPP) are allowed to generate electricity to sell to the utility, the only RE IPP in operation is the Nevis wind farm with 2.2MW of installed capacity. Utilities have relatively small customer bases, which do not allow for larger and more cost-effective power generation plants that use other fuels. The emission baseline of electricity generation in the ECC is 779,005 tCO_2/a, see Table 6.

Table 6. Key Information about Power Generation in the 5ECC

Country/ Island	Utility	Govern. Ownership (%)	Peak Demand (MW)	Installed Capacity (MW)	Energy generated (MWh/a)	Generation from Fuel Oil/ Diesel (%)	GHG emissions (tCO2/a)	Tariff (US$/kWh)	
								2013	2014
DOM	DOMLEC	21%	16.8	26.7	103,018	75	76,320	0.41	
GRE	GRENLEC	21.6%	29.2	48.6	199,909	99	151.431	0.40	0.37
St. Kitts	SKELEC	100%	24.0	43.0	147,168	100	111,480	0.35	0.32
Nevis	NEVLEC	100%	9.3	13.9	55,632	85	42,141	0.37	0.32
SL	LUCELEC	45.4%	59.7	86.2	366,080	100	290,047	0.37	
SVG	VINLEC	100%	25.7	51.4	142,029	80	107,587	0.36	0.34

SE potential. All of the 5ECC have available SE resources that could offset liquid fossil fuel generation and hence create financial savings. SE means economically viable RE and EE projects that displace fossil fuel-based electricity.

Table 7 shows the estimated investment requirements for GE only.

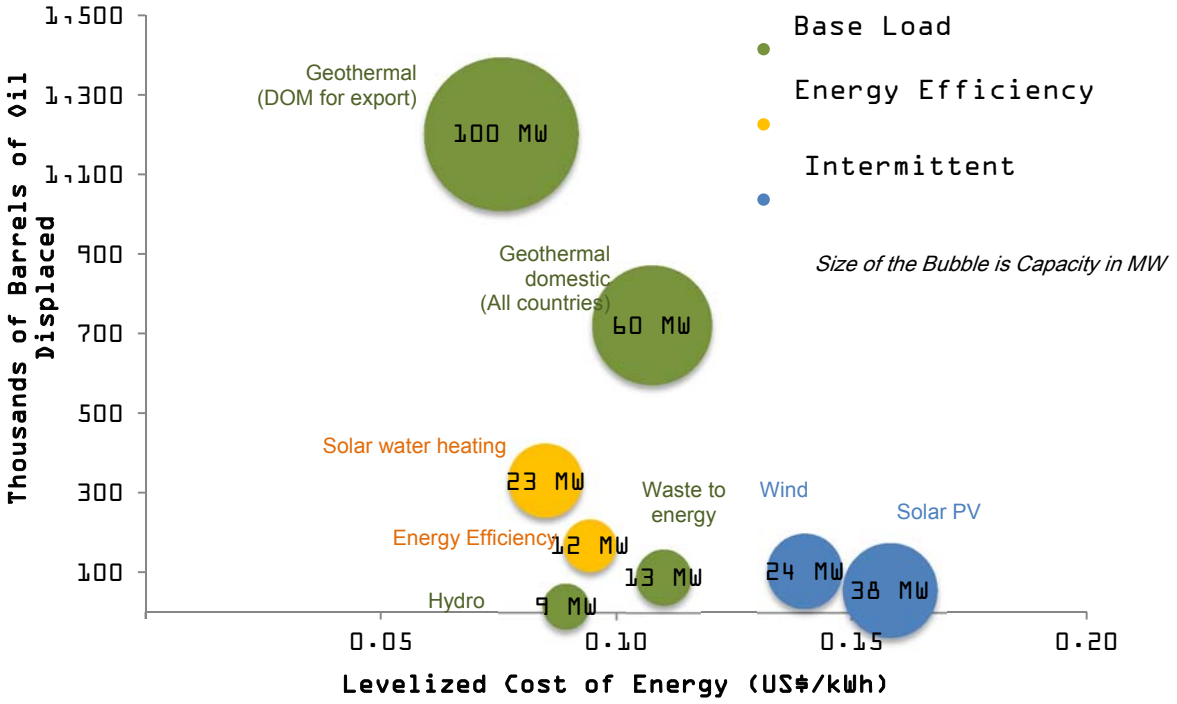
Table 7: Estimated total investment required for GE in the 5ECC (in US$ Million)

Country/Island	Stage 1a: Pre-Investment	Stage 1b: Pre-investment		Stage 2: Exploration		Stage 3: Field Development				T&D	Installed capacity (MW)	Total
	(Studies)	Slim hole/ wells	Cost (MUS$)	Full scale wells	Cost (MUS$)	Production /re-injection wells	Cost (MUS$)	Cost steam gathering system (MUS$)	Total cost Power Plant (MUS$)			
DOM	(done)	(done)	(done)	(done)	(done)	(done)	7	15	30	15	**10**	**67**
SVG	3G		(skip)[11]	2	14	3	21	15	30	16.3	**10**	**96.3**
GRE	3G	2	6	2	14	3	21	15	30	16.3	**10**	**102.3**
SL	(done)	2	6	2	14	6	42	25	56	16.3	**20**	**159.3**
SKN	3G		(done)	2	14	3	21	15	30	12.1	**10**	**92.1**
Total	**3G**	**4**	**12**	**8**	**56**	**15**	**112**	**85**	**176**	**76.0**	**60**	**517.0**

The following figure shows the technologies that can be developed to seize the region's SE potential. The figure shows the amount of barrels of oil that each technology would displace (vertical axis) and their all-in cost or Levelized Cost of Energy (LCOE) (horizontal axis). The size of the bubbles shows the potential of the technology in terms of MW of potential installed capacity and the color indicates whether it is baseload, intermittent energy or EE. The graph shows that GE, a baseload energy with more than 90% capacity factor, the lowest LCOE (around US$0.10/kWh), the largest potential displacement of oil barrels (more than 2 million barrels) and the largest estimated installed capacity potential (over 160MW), is the largest available RE resource for the ECC with the possibility in some cases of exporting power to neighboring islands via undersea cables.

[11] From 2013 to 2014 private developers in SVG conducted significant surface exploration activities that support the argument that the Soufriere volcano hosts a >200 °C geothermal reservoir. Slimholes are therefore not deemed necessary.

Figure 2. SE Alternatives for the ECC[12]



Key barriers for GE development. The potential for RE, however, remains unrealized in the ECC. Apart from some hydro power (16-20% of gross generation in SVG in 2013), electric utilities in these countries use diesel or fuel oil generators. GE development suffers from special barriers that require participation of both the governments and the private sector through PPP arrangements. The main barriers to GE in the ECC are: (i) the very high, marginally economical cost of undertaking projects small enough to sell all their power to the local utilities; (ii) lack of access to capital at appropriate terms and limited borrowing capacity of the region's governments; (iii) inadequate legislative, regulatory and policy frameworks that will facilitate the licensing, permitting or creation of geothermal power sales agreements in the islands; (iv) limited fiscal space for governments to acquire new public debt; (v) lack of economies of scale given the relative small size and isolation of electricity markets in the ECC; and (vi) high uncertainty during early development stages that the private sector is unable to bear due to RE resource risk and finally (vii) insufficient specialized technical skills like structuring public private partnerships, negotiating PPP structures with private sector counterparts, project financing, financial modelling and analysis and managing and coordinating the implementation of geothermal projects.

Expected Impact. The programme is expected to result in a reduction of GHG emissions of approximately 313,421 TCO_2 per year and in displacement of liquid fossil fuel based electricity generation which is costlier than GE generation.

[12] The information to prepare Figure 1 was obtained from the report Strategy for Developing Geothermal Potential through Public-Private Partnerships in the Eastern Caribbean

Main Goal. By promoting the development of GE the programme aims to significantly reduce the GHG emissions of the energy sector in the 5ECC (GRE, SVG and SKN), the region's dependency on liquid fossil fuels and the cost of power generation and electricity tariffs.

The programme anticipates the following five main **impacts in the 5ECC**:

1. 60MW of Geothermal power generation capacity installed in projects facilitated or financed at some stage;
2. GHG Emission Reductions of 313,421 TCO2e/year and 9,402,621 TCO2e during the lifetime of the programme;
3. Reduction of 722 Thousand barrels of oil imported for electricity generation;
4. USD 50 million reduced spending on Oil imports (at a fuel price[13] of US$70 per barrel);
5. Reduction of the average electricity generation cost and, if generation cost reductions are passed on to customers, this should lead to an average decrease in tariffs from US$0.35/kWh in 2015 (at a fuel price of US$70 per barrel) to US$0.28/kWh.

C.3. Project / Programme Description

The programme will support the 5ECC to overcome the barriers mentioned above by providing a line of credit for the Caribbean Development IDB (CDB) to finance commercially and economically viable GE projects, and grants to support the strengthening of legal and regulatory frameworks and capacity for developing GE potential. This program will provide adequate financing mechanisms to unlock investments in GE and mobilize private sector capital and expertise required for developing GE projects in the region. The programme will provide concessional financing that will crowd in private sector capital to develop and implement GE initiatives.

The proposed GCF regional programme will be part of IDB's Sustainable Energy Facility for the Eastern Caribbean (to differentiate from the GCF funded part, hereinafter will be called IDB-SEF) which aims to address barriers for EE and RE, including GE, in the six ECC (including A&B which does not have GE potential). However the IDB's request of funding from the GCF is only for DOM, GRE, SKN, SL and SVG.

The proposed regional programme for the GCF includes the following components:

Component 1: GeoSmart Initiative: Since the risk levels involved in GE projects are inherent to each of the development stages, the programme will offer financial instruments tailored for each stage to enable projects to advance to subsequent stages through to plant construction. Funds for GE projects will be made available by the CDB through its GeoSmart Initiative, to address the specific challenges that GE development faces given its risk profile. The GeoSmart Initiative will provide a range of financial support to public sector actors and/or PPP, customized for each stage of geothermal development.

Output 1.1: Exploration Drilling

The following pre-investment activities necessary to unlock investment in subsequent stages will be supported with contingent recovery grants and grants:

- Drilling of exploration wells
- Feasibility studies: Based on the results of exploration drilling the geothermal resource models will be adapted, and probability for successful production drilling will be estimated. The feasibility study will provide a "go" or "no go" decision to the developers. Environmental and Social Impact Assessments (ESIA) will be required prior to production drilling, authorization to move to this next phase will be provided based on the results of the ESIA.

Output 1.2: Production Drilling

[13] Projection of the Energy Information Agency (EIA) of United States of America forecasts that in four years from today, the time would take in average to have geothermal plant in operation; the fuel price of oil would be around US$ 70 per barrel.

The following activities in field development will be supported with concessional loans:

- Drilling of production wells
- Drilling of reinjection wells[14]

Output 1.3: Power plant, Steam gathering

The following activities in field and power plant development will be supported with concessional loans:

- Engineering and construction steam gathering system
- Engineering and construction of power plants
- Construction of substations and transmission lines

Component 2: Regulatory framework, institutional strengthening and capacity building: Technical assistance to the CDB, and to the 5ECC, including their ministries responsible for energy and electric utilities will be provided.

Output 2.1: Regulatory framework

Technical assistance will be provided to support for the 5ECC in developing an effective legal, policy and regulatory framework for the implementation of GE projects;

Output 2.2: Institutional strengthening and capacity building

The following capacity building and technical assistance activities will be provided to the CDB in order to strengthen its capacity to implement the programme:

1. developing staff capacity to evaluate and execute sub-loans
2. consulting services to provide specific skills and advisory services as and when required for sub-project preparation;
3. drafting of legal documents (i.e. loan contracts for GE sub-loans);

The following capacity building activities will be provided to DOM, SVG, GRE SKN, and SL:

4. strengthening their technical, institutional, environmental and regulatory capacity;
5. transaction advisory support to structure projects and negotiate with private partners;
6. providing opportunities for training to acquire the necessary skills to enable GE development and project execution

C.4. Background Information on Project / Programme Sponsor

CDB is the executing entity and the borrower of this Programme. The Programme Sponsor will be the PPP structured in each of the participating countries as described in this section.

The disbursements will occur in the following manner: i) from GCF to IDB. ii) from IDB to CDB (for all funding resources managed through IDB: CTF, GCF, GEF). IDB will document all the disbursements following IDB fiduciary policies which allow IDB to provide an advancement of funds to the CDB. When 70% of the funds provided are used and justified by CDB, CDB can then request another tranche or CDB can use their own funds; in that IDB will recognize and reimburse those funds. And iii) the disbursement from CDB to PPPs, which will be based on specific needs for the projects. The disbursement will be done in a similar way as from IDB to CDB, that is, advance of funds and/or recognition and reimbursement of resources in case the PPP has used its own funds.

In all five participating countries, GE projects will be structured as PPPs, bringing together the public and private sectors with the common goal of developing GE. The PPP will be majority owned by the private sector company/ies which will bring the managerial and operational expertise in geothermal. The planned structure for the five countries is presented below.

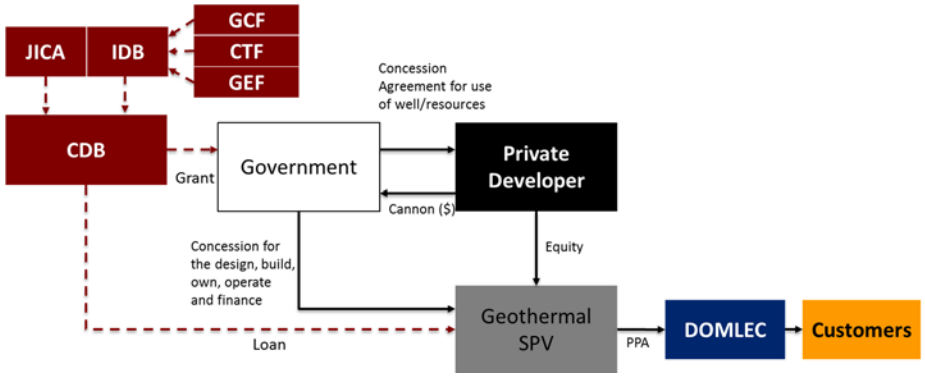
[14] Dry wells, if available, might be use for reinjection. The requirement of drilling of reinjection well will be done on a case-by-case basis.

The project team has discussed with the developers and the authorities in the five countries that in addition to having a PPP structured for the geothermal power production, the PPPs would have to procure all goods and services following CDB procurement rules which are homologous to IDB procurement policies. In essence all goods and services using funding from IDB, CDB, JICA, CTF and GCF will be procured through a competitive and transparent process.

In **DOM**, the Government has advanced considerably in developing its geothermal resources compared to other ECC. It confirmed the geothermal resource potential of the Wotten Waven-Trafalgar-Laudat geothermal field through exploratory and production well drilling and has drilled a commercial production well with generation capacity of 11MW. The cost of exploratory drilling alone was US$11.7 million, and was financed by the Government (44 percent), Agence Francaise de Developpement (AFD) (40 percent), and the European Union (17 percent).

The following figure presents a possible project structure in DOM, under which the Government would issue a resource agreement that authorizes a Private Developer to exploit the existing GE production well as well as explore and exploit the geothermal resources available as required to maintain production levels. The Government and the private Developer (which could also include DOMLEC) would form an SPV that would build, operate, and transfer (BOT) the GE and sell the power to DOMLEC through a Power Purchase agreement (PPA). The government is currently analyzing the best possible structures and options to develop GE, therefore the proposed structure is only indicative.

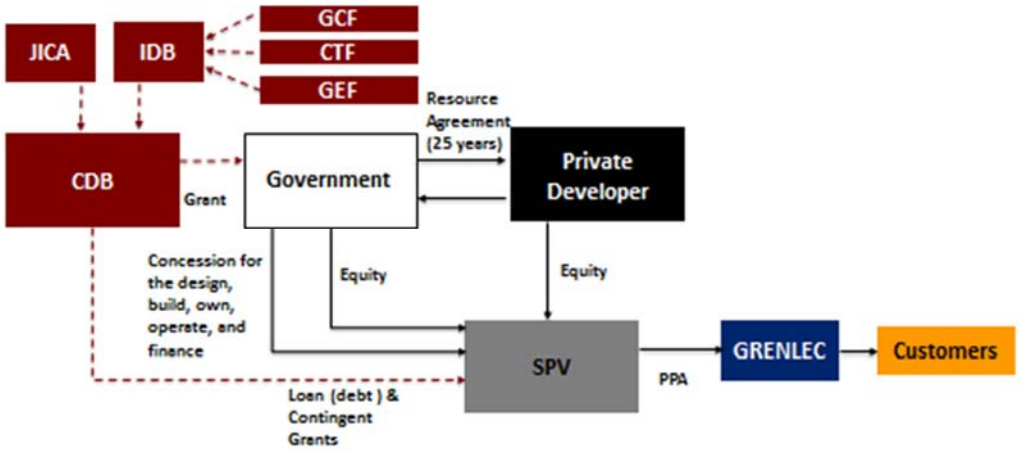
Figure 3: Possible Structure for the Geothermal Project in Dominica



In **GRE** geothermal resources have not been studied extensively. Preliminary surface exploration suggests that Grenada's geothermal resource exceeds 30MW but it has yet to be confirmed. The Government and GRENLEC (a privately owned and vertically-integrated utility) expressed interest in working together to explore the geothermal resource and develop a 10MW geothermal plant. The Government restarted exploration works in 2014 by conducting surface study with the support of the Government of New Zealand. The result of the study indicates the presence of a considerable high-temperature resource and recommends additional geophysical work to refine the boundaries of the field and composition of the reservoir.

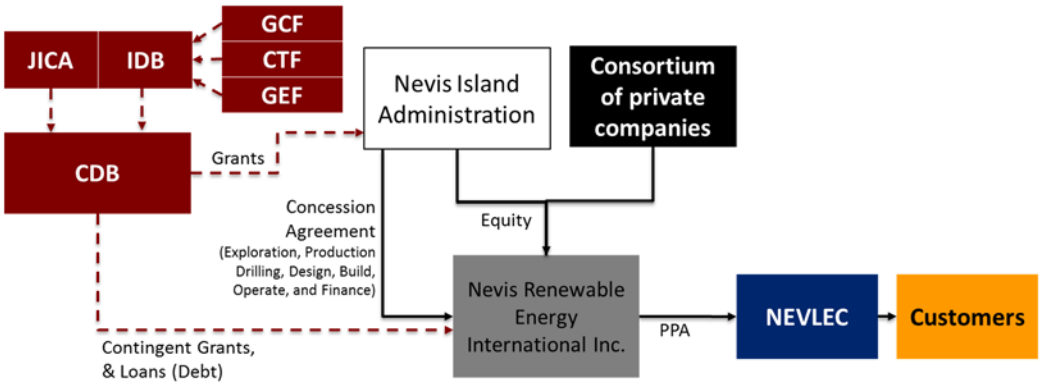
The following figure presents a possible project structure in GRE, under which the Government would issue a resource agreement that authorizes a Private Developer to explore and exploit the geothermal resource. The Government and the private Developer (which could also include GRENLEC) would form an SPV that would build, operate, and transfer (BOT) the GE and sell the power to GRENLEC through a Power Purchase agreement (PPA). The government is currently analyzing the best possible structures and options to develop GE, therefore the proposed structure is only indicative.

Figure 4. Planned Structure for the Geothermal Project in Grenada



In the case of **SKN**, with support of the US State Department, the firm Deloite was hired to assist the Government of Nevis (Nevis Island Administration –NIA) to choose a geothermal partner and developed through a competitive process that would then partner with NIA to form a PPP. Through that competitive process a consortium form by two US based firms and a Nevis based firm were selected. GE potential exists in Nevis and the Nevis Island Administration (NIA) has made significant progress towards developing the island's geothermal resources by drilling three slim holes. In September 2014, NIA signed a concession contract with Nevis Renewable Energy International Inc. ('Nevis International') to begin production drilling and construction of a power plant to serve Nevis. In early 2016, a 25 year Power Purchase Agreement was signed between NEVLEC and the developer for the purchase of 9MW of electricity on a take-or-pay basis. It is envisaged that the project would meet Nevis' demand for power and excess electricity could be sold to SKELEC on St Kitts via a 3 mile subsea cable. The following figure presents a possible project structure in Nevis.

Figure 5. Possible Structure for the Geothermal Project in Nevis

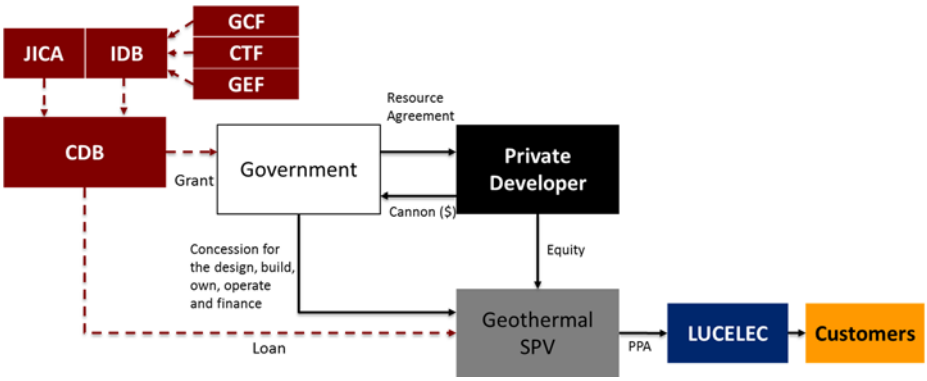


In SL, the Government is in the early stages of geothermal development despite extensive exploration of its geothermal resources. SL has an estimated geothermal potential of 75MW. If developed, this geothermal resource could meet all baseload demand for electricity in Saint Lucia, which is about 35MW. In 2014, the Government restarted efforts to

explore its geothermal resources with US$2.8 million in grants from the World Bank and the New Zealand Government. Currently, the Government is in advanced conversations with Ormat Technologies for the development of a power plant at Soufriere

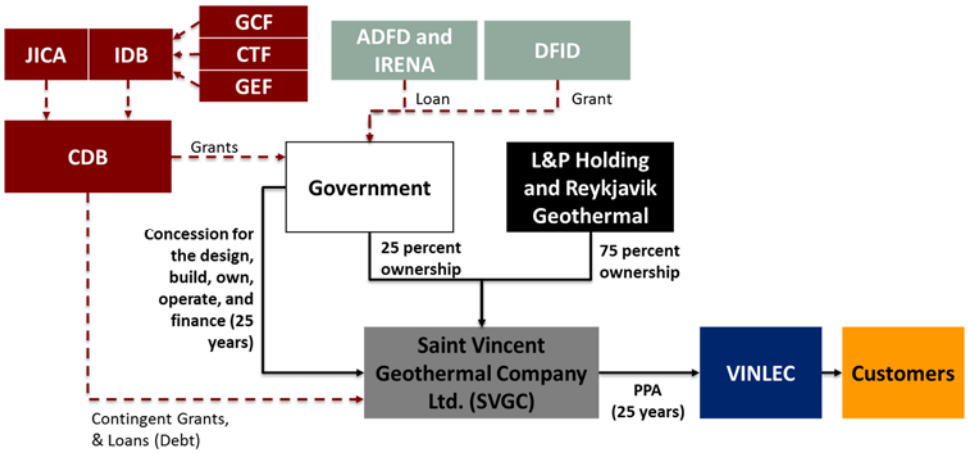
The following figure presents a possible project structure in SLU, under which the Government would issue a resource agreement that authorizes a Private Developer to explore and exploit the geothermal resource. The Government and the private Developer (which could also include LUCELEC) would form an SPV that would build, operate, and transfer (BOT) the GE and sell the power to LUCELEC through a Power Purchase agreement (PPA).

Figure 6: Possible Structure for the Geothermal Project in Saint Lucia



In **SVG**, the Government plans to develop the GE plant on a PPP basis through a special-purpose company that will be owned by the Government (25 percent) and the private sector (75 percent). The SPV is Saint Vincent Geothermal Company Limited (SVCL). The private sector companies that will own 75 percent of the special-purpose company are: Light and Power Holdings (also known as Emera Caribbean), and Reykjavik Geothermal, a geothermal development company based in Iceland. Light and Power Holdings, 80.3 percent of which is owned by the Canadian based energy company Emera, will be the project's lead and will also lead the financing. Reykjavik Geothermal will be the project's technical lead. In addition to the equity contributions provided by the Government, Emera Caribbean, and Reykjavik Geothermal, the project will also be financed with debt. In January 2015, the Government was granted a US$15 million loan with a 2 percent interest rate, by the Abu Dhabi Fund for Development (ADFD) and the International Renewable Energy Agency (IRENA) for the development of the geothermal plant. Also, the Department for International Development (DFID) will provide grants to support exploratory drilling. The SPV would have a 25 year concession to design, build, own, operate, and finance the geothermal generation plant and would sell electricity to VINLEC under a 25 year PPA. The following figure presents the planned project structure in SVG.

Figure 7. Planned Structure for the Geothermal Project in St. Vincent y Grenadines



In all five countries, in case the PPP decides not to go forward with the subsequent stage of development even though the exploration phase supported with contingent grant has been positive, the Government would have the authority to offer the geothermal license to another developer and the government would have to start the process of engaging with an new geothermal partner again. As the disbursement period of the project is 8 years, there will be enough time to restructure the sub project in case is needed and choose a new developer. The new developer would then have to absorb the financing incurred by the CTF and/or the GCF. In case, there is no PPP interested in developing the GE project during the lifetime of this project, the CTF and/or GCF funding will be assumed as grant and no repayment will occur. This scenario is unlikely to happen if the exploration is successful.

C.5. Market Overview (if applicable)

Eastern Caribbean power sector overview. All ECC except for SKN have one vertically integrated electricity utility, responsible for generation, transmission, and distribution of electricity. In SKN, two vertically integrated electricity utilities are responsible for generation, transmission, and distribution of electricity, one on the island of St Kitts and another on the island of Nevis. DOM, GRE, and SL have privately owned utilities while utilities in SVG and SKN are entirely state-owned (see Table 8).

Table 8: Market Structure of Electricity Sector in the 5ECC

Country	Utility	Jurisdiction	Government Ownership	Role	IPPs Allowed?
DOM	DOMLEC		21%	G, T, & D	Yes
GRE	GRENLEC		21.6%	G, T, & D	Yes
SKN	NEVLEC	Nevis	100%	G, T, & D	Yes
SKN	SKELEC	St Kitts	100%	G, T, & D	Yes
SL	LUCELEC		45.4%	G, T, & D	Yes
SVG	VINLEC		100%	G, T, & D	Yes

Note: G=generation, T=transmission, D=distribution

In the ECC, the economic regulatory frameworks of the electricity sectors, including the tariff setting mechanism, are established in the Electricity Supply Acts (ESAs). The exception to this is Nevis. In SKN, the electricity sectors in each island are governed by separate laws. The Electricity Ordinance of 1998 governs the electricity sector in Nevis. The Electricity Supply Act of 2011 governs the electricity sector in Saint Kitts.

Most of the 5ECC have cost-reflective tariffs (DOM, GRE, SL, SVG) ; for these countries the Program will result in less volatile and lower electricity prices. Less volatile electricity prices will allow consumers in these countries to better estimate their electricity expenditures and plan their electricity consumption more effectively.

In SVG, the Government has provided subsidies in a targeted manner. For example, the Government seems to provide subsidies to cover the fuel surcharge of low income households. There is not public information available to verify the details of subsidies offered, and whether these subsidies are offered continually or were an ad hoc response to mitigate the effects of the recession. However, despite of occasional subsidies to final consumers, in the past five years, VINLEC's financial statements show that the average tariff covers its cost of service. The only exception was 2014, when a subsidy was offered to consumers after extreme weather events affecting the population. In 2014, VINLEC offered a short term subsidy to cover a portion of the fuel surcharge to mitigate the effects of increased diesel costs. This increase in diesel costs was due to having its hydro plants out of use, as a result of the heavy rains of December 2013. There is also some information that some specific subsidies were offered in 2009 and in 2012.

For SKN, were tariffs are not cost-reflective, the Program will contribute to improve their operational performance and wane the need for subsidies. Since fuel costs make up the majority of operating expenses, a reduction in fuel costs, promoted by the Program, would reduce the operating costs incurred by utilities and improve their operational performance. In addition, the lower effective tariffs will make it more viable to pass on the full costs of service to the consumer (to charge cost-reflective tariffs). Hence, the Program will contribute to reduce the costs of generating electricity, and in doing so, to lower tariffs and make it more feasible to have cost reflective tariffs. Cost reflective tariffs, along with more cost-effective generation matrices, would in turn set stronger incentives for optimal consumption and would lead to the dismantling of subsidies.

C.6. Regulation, Taxation and Insurance

DOM

Policies in the energy sector
The Government's policies in the electricity sector aim to reduce energy prices, increase environmental sustainability, and reduce fossil fuel use. The Low Carbon Climate Resilient Strategy, adopted in 2012, sets out many of the Government's objectives for the energy sector—it envisions a "low-carbon, climate-resilient" development strategy. Specifically, it identifies the objectives of developing renewable energy projects and promoting energy efficiency and energy conservation programs.

Laws and regulations governing the electricity sector
The ESA establishes the institutional framework of the electricity sector as well as the rights and duties of the different bodies in the electricity sector including the procedure for licensing and monitoring utilities. The ESA creates the Independent Regulatory Commission ('the IRC'), which is responsible for setting tariffs, licensing service providers, and setting service standards. In addition, it sets the process for granting electricity licenses. The ESA also specifies that renewable resources must be included in Dominica's electricity generation expansion plans.

The regulation and governance of the sector is further developed through decisions made by the IRC. The IRC has issued several decisions that further develop the legal framework governing the sector. The most important decision issued by the IRC is the IRC's decision on Regulatory Policy and Procedure—Licensing Procedures. This decision sets out the license application process. It also provides DOMLEC an exclusive license for transmission and distribution, and states that there will be a single distribution license granted for the island. Another important decision is the IRC's decision on the Tariff Regime for Dominica Electricity Services Ltd. 2009/004/D ('the Tariff Regime') which establishes the tariff setting mechanism. The Tariff Regime sets a formula for determining tariffs that allows for DOMLEC to recover costs associated with generation from renewable energy and electricity purchased from IPPs.

A Geothermal Resources Development Bill (2013) was first developed in 2012 and has undergone a process of revisions since then. The Geothermal Bill is the final stages of review before it is ready to present to Parliament. The Geothermal Bill "provides for the regulation of geothermal resources with the objective of ensuring the sustainable development of the resource, and ensuring its allocation to the uses that are most economically beneficial to Dominica".

In particular, the Geothermal Bill:

- Establishes procedures for allocating geothermal resources in Dominica, including a 'competitive track', under which the Government tenders out a concession and awards it to the best bidder presenting the best option; and a 'negotiated track' for cases where there is no sufficient information for competition to work
- Creates a statutory board to advise the Minister responsible for energy (who in turn advises the Cabinet) on geothermal resource development
- Establishes an approach for securing approvals to develop geothermal projects.

GRE

Policies in the energy sector

The Energy Policy presents the Government's objectives of reducing electricity prices and increasing energy security. The Energy Policy prioritizes developing RE and reforming the national energy market to achieve its objectives. However, the Government has not yet implemented the measures called for in the Energy Policy.
The Energy Policy delineates the following actions:

- Establishing a National Sustainable Energy Office (NSEO) to pursue the objectives of the Energy Policy
- Creating a regulatory body for licensing, oversight, regulation, and rate setting for the electricity and transport sector (the Government envisages that the planned Eastern Caribbean Energy Regulatory Authority will fill this role)
- Formulating legislation and contracts consistent with a modern energy sector that would support the development of hydrocarbons and geothermal resources
- Setting the objective of RE sources providing 20 percent of all domestic energy used for electricity and transport by 2020—specifically targeting geothermal, wind energy, and solar water heaters.

To meet the RE target, the Energy Policy calls for various measures. They include providing fiscal incentives for RE: collecting and publishing data on energy production, energy consumption, and resource assessments; and developing local expertise for the installation and operation of RE technologies. For the last measure, the Energy Policy states that the Government will engage donors to join geothermal development programs that provide financing for technical assistance.

Laws and regulations governing the electricity sector

The ESA—which was passed in 1994 and amended in 1998, 2005, and 2013—governs electricity supply in Grenada. It grants GRENLEC an exclusive license to generate, transmit, distribute, and sell electricity until 2073 on all of the islands of Grenada. Any other party seeking to generate electricity in Grenada must do so with a sublicense granted by GRENLEC. The Government would need to amend the ESA to implement its plans of reducing the term of GRENLEC's license to a 30-year period, and allowing for competitive bidding in the generation segment.

The ESA establishes a clear tariff regime for GRENLEC. The ESA sets the tariff structure, and establishes electricity rates that GRENLEC can charge its customers. The ESA also presents a methodology that GRENLEC must use to adjust its tariffs. The current tariff structure only allows GRENLEC to recover the cost of service when generating with diesel or heavy fuel oil. The ESA does not establish a mechanism for GRENLEC to recover the costs of generating electricity with other fossil fuels or renewable energy. Therefore, if geothermal generation were introduced in Grenada, the Government would need to amend the tariff to allow for cost recovery.

One of the major challenges for geothermal development is the lack of legislation governing the development of geothermal resources. The Government, in collaboration with the Organization of American States (OAS), prepared the Geothermal Resources Development Bill ('the Geothermal Bill') and the Geothermal Resources Environmental and Planning Regulations ("the Geothermal Regulations'), which is intended to fill this gap.
If the Government passes the Geothermal Bill and the Geothermal Regulations, they would establish the regulatory framework for exploring, exploiting, and protecting Grenada's geothermal resources. The Geothermal Bill defines what a geothermal resource is, who owns it, and establishes the process for granting rights to explore and exploit geothermal resources. The Geothermal Bill defines two procedures for granting rights on geothermal resources; a negotiated track and a competitive track. The negotiated track assigns a developer a right to explore and exploit the resource, and is used when a geothermal resource is not proven and until GRENLEC's monopoly license expires. The competitive track awards a concession to develop a geothermal resource through a competitive bidding process. The competitive track is used when a geothermal resource is proven. The Geothermal Regulations also establish rules on how the environmental impact assessments must be carried out.

Saint Kitts

Policies in the Energy Sector
The Government prepared the Draft Energy Policy and the Draft Energy Action plan for the Federation. These documents present the Government's vision of a more affordable, reliable, and less polluting energy sectors in Saint Kitts and Nevis. However, the Government has not yet approved the Draft Energy Policy or the Draft Energy Action Plan.

The Draft Energy Policy includes the following objectives:

- Exploring alternative energy sources, particularly renewable energy, to decrease dependence on imported oil
- Interconnecting the electricity grids of Saint Kitts and Nevis, and interconnecting the Federation with other neighboring countries
- Improving the efficiency of power production, transmission, and distribution.

The Draft Energy Action Plan complements the Draft Energy Policy and defines steps for achieving these objectives. However, the actions identified in the Draft Energy Action Plan are vague and do not have timelines. The Energy Action Plan needs to be further developed to include specific actions and concrete timeframes for achieving the Government's policy objectives.

Laws and regulations governing the electricity sector
The Government developed the Electricity Supply Act of 2011 for the island of Saint Kitts. The ESA governs and establishes the structure of the electricity sector in Saint Kitts. It does so by vesting all of the Saint Kitts Electricity Department's assets and liabilities to SKELEC. The ESA also laid the legal framework to allow the Ministry of Housing to grant SKELEC an exclusive license to transmit, distribute, and supply electricity in Saint Kitts for twenty five years. In 2011, the Government granted SKELEC its license. The ESA allows IPPs to operate in Saint Kitts by obtaining a license from the Ministry of Housing. However, the ESA does not establish the process that IPPs should follow to obtain a license.

The ESA does not establish a tariff setting mechanism, but instead, stipulates that the Public Utilities Commission ('the PUC') is responsible for reviewing and setting tariffs. However, the PUC has yet to be appointed. The Governor General is responsible for setting tariffs and can adjust the tariff at his discretion by issuing regulations. These regulations must be approved by National Assembly to come into effect. The ESA does not establish a formula for calculating tariffs, does not set a minimum rate of return, and does not establish criteria that the National Assembly should use to evaluate proposed tariff adjustments.

Another key law governing the electricity sector is the Public Utilities Commission Act of 1992 ('the PUC Act'). The Government developed the PUC Act for the Federation. It mandates the establishment of the PUC to regulate the electricity sectors in Saint Kitts and Nevis. However, as mentioned previously, the PUC has not been appointed.

Nevis

Policies in the energy sector
The Government of SKN prepared the Draft Energy Policy and the Draft Energy Action plan for the Federation. These documents present the Government's vision of a more affordable, reliable, and less polluting energy sectors in Saint Kitts and Nevis. However, the Government has not yet approved the Draft Energy Policy or the Draft Energy Action Plan.
The Draft Energy Policy includes the following objectives:

- Exploring alternative energy sources, particularly renewable energy, to decrease dependence on imported oil
- Interconnecting the electricity grids of Saint Kitts and Nevis, and interconnecting the Federation with other neighboring countries
- Improving the efficiency of power production, transmission, and distribution.

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Plan needs to be further developed to include specific actions and concrete timeframes for achieving the Government's policy objectives.

Laws and regulations governing the electricity sector
The Electricity Ordinance governs the electricity sector in Nevis. It grants NEVLEC an exclusive license to transmit and distribute electricity. NEVLEC's license does not have an expiration date. The Electricity Ordinance does not establish a tariff setting mechanism, but mandates that fair and reasonable rates be used. The Public Utilities Commission ('the PUC) was given the authority of setting and adjusting tariffs. But since the PUC has not been appointed, NEVLEC sets its own tariffs.

In addition, the Electricity Ordinance allows for private individuals or companies to generate electricity for their own consumption from wind and solar in Nevis. The Electricity Ordinance also allows for IPPs to operate in the sector if they obtain a license from the Ministry of Housing, Public Works, Energy, and Public Utilities. However, the legislation does not establish a process for obtaining a license.

The legal and regulatory framework of the electricity sector is further developed by the Public Utilities Commission Act of 1992 ('the PUC Act') and the Geothermal Resources Development Ordinance of 2008. The Government developed the PUC Act for the Federation. It mandates the establishment of the PUC to regulate the electricity sectors in Saint Kitts and Nevis; however, as mentioned previously, the PUC has not been appointed. The Nevis Administration developed the Geothermal Resources Development Ordinance of 2008 ('the Geothermal Ordinance") for the island of Nevis. The Geothermal Ordinance defines what a geothermal resource is and establishes the legal framework for exploring and exploiting geothermal resources in Nevis. The Geothermal Ordinance also establishes the Geothermal Resources Advisory Committee, which is led by the Minister responsible for Natural Resources, to develop and implement renewable energy policies in Nevis.

SL

Policies in the Energy Sector
In June 2010, the Cabinet of Saint Lucia approved the National Energy Policy ('the Policy'). The Policy aims to use market forces to lower the cost of electricity by exploiting renewable energies and reducing Saint Lucia's dependence on imported oil. The Policy also aims to achieve higher energy security and "minimize negative environmental effects from the energy sector". The Policy proposes establishing a commission to regulate the electricity sector. The commission would be responsible for designing tariff the structure, setting tariff levels, monitoring standards on quality of service, and advising on issuing of licenses to IPPs. It would also establish and monitor the tendering processes for IPPs, and act as an arbitrator for disputes in the sector.

In its 2014 Budget Statement, the Government reaffirms its commitment to expanding the use of renewable energy in Saint Lucia. Specifically, the Government presents its plan for reforming the electricity sector and increasing the use of renewable energy. The 2014 Budget Statement includes the following objectives:

- Reforming the energy sector to reduce Saint Lucia's reliance on fossil fuels for generating electricity and reducing the cost of electricity to consumers
- Unbundling the generation segment and allowing IPPs to enter the renewable energy sector
- Producing 35 percent of total electricity generated from renewable sources by 2020

Laws and regulations governing the electricity sector
The most important law in Saint Lucia's electricity sector is the ESA of 1994, which was amended in 1996, 2001, 2006 and 2015. It lays out the structure of the sector and sets out the tariff-setting mechanism. It grants LUCELEC the exclusive right for the generation, transmission, and distribution of electricity from fossil fuels only until 2045 and allows for the licensing and regulation of the generation of electricity from RE sources. The ESA, and its amendments, establish the formula used to determine the tariffs that LUCELEC charges its customers. The goal of the tariff formula is to cover the reasonable cost of providing the service while allowing a fair return on the capital invested in the business.

The Government, in collaboration with the Organization of American States, prepared the Geothermal Resources Development Bill ('the Geothermal Bill') which is intended to govern the development of geothermal resources. This Bill will establish the legal framework needed to develop geothermal resources by removing geothermal from mineral and water acts, establishing the rules of obtaining permits, licenses, and concessions, and establishing the Geothermal Resource Authority.

SVG

Policies in the Energy Sector
The Energy Policy and the Energy Action Plan present the Government's vision of a more economical, reliable, and less polluting energy sector. However, the Government has not yet implemented the measures called for in the Energy Policy and Energy Action Plan.

The Energy Policy includes the following guiding principles for the energy sector:

- Providing clean, reliable, and affordable energy to consumers
- Reducing fossil fuel use through expansion of renewable energy and energy efficiency technology
- Liberalizing the energy market and encouraging private sector participation in energy development and energy services
- Setting electricity tariffs that reflect the full cost of service, while providing minimal subsidies for energy services to the lowest income households.

The Energy Action Plan complements the Policy and defines specific targets for the period 2009 to 2030, including the following:

- Produce 30 percent of electricity from renewable resources (including hydroelectric power) by 2015 and 60 percent by 2020
- Reduce the projected increase in peak demand by 5 percent by 2015 and 10 percent by 2020
- Reduce projected electricity generation by 5 percent by 2015 and 15 percent by 2020
- Reduce electricity losses to 7 percent by 2015 and 5 percent by 2020.

Additional measures that the Energy Action Plan calls for (there are 40 in total) include:

- Requiring the development of utility scale renewable energy projects, either by VINLEC or IPPs
- Implementing a net-metering policy to increase the supply of power from distributed generation.

The Government signaled the importance of geothermal development in the SVG National Economic and Social Development Plan 2013-2015" ('the National Development Plan'). In the plan, objective 2 for energy is "to encourage exploration and increased utilization of renewable energy technologies" and one of the strategic interventions for this objective is to "explore the feasibility of geo-thermal energy."

Laws and regulations governing the electricity sector
The ESA—which was passed in 1973 and amended in 1974, 1976, 1978, 1980, and 1987 —governs electricity supply in SVG. It grants VINLEC an exclusive license for supplying electricity and gives it responsibility for issuing licenses to other parties that wish to generate, distribute, or transmit electricity in the country. This is an important provision because VINLEC does not operate on some of the smaller inhabited Grenadines. However, VINLEC has not established a procedure that independent power producers can follow to obtain a license.
The ESA also establishes the tariff setting mechanism. Either the Prime Minister or VINLEC can suggest a tariff adjustment at any time. If the parties disagree on a suggested tariff, they jointly appoint an arbitrator to determine the tariff. The ESA set the initial tariffs for VINLEC's services (which are no longer the tariffs used), but did not create a formula for adjusting tariffs over time.

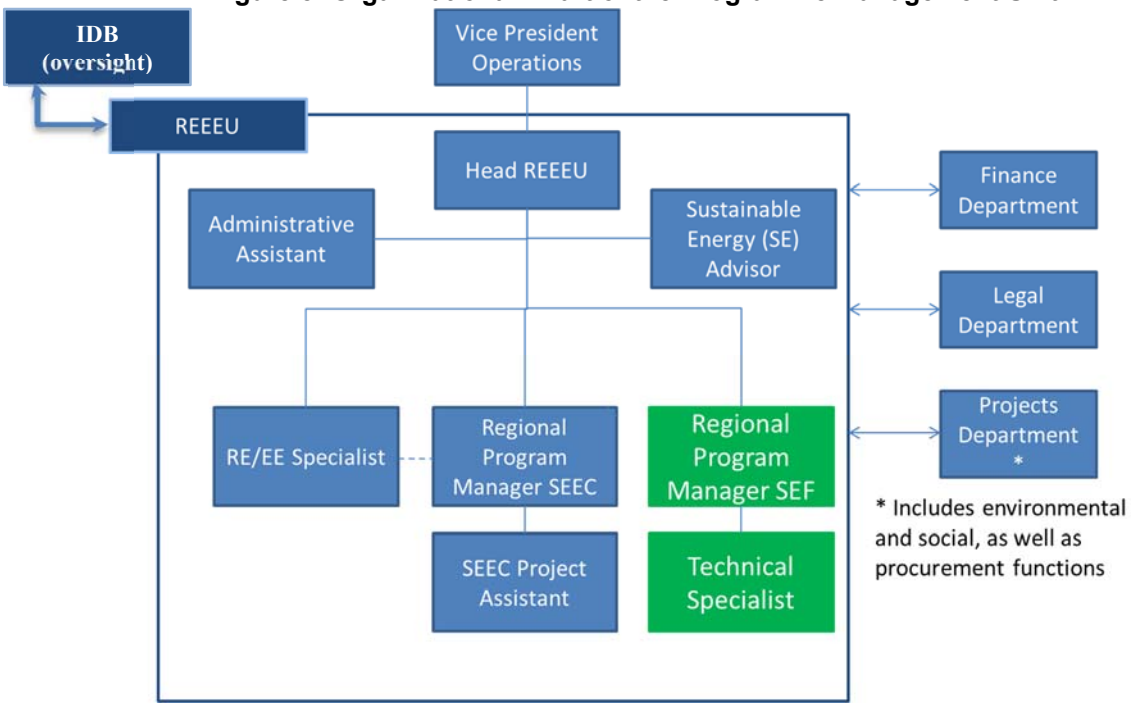
The legal framework governing the exploration and exploitation of geothermal resources is contained in the Geothermal Bill, which was approved by Parliament in August, 2015.

C.7. Institutional / Implementation Arrangements

Executing Agency (EA). The CDB will be the borrower and the EA for the programme and will work in close collaboration with IDB and other donors providing financing. Primary responsibility over programme implementation rests with CDB's Renewable Energy and Energy Efficiency Unit of the CDB (REEEU) and more specifically with the Program Manager (PM) of the IDB-SEF. The REEEU will be responsible for implementing and administering the programme for all participating countries (DOM, GRE, SKN, SL and SVG) and for administrating the IDB-SEF more broadly which includes A&B in addition to the 5ECC. The PM, with the support of the REEEU and other CDB staff providing technical, financial, environmental, social and legal assistance, is responsible for implementing and

administering the programme. Among other responsibilities, the PM, with the support of the REEEU, is responsible for actively engaging the beneficiary countries to generate demand, evaluating the eligibility of applications for funds, disbursing funds, and monitoring the implementation of the projects.

Figure 8: Organizational Chart of the Programme Management Unit



In addition, the REEEU has the support of a consulting firm on retainer (funded by the IDB) to support with the implementation of the programme, appraising project applications, and evaluating and monitoring project execution. The PM reports to the head of REEEU.

The PM is in charge of:

- Administering the programme, including monitoring accounts, creating necessary requests for advance of funds, and requesting disbursements
- Appraising and approving or rejecting applications, based on a technical, economic, and financial review of project applications
- Monitoring and evaluating progress and results obtained by the programme and individual projects, gathering information from project developers and ECC governments, and preparing periodic progress and supervision reports for the Donors including (IDB, the Japan International Cooperation Agency (JICA), the Clean Technology Fund (CTF), GCF, DFID and Global Environment Facility (GEF), among others[15]). This responsibility includes developing a system for gathering and maintaining data needed to track the programme's individual projects. It also includes identifying and proposing mitigation measures for risks that may affect individual projects and the programme.
- Financial management of the project and will liaise with CDB's Finance Department as it relates to the processing of payments and accounting and financial reporting of the project.
- Carrying out and overseeing procurement processes. This includes preparing and updating procurements plans and carrying out the tendering processes for any goods and services the PM needs for fulfilling its role. It also includes supporting ECC governments in preparing Terms of Reference and overseeing the tendering process for the selection of project suppliers and consultants.

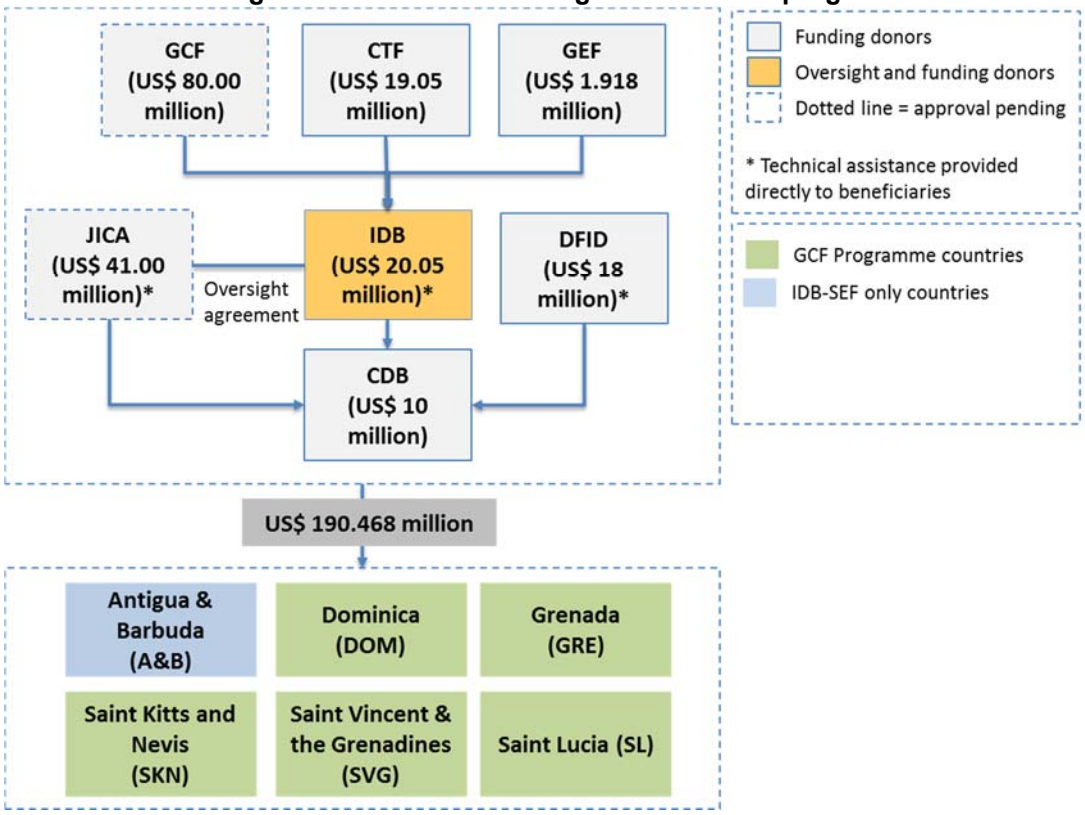
[15] Other donors such as the European Union and UK Department for International Development (DFID) expressed their interest in participating in the programme.

- Facilitating external evaluations and ensuring that recommendations are implemented
- Arranging for the submission of audited financial reports, as follows:
    - Submission of Annual Audited Financial Statements of the CDB. These will be become due for submission within 180 days following the close of CDB's fiscal year end (December 31st).
    - Annual Assurance report on the process of preparation and submission of disbursement requests. The engagement will be conducted by an independent audit firm that is eligible to the IDB, and the report submitted within 180 days following the close of CDB's fiscal year end, December 31st.
- Preparing Terms of Reference for consulting services for the CDB, to be approved by the IDB, that are to be funded with SEF resources

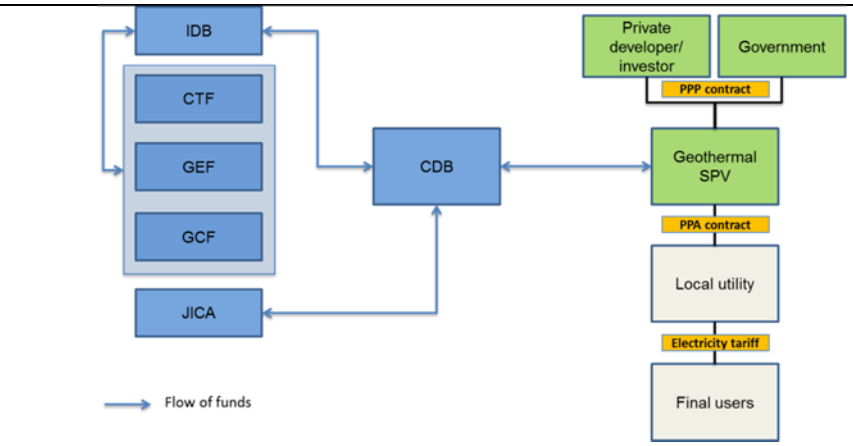
Institutional arrangements

There are distinct actors involved in the programme that can be separated by function: lenders, borrowers, executing agency, and entities with responsibility for oversight. Some of these actors have multiple functions in the execution of the programme. The following figure provides an overview of the institutional arrangements for the programme.

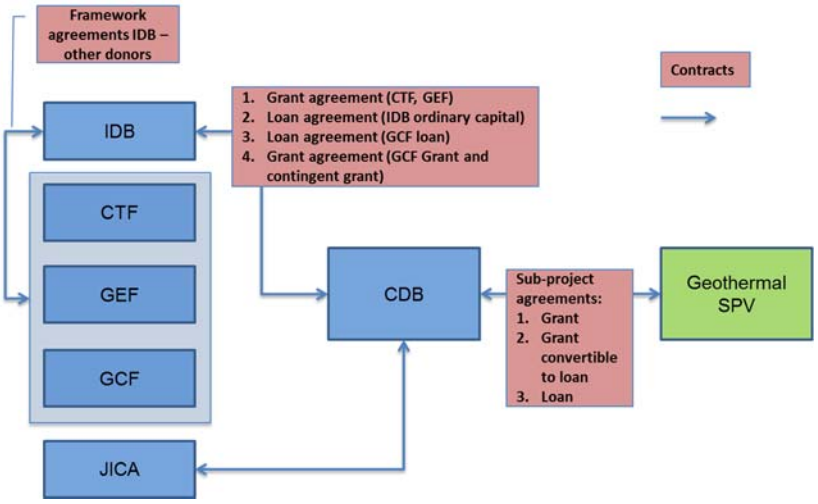
Figure 9: Institutional Arrangements for the programme



Flow of funds SEF



Relevant contracts



The actors participating in the programme are: oversight donors, funding donors, one executing agency, the REEEU, the PM and the governments of the 5ECC. The donors provide funding to the borrower, the CDB. The PM manages and supervises the execution of the loans and grants as well as ensures that the loans are being disbursed adequately in order to fulfill the objectives of the programme and the IDB-SEF. The PM liaises with the individual governments, the project developers through Special Purpose Vehicles (SPVs) and oversees funding and programme implementation. The role of each actor involved in the programme is presented in table 9.

Table 9: Roles of each actor involved in the SEF

Actor	Financing SEF	Implementing the Program	Oversight	Implementing Projects
Oversight Donors	✓		✓	
Funding Donors	✓			
CDB	✓	✓	✓	
Governments and Project Developers	✓			✓

Financial structure. The Ordinary Capital (OC) resources of the IDB (interest rate 1.1%[16]) will be treated and on-lent by CDB as their own OC resources (interest rate 2.97%[17]). The Clean Technology Fund (CTF), GCF, Japan International Cooperation Agency (JICA) and Global Environment Fund (GEF) resources will be managed and accounted for as special funds within the CDB, which means a spread of 1% would be charged over the interest of each of these funds to cover the operational costs of CDB.

Disbursements and commitment period. It is expected that the loan will have an 8 year disbursement period. As operations are executed, the CDB will present disbursement requests based on the advance of funds mechanism. Advances will be disbursed based on the liquidity needs of the project within a 6 month period. With the exception of the first advance of funds, the CDB should have presented a justification for the use of at 70% of the total cumulative balances pending justification for this purpose, and the IDB having accepted such justification.

Execution and administration. The provisions governing the programme execution, including the use of resources and eligibility of each financial instrument to be used on a project by project basis, will be established in the Operating Manual (OM) agreed by the IDB and CDB. It is a special contractual condition prior to the first disbursement that: (i) the CDB provides evidence of the entry into effect of the operating manual, including the sub-loan and sub-grant agreement templates of the program, in terms previously agreed with the IDB; and that (ii) the IDB provides its non-objection for the sub-loan and sub-grant model agreements, meeting the minimum requirements established in the OM.

The executing mechanism which is summarized here will be fully described in the OM. To begin the project cycle, every sub project would require a 2 page concept note, a checklist with the issues to be considered (Technical, Environmental, Social and Financial) and a non-objection from the IDB to move forward. A final non-objection will be requested prior to CDB's board approval. It is expected that as part of the execution, the IDB project team will be continuously monitoring the development of the sub projects and providing the required support to the CDB to facilitate the execution of the sub-projects. In order for the project to be granted with IDB's Non objection the will require that checklist is fully addressed and the Technical, Environmental, Social and Financial issues are addressed and/or mitigated.

[16] Variable Libor-based rate; As of July 31, 2015
[17] As of January, 2016

C.8. Timetable of Project/Programme Implementation

A timetable with details of Programme implementation can be found in the attached Excel worksheet "*GCF-Geothermal Development Facility-Budget and Timeline-IDBApril2016*".

D.1. Value Added for GCF Involvement

ECC face high-energy prices due to high and volatile cost of liquid fossil fuels and low economic growth and macroeconomic imbalances. Public sector institutions are weak and have very limited fiscal space to take on GE project development. Due to very limited market size, the lack of economies of scale, high capital cost and high early exploration resource risk, grant and concessional finance are necessary in order to reduce project risk and provide an incentive for public and private sector to engage in GE project development.

The programme will support GE development in the 5ECC with projects at different levels of development; funding from the IDB, CTF and CDB was approved in October, 2015 and JICA is expected to provide additional resources. Even though some resources could already be mobilized the estimated total funding needs are above USD 500 million (see

Table 7) and as such the GCF contribution is crucial.

GCF will provide funding for drilling exploration and production drilling in SL and SKN where no other funding sources with the required risk profile (i.e. contingent grants) have been identified yet. Without GCF concessional grants for SL and SKN viability of drilling exploration is highly questionable due to a lack of funding able to take on such high risk. GCF funding (senior loans) in GRE, SVG and DOM will be used for field development/plant construction. Without GCF concessional senior loans for GRE, SVG and DOM the overall project cost would be higher resulting in higher electricity tariffs. Moreover, by securing funding for both, early stages of development and the later stages of plant construction, the programme is ensuring an end to end solution which will result in actual GE capacity being installed as the programme provides a more seamless transition from one stage to the next.

The GCF contribution therefore is essential to transform the energy matrix in the 5ECC towards a sustainable, low carbon sector while at the same time reducing electricity tariffs for the final consumers.

Furthermore, the execution of the program by the CDB has the added value of exposing the regional Bank to the procedures that GCF has in place, providing a “on the ground” strengthening for future direct access to GCF as a potential accredited entity.

D.2. Exit Strategy

The programme has a duration of 8 years and will be supporting the whole project development cycle from drilling exploration, to production drilling, electricity production and construction of transmission lines. It is expected that all participating projects will be at their final implementation phases (i.e. finishing Plant construction and/or transmission lines) once the programme ends. The investments, operational and maintenance costs will be funded through 25 years PPA, therefore long term sustainability of the programme is expected to be assured.

In addition, loans will only be provided to already established PPPs with all contractual agreements in place, including financial engagements of the private sector and public sector for different stages of the project.

Long term viability is achieved through PPA agreements with the local utility providing constant revenue streams. These will allow the GE developers to recover their investments, serve its debts as well as cover the operational and maintenance expenses.

In this section, the accredited entity is expected to provide a brief description of the expected performance of the proposed project/programme against each of the Fund's six investment criteria. Activity-specific sub-criteria and indicative assessment factors, which can be found in the Fund's Investment Framework, should be addressed where relevant and applicable. This section should tie into any request for concessionality made in section B.2.

E.1. Impact Potential

Potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas

E.1.1. Mitigation / adaptation impact potential

The programme is expected to result in a reduction of GHG emissions of approximately 313,421 tCO_2 per year and 9,402,621 TCO2e during its lifetime by displacing liquid fossil fuel based electricity generation.

By completely transforming the energy matrix of the 5ECC through GE, the programme will reduce the region's dependency on imports of liquid fossil fuels. This will generate important savings, totaling 50 million USD per year, which will allow improving the balance of payments, increasing the fiscal space of DOM, GRE, SL, SVG and SKN, increase the competitiveness of small and medium enterprises and open the path for green growth.

On average, the import of fossil fuels represents 10% of their GDP. The programme will increase the resilience of the five beneficiary countries, by liberating key economic resources to allow them to be more prepared to respond to extreme climatic events.

A virtuous circle will arise from the transformation of the energy matrix, benefitting the population as a whole and key economic sector such as tourism, not only making it more competitive in terms of costs through the reduction of the electricity tariff but also greening the sector and making it more sustainable.

Moreover, once the electricity baseload will be covered by the GE power generation, DOM, GRE, SL, SVG and SKN can aspire to have an electricity matrix 100% based on RE resources, diversifying sources with solar technology and as such become an example of sustainability and green growth in the region.

E.1.2. Key impact potential indicator

Provide specific numerical values for the indicators below.

GCF core indicators	*Expected tonnes of carbon dioxide equivalent (t CO_2 eq) to be reduced or avoided (Mitigation only)*	*Annual*	313,421
		Lifetime	9,402,621
	Expected total number of direct and indirect beneficiaries (reduced vulnerability or increased resilience); number of beneficiaries relative to total population (adaptation only)	*Total*	481,652[18]
		Percentage (%)	100

[18] The whole population of DOM (72,003), GRE (105,897) , SL (182,273), SVG (109,373) and SKN (Nevis) (12,106) will be direct beneficiaries of the programme by benefiting from the access to GE and the reduce cost in tariff.

Other relevant indicators	• 60 MW of Geothermal power generation capacity installed in projects facilitated or financed at some stage by the Programme in the ECC • Reduction of 722 Thousand barrels of oil imported per year for electricity generation in ECC with geothermal projects financed at any stage by the program[19]. • USD 50 million yearly reduced spending on Oil imports (at a fuel price of US$70 per barrel) • Reduction of the average electricity generation cost and, if generation cost reductions are passed on to customers, this should lead to an average decrease in tariffs from US$0.35/kWh in 2015 (at a fuel price of US$70 per barrel) to US$0.28/kWh[20].

It is expected that the installation of 10 MW of Geothermal generation capacity in 4 participating countries and of 20MW of GE generation capacity in another one, totaling 60 MW, will displace the diesel fuel based thermal plants in use for baseload electricity production. These units will be shut down as they will no longer be required to supply baseload electricity nor will be cost effective compared with the new GE plants.

Emission Reductions will be calculated for each country as follows:

$$ERc,y = EGPJc,y \times EFfuel - Egp,y$$

Where:

ERc,y = Emission reductions in country c in year y (t $CO2$)

$EGPJ,y$ = Quantity of net electricity generation supplied by the new geothermal plant to the grid in country c in year y (MWh)

$EFfuel$ = Emission factor of No.2 Fuel oil (t $CO2/MWh$)

Egp,y = Emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (t $CO2e/yr$)

Emissions from the operation of geothermal power plants will be calculated as follows (as per CDM methodology ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0):

$$EGP,y = (wsteam,CO2,y + wsteam,CH4,y \times GWPCH4) \times Msteam,y$$

[19] The calculation of the reduction of oil barrels imported is based on the oil that will be displaced by the installation of the 60 MW of GE. The following factors have been used:
Heat Rate 10,200 kj/kWh
Oil enegy content 6,311,532 kj/barrel of oil.

The generation of 446,760 MWh/year will thus displace 722,004 barrels of oil. At a fuel price of US$70 per barrel this is equivalent to USD 50 million yearly reduced spending on Oil imports.

[20] For each country, the estimated average tariff when geothermal generation is introduced is calculated as the weighted average of the current average tariff (2014) and the estimated 'tariff with geothermal'. The weights are the contribution of geothermal and diesel (or HFO) generation to the total projected generation in each country when geothermal comes online. The 'tariff with geothermal' is the sum of two components: the geothermal PPA rate, plus the portion of the current tariff, that is not generation cost, that will still be charged to customers when geothermal comes online. The geothermal PPA rate is the rate at which the geothermal projects need to sell each kwh of electricity to be able to service their debts and provide equity investors with a 15 percent real return. The portion of the current tariff that is added to the PPA rate is an estimate of the costs not related to generation, which are charged to customers via tariff regardless of the generation technology used. 4 Such costs include an estimate of transmission and distribution costs, administrative and other non-generation OpEx, and other costs.

Where:

$PEGP,y$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (t CO2e/yr)

$wsteam,CO2,y$ = Average mass fraction of CO2 in the produced steam in year y (t CO2/t steam)

$wsteam,CH4,y$ = Average mass fraction of CH4 in the produced steam in year y (t CH4/t steam)

$GWPCH4$ = Global warming potential of CH4 (t CO2e/t CH4)

$Msteam,y$ = Quantity of steam produced in year y (t steam/yr)

Considering the small size of the Geothermal plants (10MW) it is considered that emissions from fossil fuel and leakage are negligible and thus will not be accounted and is not included in the ex-ante calculation of emission reduction. However, once a geothermal plant is in operation fossil fuel consumption for the operation of the plant will be monitored as well as electricity consumed from the electricity grid.

Moreover as per CDM methodology ACM0002 Fugitive CO2 and CH4 emissions due to well testing and well bleeding are not considered, as they are negligible.

The total Emission Reductions of the programme will be calculated as follow:

$$\sum_{c=1}^{3} \mathrm{E}R_c$$

Where:

ERc = Emission reductions in country c in year y (t CO2)

Ex-Ante Calculation of Emission Reductions:

(DOM, GRE, SKN, SVG)

ERc,y = 74,460× 0.7575– 5000 = 51403 (TCO2e/y)

(SL)

ERc,y = 148,920× 0.7575– 5000 = 107,807 (TCO2e/y)

Where:

$EGPJ,$ = 74,460 MWh Considering Geothermal power plant with plant nameplate capacity of 10MW and a 85% capacity factor.

$EGPJ,$ = 148,920 MWh Considering Geothermal power plant with plant nameplate capacity of 20MW and a 85% capacity factor.

EFfuel = Emission factor of No.2 Fuel oil is of 0.7575TCO2e/MWh (Reference: US Energy Information Administration)

Egp,y = 5000 TCO2e. At this stage, it is currently not possible to have a specific value for Egp,y, however to be conservative with the estimation of ex-ante emission reductions of the programme a conservative value of 5000 TC02e from the geothermal plant operation[21]. This value will be adjusted when more precise data is available.

Ex-Ante Calculation of Emission Reductions of the Programme

$\sum_{c=1}^{5} ER_c$ = 313,421 TCO2e

Benchmark against other projects

The only project in a comparable context is in Guadeloupe which has an installed capacity of 15MW of geothermal generation consisting of a 4.7MW plant, Bouillante 1, and a 10MW plant, Bouillante 2. Geothermie Bouillante S.A. ('Geothermie Bouillante'), the plant operator and project developer, is planning to increase Guadeloupe's geothermal generation capacity by building a third plant in the near future. The geothermal project in Guadeloupe has been developed in two phases, which each had a different project structure. The first phase included private sector participation, whereas the second phase only included participation from government-owned companies. This second power plant has generated €60 million in savings to customers in nine years. No emission data is available for the plant.

E.2. Paradigm Shift Potential

Degree to which the proposed activity can catalyze impact beyond a one-off project/programme investment

E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)

This programme will have a transformational effect for the ECC by replacing power generation currently based on liquid fossil fuels with geothermal power, a renewable energy source. Not only will carbon emissions be reduced, but the electricity cost for final users will be reduced boosting the region's competitiveness.

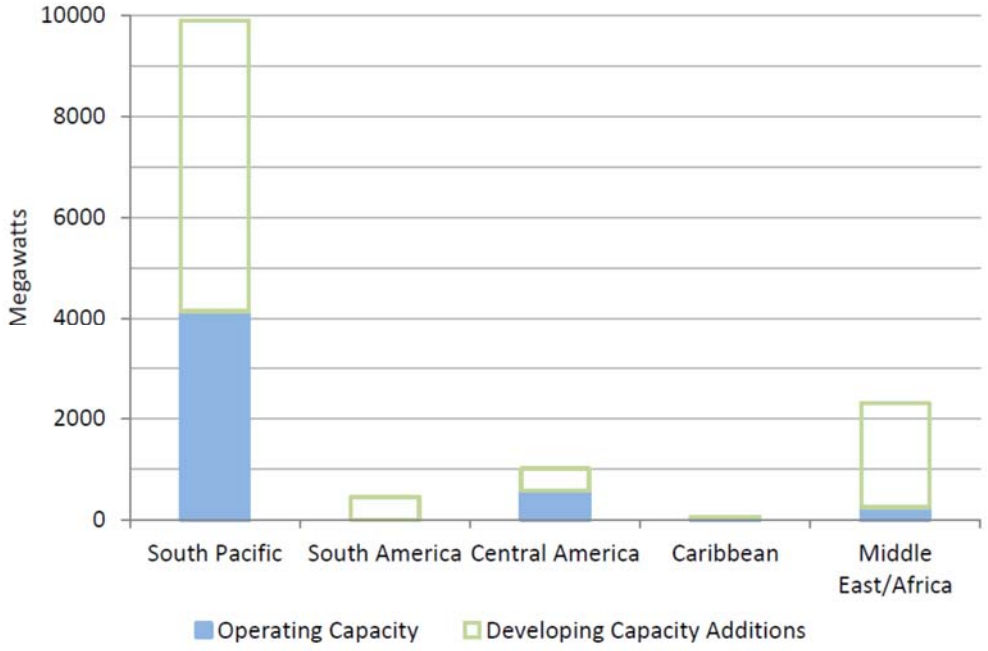
In addition to the GE development that will be supported by the programme in these five countries, the ECC have the potential to develop an additional GE plant in DOM to export to neighboring islands. Depending on the results of SVG's exploration, if successful, more GE could be developed to export to Barbados.

In SKN the programme also has the potential to scale up to a second phase, to add additional 25MW in order to supply St Kitts from Nevis through a subsea cable. SKN could also develop more GE to export to the neighboring islands (Saba and Montserrat).

The successful implementation of the GeoSmart Initiative will generate a wealth of experience that can be shared through south-south cooperation between SIDS from the Caribbean and the Pacific. Facing similar conditions and barriers than the ECC, the Pacific islands have an important untapped geothermal resource potential, in particular Papua New Guinea, Vanuatu, Samoa, Tonga, N. Marianas Islands. Fiji, Solomon Islands and New Caledonia. The potential for replication is illustrated in the figure 9 below.

[21] A survey of CO2 emissions from geothermal power plants has been performed by the International Geothermal Association (IGA) This survey found a wide spread in emission rate in the 6,648 MWe of plant surveyed and found that "4858 MW (73%) of the plants surveyed had a MW weighted average of 55g/kWh.". Applying this average to the expected 74,460 MWh to be generated by the 10MW GE plants per year, give an expected emissions of 4095 TCO2e per year. Thus we consider that the value of 5000 TC02e from the geothermal plant operation applied is conservative. Reference: Bertani, R., and I. Thain (2002). Geothermal power generating plant CO2 emission survey. International Geothermal Association (IGA) News, 49, pp. 1-3 (ISSN: 0160-7782). Available at: www.geothermal-energy.org/308,iga_newsletter.html.

Figure 10: Geothermal Power Operating and Developing Capacity by Developing Region



Source: Geothermal Energy Association, 2014

E.2.2. Potential for knowledge and learning

An action plan for Capacity Building and Institutional Strengthening has been designed for the programme which identifies the tasks and institutional arrangements that will ensure that Governments in the 5ECC have the institutional capacities needed to develop their GE resources.

The expected result of this capacity building action plan is that local authorities have the capacities and skillsets necessary for implementing the respective geothermal project in their country as well as future renewable energy projects. This specifically refers to:

- project management
- design, negotiation and implementation of commercial agreements with private counterparts and PPP GE projects
- project financing, financial modelling of geothermal and renewable

In order to achieve the expected results the following tasks are indicative of possible assistance for each country:

DOM

- Carry out trainings to strengthen the Ministry of Public Works, Energy, and Ports, and in particular its Geothermal Project Management Unit's ability to execute GE projects
- Carry out trainings to strengthen the IRC's capacity to develop regulation for GE
- Hire a full time staff member to support the Geothermal Project Management Unit.

GRE

- Carry out trainings to strengthen the Energy Division's ability to execute GE projects
- Hire a full time staff member to support the Energy Division.

SKN

- Prepare an Integrated Resource Plan for electricity sector in Saint Kitts
    - Prepare the bidding documents for the consultancy
    - Publishing and reviewing Expressions of Interest and select Short List
    - Review proposals, make selection, and sign contract
    - Prepare the Integrated Resource Plan
- Provide transaction advisory support for geothermal energy project in Nevis
    - Prepare the bidding documents for the consultancy
    - Publishing and reviewing Expressions of Interest and select the short list
    - Review proposals, make selection, and sign contract
    - Carry out transaction advisory support
- Hire a full time staff member to support the Ministry of energy in Nevis

SL

- Carry out trainings to strengthen the Ministry of Sustainable Development, Energy, Science, and Technology's ability to execute GE projects
- Hire a full time staff member to support the Ministry or the National Utilities Regulatory Commission if created.

SVG

- Carry out trainings to strengthen local capacities for the GE project
- Hire a full time staff member to support the Energy Unit
- Provide transaction advisory for GE project
    - Prepare the bidding documents for the consultancy
    - Publishing and reviewing Expressions of Interest and select the short list
    - Review proposals, make selection, and sign contract
    - Carry out transaction advisory support

Once implementation of the programme starts in the 5ECC, the areas included in the trainings and the technical assistance offered may be expanded to address other areas identified by the respective Governments as needed. The specific topics included in the training will be agreed upon with the local authorities, the PMU, and the Donors.

Monitoring of capacity building and institutional strengthening will be done via semi-annual progress reports which will also include lessons learned. The Eastern Caribbean Donor coordination meetings (already existing on a semiannual basis) and side events at regional annual energy events such as the Caribbean Renewable Energy Forum (CREF) will be used as platform to share lessons learned and donor coordination. In case more donor coordination meetings are required, these can be programmed by the PM as required.

Technical support and capacity building will be provided to the CDB during the implementation of this programme to strengthen its capacity as a potential GCF Regional Implementing entity for the Caribbean.

E.2.3. Contribution to the creation of an enabling environment

The programme introduces a new financial instrument for early exploration drillings – contingent grants – which has not been available in the region before, with the objective of reducing the barriers for private sector investment in early stage of GE development. Once the first stage of exploration drilling is overcome, private sector investments are more likely to be secured.

Sustained participation of public and private sector will be assured by implementing the programme through PPP structures in the three participating ECC. The programme will only provide loans to already established PPPs with all contractual agreements including financial engagement of the private sector and public sector in place.

CDB may decide on a case by case basis how the contingent grants will be used, either as a Grant Convertible to Loan (GrCL) or as a Loan Convertible to Grant (LCGr).

- In the case of a GrCL funding, the PPP will receive a grant and in the case that the exploration is unsuccessful, the GrCL remains as a grant. In case the exploration is successful the grant will be converted into a loan and the loan conditions for CTF or GCF for GrCL will apply. This case is recommended when the uncertainty of the geothermal source is very high.
- In the case of the LCGr, a loan is provided from CDB to the PPP using a combination of IDB, JICA and GCF (concessional loan) funding to fund the exploration phase. If the exploration is unsuccessful the CTF or GCF (grant) will repay the loan. In case the exploration is successful, the CTF or GCF resources remain untouched and can be used for another exploration phase of another GE project of any of the five beneficiary countries. This case is recommended when the uncertainty of the geothermal source is less than in the previous case.

E.2.4. Contribution to regulatory framework and policies

The successful implementation of projects financed by the programme requires that an enabling regulatory framework be in place in the 5ECC. Building on the already existing regulatory framework the programme will support the 5ECC governments in the following tasks:

DOM

- Set tariffs that reflect the cost of producing electricity with geothermal generation
- Development of GE regulation.

GRE

- Set tariffs that reflect the cost of producing electricity with geothermal generation
- Development of GE law.

Saint Kitts

- Establish a clear process for IPPs to sell their electricity to SKELEC.
- Set tariffs that reflect the cost of producing electricity with geothermal generation

Nevis

- Establish a process for geothermal developers to obtain a license that is consistent across all relevant laws
- Assign responsibility for monitoring the geothermal resource to prevent overexploitation.
- Set tariffs that reflect the cost of producing electricity with geothermal generation.

SL

- Set tariffs that reflect the cost of producing electricity with geothermal generation
- Development of GE law.
- Establishing a regulatory body.

SVG

- Establish a clear framework governing geothermal resources.
- Improve process to obtain a license for a geothermal power plant
- Set tariffs that reflect the cost of producing electricity with geothermal generation

E.3. Sustainable Development Potential

Wider benefits and priorities

E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

Economic co-benefits:

- 120 construction and 51 operation and maintenance jobs will be created.
- The programme will lead to a reduction in oil import of approximately 722,000 barrels per year for electricity generation in the 5 targeted countries, implying total savings of 550 million USD on oil imports per year (at a fuel price of 70 USD per barrel).
- As a result, the region's dependency on fossil fuels for power generation will be reduced by around 40% through the exploitation of geothermal resources, leading to an increased energy security.
- Reduction of the average electricity generation cost, which if passed on to consumers, will lead to an average decrease in tariffs from USD 0.33/kWh in 2015 (at fuel price of 70 USD per barrel) to USD 0.28/kWh.
- Upon implementation of the programme, the diesel fuel based electricity generation that is currently dominant in DOM, GRE, SKN, SL and SVG will be largely and gradually displaced for baseload electricity

generation as it will no longer be cost-effective in comparison with the new geothermal plant energy production.

Socio-economic/environmental:

- The programme will benefit the tourism sector, which is the main economic sector for the five countries, not only by making it more competitive in terms of costs through the reduction of the electricity tariff but also by greening the sector and making it more environmentally friendly.
- The programme will improve the air quality in the five islands by significantly reducing the burning of fossil fuels.

Gender-sensitive perspective:

- The programme targets 30% of women trained in construction, operation and/or maintenance of energy infrastructure and projects and 35 % of women participating in the programme consultations. The companies will be encouraged to adopt practices such as hiring under equal conditions, review of hiring requirements to detect criteria that potentially exclude women, and the possibility of setting targets related to women participation. Besides, the project will promote the inclusion of local women in training activities for the construction, operation and maintenance work that does not require specific qualifications.

E.4. Needs of the Recipient

Vulnerability and financing needs of the beneficiary country and population

E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)

Vulnerability of the countries:

- DOM, SL, SVG, SKN and GRE belong to the group of the small islands developing states (SIDS), which are especially vulnerable to the climate change and sea-level rises also due to their isolation and small size (in economic and demographic terms).
- Energy supply diversification is of great importance for the population which is vulnerable to the tariff changes linked to the fluctuation of fuel prices. Since the electricity matrix of the 5ECC mainly depends on one imported fuel source (80 to 100% based on imported liquid fossil fuels; see section C.2.), they are extremely vulnerable to any changes related to this fuel. Electricity tariffs for example are indexed to fuel prices, or include a fuel surcharge with a direct pass through to end consumers and therefore exposed consumers to oil price volatility. In case of an extreme event supply shortages could occur and affect electricity supply and lead to blackouts. Diversification of energy supply is therefore urgently needed and GE can play an important role in achieving it. Therefore replacing fossil fuel power generation with GE, will provide energy security which in turn translates in savings that can be used for emergencies in extreme weather conditions (very common in the region).

Economic and social development of the countries:

- DOM debt-to-GDP ratio has reached almost 80% in 2014. In 2015 Tropical Storm Erika has significantly affected the island with a loss estimated to 96% of the GDP. Dominica has a population of 71,293 (2011) and a 2014 GDP of USD 524 million.
- GRE public debt has peaked in 2013 reaching approximately 107.5% of the GDP. 2014 GDP of Grenada is of USD882.2 million and GNI per capita is of USD 7850. GRE has a population of 106,300.
- SVG debt-to-GDP ratio increased by about 15 percent of GDP over 2008-2013, reaching 74 percent of GDP in 2013. This ratio is expected to continue to increase until 2017. In December 2014, a strong climatic event, causing flooding and massive economic losses reaching 15% of the GDP has further exacerbated the country's economic conditions on top of contraction from the global slowdown, increase in commodities price as well as two previous climatic events in 2010 and 2011. 2014 GDP of SVG is of USD 728.7 million and GNI per capita is USD 6560. SVG has a population of 109,400 people.

- SKN high public debt to GDP ratio of 159.3% in 2010 fell significantly to 103.1 percent at the end of 2013. 2014 GDP of SKN is of USD 833.3 million and GNI per capita is USD 14450. SKN has a population of 54,790.
- SL debt-to-GDP reached almost 80% in 2013. The island has a population of 169,115. In 2012, St Lucia faced a recession and a rate of growth close to zero in 2013 and had a 2014 GDP of US$ 1,404 million. Because of the small size and isolation of the islands, there is no economy of scale in the electricity markets.
- Because of the small size and isolation of the islands, there is no economy of scale in the electricity markets.
- The economies of the three Small Island Development States are highly vulnerable to climate change, in particular to extreme climatic events and sea level rise.

Absence of alternative funding:

- The economic and fiscal situation of the five countries makes it costly for them to access international capital markets for the development of geothermal/ renewable energy projects. High amount of capital is needed for the development of geothermal projects in ECC. The borrowing capacity of the islands at appropriate terms is limited.

E.4.2. Financial, economic, social and institutional needs

The economic and fiscal situation in the ECC makes access to international capital market costly and poses obstacles for the development of renewable energy projects such as GE. The limited borrowing capacity as implied by the Debt-to-GDP ratios averaging 86% limits the governments' ability to invest in Sustainable Energy (SE), and particularly in GE technologies thus perpetuating dependency on imported fossil fuels and its tightening effect on fiscal space.

The programme addresses fiscal constraints of the countries to take additional debt and the lack of private capital with a similar risk profiles for GE development by providing grants and concessional financing.

The programme will lead to an average decrease in tariffs from US$0.35/kWh in 2015 (at a fuel price of US$70 per barrel) to US$0.28/kWh which would result in significant reductions in electricity bills and cost savings for customers.

The only island with a geothermal bill approved is Nevis. This bill has been approved in 2008 and requires some revision under the current GE development context. In addition the bill only covers Nevis, and requires to be expanded to the Federation of SKN. In addition some regulatory aspects must be defined for the GE interconnection between the two islands.

DOM, SLSVG and GRE have an initial draft bill, but both countries require additional support to revise and finalize these bills.
Eligible activities for Capacity Building in the 5 countries will be the following:
- Funding for consultants that will support the implementation of GE projects
- Studies to establish strategies and plans for the energy sector
- Training and study tours to build skills among local authorities on GE technologies and projects and designing and implementing Public Private Partnerships (PPPs)
- Transaction advisories for structuring and negotiating GE projects with private sponsors
- Legal, regulatory, and policy reform of the energy sector

These Institutional strengthening and capacity building activities will be implemented to address lack of local capacities and lack of implementation capacity.

E.5. Country Ownership

Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme

E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

In 2012, the representative of the Alliance of Small Island States (AOSIS), issued the Barbados Declaration on Achieving Sustainable Energy for All, in which among others the countries expressed their concern that "[…] most SIDS are highly dependent on imported oil and other fossil fuels for transport and electricity generation and this is a major source of economic vulnerability for SIDS. This leaves SIDS highly exposed to oil-price volatility. The increasing cost of imported fossil fuels represent a major impediment to the achievement of sustainable development and poverty eradication in SIDS as scarce financial resources are diverted from efforts to promote social and economic development and ensure environmental protection. Furthermore, many remote and rural SIDS communities have little or no access to modern and affordable energy services. " And also underscored that "[…] while SIDS contribute the least to global emissions and have limited human, financial and technical resources, our nations continue to take significant actions towards the reduction of our own emissions including through regional and inter-regional energy initiatives as our contribution to resolving global climate change and as a demonstration of our moral leadership in the fight against climate change."

In the framework of this declaration the SIDS adopted voluntary commitment to transform their energy matrix, in particular GRE and SVG:

GRE: "Grenada is committed to transition to a low carbon development path through increasing the efficiency of energy usage and the further deployment of indigenous sources of renewable energy. Grenada voluntarily commits to a minimum target of reducing its total GHG emissions by 20% below Business As Usual by 2020."

SVG: "(i) Reduce projected increase in peak demand by 5% by 2015 and 10% by 2010 an strive to reduce power losses down to a total of 7% by 2015 and 5% by 2020; (ii) Deliver 30% of projected total electricity output from Renewable Energy Sources (RES) by 2015 and 60% by 2020; (iii) Increase energy security and diversify the energy portfolio; (iv) Reduce projected consumption of fossil fuels in the transport sector by 10% by 2015 and 15 % by 2020; and (v) Reduce projected electricity generation by 5% by 2012 and 15% by 2020."

This program will contribute to the achievement of these objectives. It is also in line with Caribbean Community Secretariat (CARICOM's) Caribbean Sustainable Energy Roadmap and Strategy (C-SERMS) framework which is part of the Regional Energy Policy establishing targets for the contribution of RE to total electricity generation. The ministers of Energy of CARICOMs member states approved it in March 2013.

Moreover, the programme will contribute to the implementation of the national energy policy of DOM, GRE, SKN, SL and SVG (see section C.6 for more details on these policies) and the development of geothermal resource bills. SKN is the only country in the ECC which has already adopted the Geothermal Resource Development ordinance.

During the preparation of this programme, the IDB has worked very closely with the CDB and the governments of DOM, GRE, SKN, SL and SVG. Between May 28 and June 10, 2015, the IDB carried out a mission in the ECC together with the CDB for the preparation of the SEF. The mission included:

a) Meetings with high government authorities (Prime Ministers, Minsters of Energy and Permanent Secretaries) as well as GE developers to confirm the demand for this programme

b) Identify a potential pipeline of projects.

The mission met with government representatives in St. Lucia on June 1, St. Vincent & the Grenadines on June 2, in Grenada on June 3, in St. Kitts and Nevis on June 5 and in DOM on June 8, to present the SEF and this programme and identify potential projects, in particular with:

SL: Ms. Tracy Polius, Permanent Secretary, Department of Planning & National Development; Mr. John Calixte, Deputy Permanent Secretary, Department of Planning & National Development; Mr. Sylvester Clauzel, Permanent Secretary Ministry of Sustainable Development, Science & Technology; Mr. Barrymore Felicien --- Chief Public Utilities Officer Ministry of Sustainable Development, Science & Technology

SVG: Hon. Ralph Gonsalves, Prime Minister Saint Vincent and the Grenadines; Mrs. Laura Anthony Browne, Director of Planning, Central Planning Division; and Mr. Ellsworth Dacon, Director Energy Unit.

GRE: Mr. Timothy Antoine, Permanent Secretary — Finance, Energy; and Mr. Mike Sylvester, Deputy Permanent Secretary Ministry of Finance; Mr. John Auguste, Snr. Energy Officer.

SKN: Hon. Ian Liburd, Minister of Public Infrastructure, Post, Urban Development & Transport; Ms. Lavem Queeley, Director, Economic Affairs and PSIP, Ministry of Sustainable Development; Hon. Alexis Jeffers, Minister of Communications, Works, Public Utilities, Posts, Physical Planning, Natural Resources and Environment, Agriculture, Lands, Housing, Cooperatives and Fisheries, Nevis Island Administration; and Hon. Troy Liburd, Junior Minister with responsibility for Communications, Public Works, Public Utilities, Posts, Physical Planning, Natural Resources and Environment.

DOM: Mrs. Rosamund Edwards, Financial Secretary; Ms. Careen Prevost, Permanent Secretary, Ministry of Foreign Affairs & Caricom Affairs, & the Ministry of Trade, Energy & Employment

This programme has received support at the highest level of governmental authorities in thefive participating countries and is fully aligned with their national development priorities as confirmed by the No-Objection letters issued for the GCF.

E.5.2. Capacity of accredited entities and executing entities to deliver

The IDB is the main source of multilateral financing for Latin America and the Caribbean (LAC). Since 1961, the IDB has provided almost US$246 billion for projects to reduce poverty, raise standards of living, spur economic growth, protect natural resources, foster integration and trade, and reach other agreed goals. IDB's operations approvals in 2014 totaled US$13.8 billion and average annual approvals have increased consistently from US$9.8 billion in 2005–2009 to US$12.6 billion in 2010–2014. The IDB is a global partnership of 48 member countries in which the 26 borrowing countries of LAC hold the majority of shares. The IDB holds a credit rating of AAA/aaa. The IDB has developed and is currently developing GE projects in Mexico, Nicaragua, Bolivia, Chile, Colombia, Ecuador and El Salvador.

The CDB is a regional financial institution established by an Agreement signed in Kingston, Jamaica, in 1969. It has a membership of 27 countries consisting of 19 regional borrowing members, 3 regional non-borrowing members and 5 non-regional non- borrowing members. In 2014, CDB assisted the development agenda of Borrowing Member Countries (BMCs) by providing US$270 million in loans, grants, equity investments, and guarantees. The adoption of renewable energy (RE) and energy efficiency (EE) solutions is an imperative for CDB, as articulated in the new Energy Sector Policy and Strategy, which was endorsed by the Board in December 2014.

In its 45 years of existence, the CDB has been continuously involved in the development of the power sector, leading on the transformation (through technical assistance and advice) of several government departments, with responsibility for electricity, into electric utility corporations. Lending over the period has largely supported investments in generation and transmission and distribution by public and private utilities. CDB's involvement with the sustainable energy sub-sector began in the 1980s when, with development partners, a regional energy project was executed by CDB. For the last 4 years, small-scale solar Photovoltaics (PV) installations are routinely included in social infrastructure projects in off-grid rural and hinterland locations, such as schools, clinics and for water pumps. Sustainable energy considerations have been mainstreamed in CDB's operations, so that routine screening for opportunities for the inclusion of SE components across sectors is now normal. Loans to the private sector supported generation from bio-mass by an independent power producer and more recently a utility-scale solar PV plant. The Sustainable Energy Technical Assistance Project was implemented through a grant to the OECS Commission in 2011 for the development of appropriate frameworks and strategies for 9 OECS countries along with programs to build awareness in the sub-region. Since 2014, the CDB has renewed its focus on the energy sector, with particular emphasis on sustainable energy, through the establishment of appropriate internal structures and staffing, policy and strategy, partnerships and appropriate resource mobilization.

On January 27, 1977, the IDB Charter was amended to allow it to provide financial resources to the CDB to support the development of its members. On September 28, 1977, the IDB and the CDB entered into an agreement setting forth the general standards applicable to operating relations between both institutions. Since then, the IDB has financed five global loan programs to the CDB totaling US$114 million where resources were on-lent by the CDB to projects in its member countries.

E.5.3. Engagement with civil society organizations and other relevant stakeholders

IDB and CDB will require that all beneficiary countries develop multistakeholder engagement plans and consultations. Nevis and DOM already performed mulitstakeholder engagements. SVG implemented multistakeholder meetings on July 15-July 19 2015. All other counties will need to comply at the relevant project development stage. Refere to the Environmental and Social Management Report for more details on Stakeholder Engagement Plans and stakeholder and community consultations.

E.6. Efficiency and Effectiveness

Economic and, if appropriate, financial soundness of the project/programme

E.6.1. Cost-effectiveness and efficiency

The programme addresses the barriers discussed in C.2. and allows the countries to access different types of support and funding based on the stage of geothermal development that they are in. The Programme will allow for a tailored support based on the specific needs of each country. All funding would be channeled through the CDB to the projects and governments. By supporting the geothermal projects that are already underway in the countries, the programme will allow to build on the work that has already been done in each country.

As mentioned the programme will provide funding to PPP structures which involve the Government, a specialized private firm, and in some cases could involve also the vertically-integrated electricity utility, thus crowding in public and private investment.

Considering an expected lifetime of emission reductions of 30 years (most likely the impacts will continue beyond that period) the abatement cost of the programme for the GCF is of US$8.51 per tCO2e.

E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

The GCF will provide 44% of the total programme funding of US$ USD190.468 million. The co-financing ratio of the programme is therefore 1:1.27.1. In addition the programme will mobilize an additional estimated investments from the private sector 0f US$ 340 million. For more details please refer to the attached Excel worksheet “GCF-Geothermal Development Facility-Budget and Timeline-IDB-April2016.

Geothermal plants provide baseload electricity thus do not put pressure on the grid due to variability as solar and wind energy do. The programme will replace existing baseload generation plants which could be adapted to provide peaking capacity. This would enable future integration of variable solar and wind energy and thus catalyze long term clean energy investment.

E.6.3. Financial viability

A Cost Benefit Analysis (‘CBA’) was developed estimating the economic costs and benefits of the three GE projects for a period of 40 years, as follows:

- Economic costs include the capital investments needed to complete the stages that are pending for the geothermal projects in each country.

- Economic benefits include the savings in generation costs and the benefits from reductions in CO2 emissions. Generating electricity from geothermal resources cost less than generating electricity from fuel oil. Therefore, the countries will save in generation costs by replacing fuel oil generation with geothermal generation. In addition, geothermal generation produces less CO2 emissions than fuel oil generation. Therefore, the countries will benefit from reductions in CO2 emissions by replacing fuel oil generation with geothermal generation.

The results are presented in the following table which shows the net present value of the benefits, costs, and net benefits of the GE project in each of the 5ECC as well as the internal rate of return (IRR) as shown in table 10.

Table 10: Economic Costs and Benefits of the Geothermal Projects (US$ millions)

Project	Present Value (PV) of Benefits (US$)	PV of Costs (US$)	PV of net benefits (US$)	IRR
DOM	110.6	60.6	50.0	20.4%
GRE	100.7	78.9	21.8	14.7%
Nevis	97.4	78.3	19.2	14.5%
SL	178.6	121.8	57.4	16.7%
SVG	99.1	80.1	19.0	14.4%
Total	586.4	419.1	167.3	

The most important effect of having GCF funding for the 5ECC is the enhancement of GE project feasibility as the average cost of financing for GE projects is reduced and ensuring, that by providing an end to end solution, these projects will reach GE plant construction and generate the expected benefits. Also, GCF funding leads to a higher reduction in average tariffs for final users as compared to the expected reduction without GCF. The reduction in the average tariff to customers is higher due to the availability of GCF funding. Below, as shown in table 11, the average electricity tariff for the 5ECC is 0.28US$/kWh with GCF funding and US$0.29/kWh without GCF funding.

More importantly, GCF will contribute to assure that funding for end to end investments (from exploration until transmission lines and substations) will occur, and therefore power will be generated in the shortest time possible, hence oil power generation will be displaced faster than with GCF funding. Before the SEF, funding was scattered, obtained is small quantities and had no clear planning of funding and its activities. The SEF, with the GCF funding, will contribute to help governments plan carefully their GE developments, expedite GE investments, harnesses the benefits of concessional lending, and translate these into lower electricity tariffs, making their countries more competitive.

The table below compares the estimated all in cost of project debt, including both concessional debt made available through this programme and IDB-SEF and commercial debt. GCF funding helps reduce the all in cost of debt further for GE projects in the region thus translating into even lower electricity tariffs. GCF funding reduces average all in cost of debt from 5.16% to 4.15% thus reducing average electricity tariffs from 0.29 to 0.28 US$/Kwh.

Table 11:Value added of GCF (all in cost and tariff)

All in cost of total project debt		Est. Avg. tariff in country with geothermal

	(annual %)		Avg. tariff (2014) (US$/kwh)	(US$/kwh)	
Country	With GCF	Without GCF		With GCF	Without GCF
DOM	2.09%	4.03%	0.36	0.24	0.26
GRE	4.57%	5.09%	0.37	0.34	0.35
Nevis	4.59%	6.06%	0.32	0.26	0.28
SL	5.57%	6.50%	0.32	0.29	0.30
SVG	3.12%	4.10%	0.35	0.28	0.29
Average	4.15%	5.16%	0.35	0.28	0.29

E.6.4. Application of best practices

Technical, Environmental and Procurement best practices will apply in this programme.

From a technical point of view, the high-risk cost of drilling to confirm the existence of a viable geothermal resource remains one of the key challenges facing the industry. However, following best practices in the exploration stage will reduce the uncertainty of the resource's location, size, and productivity characteristics, which in turn will lower the risk during the drilling phase. The International Finance Corporation (IFC) and the International Geothermal Association in 2014 published a "Best Practices Guide for Geothermal Development"[22] which can be used by developers and contractors to identify the most appropriate tools and techniques to define the resource, and by investors to ensure that projects have made all reasonable efforts to reduce risks. Whenever applicable to the project and country specific context, this document will be used as a resource to ensure best practices are applied. IDB will therefore contract specialized consultants who will accompany CDB in the programme implementation process and ensure best practices projects are applied during all project development phases.

Environmental and social best practices are applied by requiring all projects funded by the programme to follow IDBs and CDBs best environmental and social safeguard policies, standards and guidelines which follow best international practices, which follow International Finance Corporation (IFC) environmental and social performance standards.

From a procurement point of view, the programme will ensure that competitive bidding process will occur for all GE stages in all beneficiary countries following CDB procurement rules that are compatible with IDB procurement policies.

E.6.5. Key efficiency and effectiveness indicators

	Estimated cost per t CO_2 eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)

[22] http://goo.gl/Am9W4i

GCF core indicators	(a) Total project financing	US$ USD190.468 million million
	(b) Requested GCF amount	US$ 80 million
	(c) Expected lifetime emission reductions overtime	9,402,621 tCO_2eq
	(d) Estimated cost per tCO_2eq (d = a / c)	US$ 20.3 **/ tCO_2eq**
	(e) Estimated GCF cost per tCO_2eq removed (e = b / c)	US$ 8.5 **/ tCO_2eq**

Methodology used for calculating the indicators (d) and (e) above.

The "Total project financing" is the whole amount of funding made available through the programme which includes IDB, CTF, JICA, GEF, CDB and GFC.

For emission reduction calculations, please refer to chapter E.1.2.

Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (mitigation only)
The total funding including the Programme and other donors and private sector is currently estimated at US$ 530 million. For more details please refer to the attached Excel worksheet "*GCF-Geothermal Development Facility-Budget and Timeline-IDB-April2016*

Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/programme)	

** The information can be drawn from the project/programme appraisal document.*

F.1. Economic and Financial Analysis

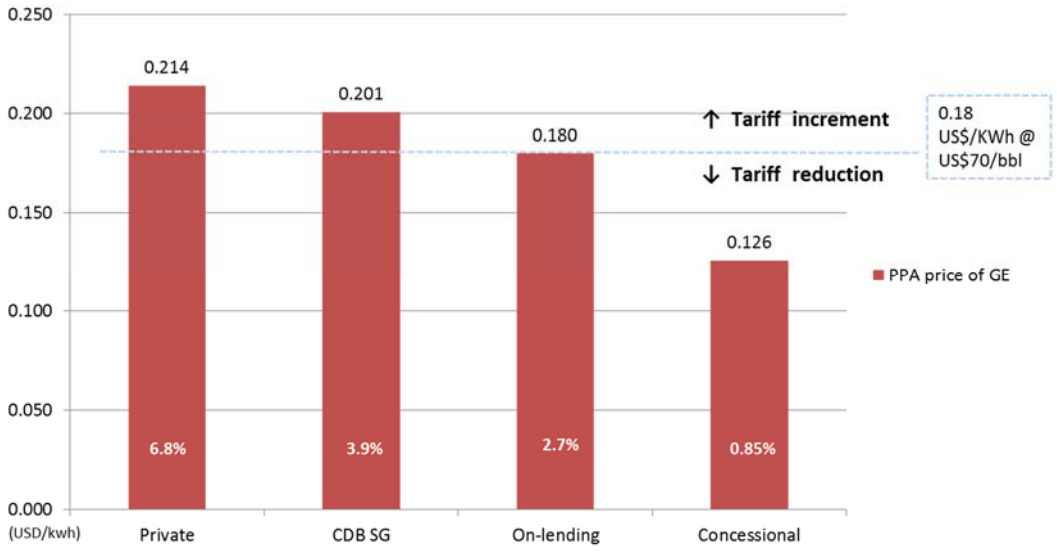
A financial analysis of GE projects is presented below for each of the participating countries. Please note that the IRR is Internal Rate of Return of the cash flows to equity investors and we assume a 12% real discount rate, as shown in table 12.

Table 12: NPV and IRR to equity investors of GE

Country	NPV (US$ Millions)	IRR to equity investors (real)	PPA (US$/kWh)
DOM	1.9	15%	0.096
Grenada	5.6	18%	0.187
Nevis	5.3	15%	0.172
SL	10.1	15%	0.163
SVG	3.5	15%	0.145

Justification for concessionality: *C*alculations were made to estimate the impact of financing cost on the indicative PPA price for small scale GE. Only with the concessional funds from the GCF and the blending of funds will concessionality be enough to make projects feasible and result in electricity tariff reduction as presented in the figure 8 below. The analysis of figure 8 shows that blended rate of concessional loans at 2.7% or below will translate in tariff reduction, any rate above, will have an increment in tariff, hence the need for concessional funding.

Figure 8: Effect of Conccesional loans in Tariff

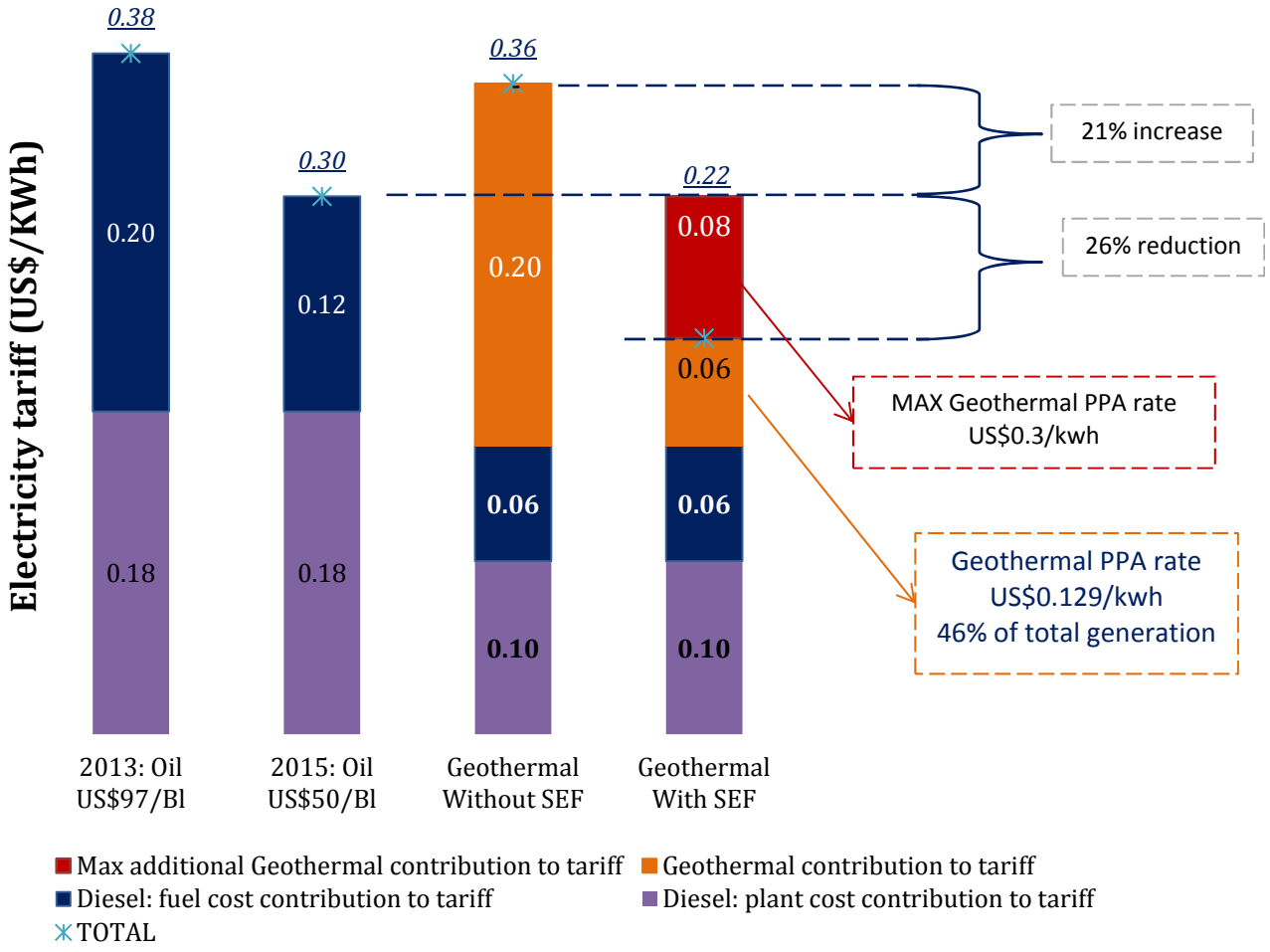


Using SVG as an example, the following figure shows how the availability of concessional funding as offered through IDB-SEF and this programme, would allow for the reduction of electricity tariffs in the country. In the absence of concessional funding, GE projects would rely on a higher share of equity contributions from private developers in order to prove the geothermal resources and undertake capital intensive investments in these small electricity markets. This would increase the average cost of capital for GE projects leading to an increase instead of a decrease of electricity tariffs.

As the following figure shows, in a scenario without concessional funding (see bar labeled Geothermal Without SEF) tariffs could increase around 30% with respect to the 2015 average. With concessional funding (see bar labeled Geothermal With SEF) allocated to SVG so that 100% of drilling needs (exploratrory, production, reinjection) and 70% of field development and plant construction financing needs are met by IDB-SEF the programme, the estimated PPA would be 0.186 US$/KWh leading to a 18% reduction in electricity tariffs with respect to the 2015 average in SVG.

This is meant only as an example of the effect of concessional funding on electricity tariffs. It does not reflect the allocation of IDB-SEF and programme funds used to evaluate the programme and to elaborate this funding proposal.

Figure 11: SVG - Concessional terms make tariff reductions possible



F.2. Technical Evaluation

As shown in figure 1, GE has the lowest levelized cost of energy, largest potential and displaces more oil than any other technology. GE is therefore the best technical solution for the 5ECC because it can provide baseload energy with more than 90% capacity factor, at the lowest cost and can therefore fully replace liquid fossil based generation and doesn't generate grid integration issues (such as back up capacity and intermittency issues) as wind and solar do.

F.3. Environmental, Social Assessment, including Gender Considerations

IDB Policies and management programs related to Environmental and Social Assessment, as well as gender policies, are fully consistent with GCF requirements. IDB has gone through an in-depth assessment by the GCF Secretariat and the Independent Accreditation Panel and a full accreditation with no conditions has been awarded.

As reference, the conclusion of the Independent Panel on IDB application, as included in the GCF Board document "Consideration of Accreditation Proposals" endorsed by the GCF 10th Board: *"The applicant fully meets the requirements of the Fund's interim ESS in relation to the high E&S risk Category A/I-1; and (c) The applicant has demonstrated that it has policies, procedures and competencies by which to implement its gender policy, which is found to be consistent with the Fund's gender policy, and has also demonstrated that it has experience with gender consideration in the context of climate change activities"*

All the steps required by the IDB in relation to the ESS and Gender are described in detail in the IDB accreditation application sections 6 and 7, respectively.

Environmental and Social Impacts: The exploration phase of each project will include possible negative environmental impacts and risks, though the more significant impacts are expected during construction. Each of the projects will involve drilling and testing of new production wells, reinjection wells, construction of the power plants buildings, installation of equipment and, potential new access roads and electrical transmission associated facilities. Main construction impacts expected are: (i) potential contamination of soil and ground water by drilling mud (essentially a suspension of a natural clay material - bentonite - with some additives added), drilling mud with cuttings, or through the reinjection of the geothermal fluid (essentially a mixture of hot water and steam, at temperatures that can reach 290°C, with dissolved salts and gases); (ii) increased water demand from wells drilling and testing and for the cooling system; (iii) potential land contamination due to the disposal of drilling mud and solid wastes; (iv) noise and vibrations generated during drilling; and (v) effects of drilling on groundwater aquifers, nearby hot springs, natural thermal features, and induced micro-seismicity and/ground subsidence; (vi) increased heavy traffic and potential traffic accidents in the vicinity of the project site; (vii) noise and dust emissions; and (viii) soil erosion and loss of vegetation.

Most of these construction impacts and risks can be adequately mitigated through the implementation of appropriate environmental, health and safety management plans and standard operating procedures (SOPs). Once in operation, main impacts and risks are: (i) an increased level of micro-seismicity in the region; (ii) land subsidence; (iii) surface and underground water contamination due to accidental spills; (iv) mud contamination; (v) air emissions of hydrogen sulfide; (vi) health and occupational accidents; and (vii) increased exposure of community and workers to explosions, well blowouts and pipeline failures.

As of now Environmental and Social Impact Assessments (ESIA) have been done for DOM, Nevis (exploration phase), and SVG (exploration phase); the latter financed by IDB. Further ESIAs will be financed by the programme and/or IDB-SEF as required.

Management of Environmental and Social Aspects: CDB's current Environmental and Social Policies and Review Procedures (ESRP) were approved at the end of June 2015. Their procedures include a set of nine environmental and social performance standards (PS) that reflect the principles, core policies, standards and best practice approaches adopted and used in the treatment of sensitive environmental and social issues by the multilateral

financial and development community. As a matter of practice, under this Facility, sub-projects will be reviewed against the IFC Performance Standards and World Bank Environmental, Health and Safety (EHS) Guidelines.
IDB and CDB have agreed that for all Geothermal high risk sub-projects (Category A and B+), IDB will undertake Environmental and Social Due Diligence ("ESDD") alongside CDB's team throughout the project preparation, appraisal, and monitoring phases. The objective of this hand-in-hand due diligence is to help build environmental and social (E&S) capacity in CDB's analysis of high risk geothermal projects, and ensure that project impacts are adequately mitigated according to the IFC Performance Standards and WB EHS Guidelines.

The ESSD will specifically address the following aspects:

a. Confirmation that the Project has been designed and carried out in compliance with environmental law and regulations of the specific country, any applicable IDB Environmental and Social Safeguards and IFC EHS Guidelines;
b. An assessment of the Project's Environmental, Health and Safety Management System, including plans and procedures, to assess their adequacy in terms of responsibilities, training, auditing, reporting, and resources to be made available to ensure adequate implementation;
c. Detailed review of the drilling program and storage facilities for the drilling mud; Evaluation of management of drilling fluids and mud cuttings (treatment on-site and disposal); Assessment of the monitoring framework of the drilling fluids and post-treatment techniques;
d. Verification if public consultations have been conducted according to Bank's requirements and in accordance with OP-765; especially in terms of good faith negotiation;
e. Assess if sufficient social baseline efforts have been done by the company to obtain an accurate socio-economic portray of the Indigenous communities;
f. Assessment of potential adverse socio-economic impacts of land acquisition, construction activities, temporary loss of access to agricultural land required for the installation of the transmission line; Evaluation of mitigation and compensation framework and measures for the current land owners along planned transmission lines;
g. Assess impacts related to the presence of the workers camp and if management plans are adequate, especially in terms of waste water storage and treatment; Evaluation of the social impacts associated with the presence of a people workers camp (in migration, substances-abused problems, acceptance from host communities, retrenchment management, etc.);
h. Assess health and safety practices for workers and if the Project is meeting best industry standards in terms or working at high altitude and in remote region;
i. Evaluation of potential impacts and risks on seismicity and subsidence, as well as measures considered to monitor and mitigate these risks;

Due to the high risk nature of GE projects, the IDB will engage the CDB in a "hand-in-hand" E&S due diligence process on all geothermal sub-projects, providing final sign off and closely monitoring project implementation with the support of an external consultant. In addition to this agreed due diligence process requirement, the IDB will require as part of the loan agreement that the CDB comply with all applicable local environmental, social, health and safety, and labor regulatory requirements, and in relation to the financing of sub-projects with IDB's proceeds ensure that each sub-project complies with: (i) CDB´s E&S policies and review procedures; (ii) in-country regulations; (iii) IDB's list of excluded activities; (iv) fundamental principles of the rights at work; and (v) the International Finance Corporation (IFC) performance standards and applicable WB environmental, health and safety guidelines. For further details on the possible risks and impacts, due diligence process stages and risk management mechanisms, and contractual requirements, please refer to the Environmental and Social Management Report (ESMR) for the IDB-SEF.

Gender: The programme will incorporate in its components elements which will contribute to the achievement of the first strategic gender objective in the Implementation Guidelines for the Operational Policy on Gender Equality in

Development that is empowering women economically by facilitating women's access to economic opportunities and promoting women's entrepreneurship.

The programme will encourage gender equality in hiring. The companies will be encouraged to adopt practices such as hiring under equal conditions, review of hiring requirements to detect criteria that potentially exclude women, and the possibility of setting targets related to women participation. Besides, the project will promote the inclusion of local women in training activities for the construction, operation and maintenance work that does not require specific qualifications.

When possible the project will support a shift from the informal to the formal sector for women's businesses that provide services such as cleaning, food services, textile production for uniforms, etc. to the geothermal facility. To secure the working environment of women employed in the plant there will be exclusive bathrooms for women, and appropriate uniforms for females.

F.4. Financial Management and Procurement

Procurement: Given the consistency of CDB procurement policies with those of the IDB, CDB will use its own procurement policies for operations receiving financing from this programme. IDB policies require that funds from Bank loans be used only for procurement of activities contracted with firms or individuals of IDB member countries. Therefore, an exception will be requested for approval by the Board of Executive Directors so that goods, works and services providers from CDB member countries, which are not members of the IDB, may participate in the procurement processes for activities to be financed with resources of the SEF.

Financial Management: The CDB's financial management electronic system, which includes a Bank Enterprise System (Infor's SmartStream) and a Loan, Borrowing and Grant Management System (Flexcube) will be used to facilitate the financial management and reporting of the project. The financial reports are prepared in accordance with International Financial Reporting Standards under the historical cost basis except as modified by the revaluation of debt securities at fair value through profit and loss and derivative financial instruments are reflected at fair value. Financial management of the project will be i) guided by the CDB's accounting policies and procedures, and procedures related to the financial and operational aspects related to the management of projects under their administration; and ii) in accordance with requirements as per IDB's Financial Management Guidelines ; Disbursement Handbook and Financial Reports and External Audit Handbook.

External Control and Reporting Requirememts of the project.

- Submission of Annual Audited Financial Statements of the CDB. These will be become due for submission within 180 days following the close of CDB's fiscal year end (December 31st).
- Annual Assurance report on the process of preparation and submission of disbursement requests. The engagement will be conducted by an independent audit firm that is eligible to the IDB, and the report submitted within 180 days following the close of CDB's fiscal year end, December 31st.

Financial structure: The CDB has two sources of funding for its borrowing members: (i) OCR financed from equity contributions, market borrowings and income; and (ii) Special Funds Resources (SFR). The SFR comprises a number of funds, the largest of which is the Unified Special Development Fund, while all others funds together are referred to as the Other Special Funds (OSF). The Ordinary Capital (OC) resources of the IDB will be treated and on-lent by CDB as its OCR resources; the CTF, GCF, and GEF resources will be managed and accounted for as special funds within the OSF. More information is available in the financial terms sheet.

Disbursements and commitment period. It is expected that the loan will have an 8 year disbursement period. As operations are executed, the CDB will present disbursement requests based on the advance of the programme. Advances will be disbursed based on the liquidity needs of the project within a 6 month period. With the exception of the first advance of funds, the CDB should have presented a justification for the use of at 70% of the total cumulative balances pending justification for this purpose, and the Bank having accepted such justification.

The satisfactory delivery of relevant Environmental and Social Impact Assessments (ESIA) will be a precondition to disbursement for the programme from CDB to each sub- project.

Execution and administration. The provisions governing program execution, including the use of SEF resources and eligibility of each financial instrument to be used on a project by project basis, will be established in the Operating Manual (OM) agreed by the IDB and CDB. It is a special contractual condition prior to the first disbursement of the IDB-SEF that: (i) the CDB provides evidence of the entry into effect of the OM, including the Credit Regulations of the program, in terms previously agreed with the Bank; and that (ii) the Bank provides its non-objection for the sub-loans model agreements, meeting the minimum requirements established in the OM.

G.1. Risk Assessment Summary

The main risks identified for this programme are Environmental and Social Safeguard Risks, Fiduciary Risk and Institutional capabilities risk.

G.2. Risk Factors and Mitigation Measures

Please describe financial, technical and operational, social and environmental and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures.

Selected Risk Factor 1

Description	Risk category	Level of risk	Probability of risk occurring
Environmental and Social Safeguard Risks: The construction impacts for GE projects can include: (i) potential contamination of soil and ground water by drilling mud; (ii) increased water demand from wells drilling and testing and for the cooling system; (iii) potential land contamination due to the disposal of drilling mud and solid wastes; (iv) noise and vibrations generated during drilling; (v) effects of drilling on groundwater aquifers, nearby hot springs, natural thermal features, and induced micro-seismicity and/ground subsidence; (vi) increased heavy traffic and potential traffic accidents in the vicinity of the project site; (vii) noise and dust emissions; (viii) soil erosion and loss of vegetation; (ix) potential impacts to thermal features; and potential impacts to marine habitat and fauna.	Social and environmental	High (>20% of project value)	Medium

Mitigation Measure(s)

Most of these construction impacts and risks can be adequately mitigated through the implementation of appropriate environmental, health and safety management plans and standard operating procedures.

Due to the high risk nature of these sub-projects, the IDB will engage the CDB in a “hand-in-hand” E&S due diligence process on each Category A and B+ GE project (according to IDB policies A is the highest risk classification; C the lowest), providing final sign off and closely monitoring project implementation with the support of an external consultant. In addition to this agreed due diligence process requirement, the IDB will require as part of the loan agreement that the CDB comply with all applicable local environmental, social, health and safety, and labor regulatory requirements, and in relation to the financing of sub-projects with IDB’s proceeds ensure that each sub-project complies with: (i) CDB´s E&S policies and review procedures; (ii) in-country regulations; (iii) IDB’s list of excluded activities; (iv) fundamental principles of the rights at work; and (v) the International Finance Corporation performance standards and applicable World Bank environmental, health and safety guidelines.

Selected Risk Factor 2

Description	Risk category	Level of risk	Probability of risk occurring

Fiduciary risk: The fiduciary risk has been assessed as low risk mainly due to the adequacy of the CDB's organization structure and procedures for fiduciary management, its demonstrated capacity in the fiduciary management of projects, and, the overall low risk of the CDB operational performance. The CDB is an AA rated financial institution that, according to recent reports is based on (i) its strong business profile which is reflected in its role as "the cornerstone lender" to Caribbean governments and its "extremely strong financial profile", reflected through its strengthening capital adequacy, its less diversified funding profile, and its solid liquidity. It should also be noted that the CDB has also continued to strengthen its governance structure through the consolidation of its risk management and monitoring framework, as well as through the introduction of new institutional checks and balances".	Financial	Low (<5% of project value)	Low
Mitigation Measure(s)			
A financial due diligence of CDB was undertaken by the IDB for the preparation of the Programme confirming the conclusions reached by the Standard & Poor's assessment.			
Selected Risk Factor 3			
Description	Risk category	Level of risk	Probability of risk occurring
Institutional capabilities of executing sub-projects through PPP. PPP are relatively new in the Caribbean and both the CDB and country governments have a limited track record structuring and financing this type of projects and sub-loans.	Technical and operational	Medium (5.1-20% of project value)	Low
Mitigation Measure(s)			
For this not to affect the execution and effectiveness of the Programme, technical assistance activities both to the EA and country governments to strengthen their capacity to implement the Programme have been included, considering among other aspects, the capacity of lending to private sponsors. In addition to this, the CDB, in cooperation with its development partners, including the IDB and its Multilateral Investment Fund, has established a US$1.2 million regional PPP support program designed to assist its borrowing member countries in the development and implementation of PPP. Component 2 of this programme is designed to specifically mitigate this risk, providing technical assistance and capacity building to both the EA and beneficiary countries. Additionally, the IDB will be funding a consulting firm that will provide technical support to the EA during the entire loan preparation and approval of at least one GE project.			
Selected Risk Factor 4			
Description	Risk category	Level of risk	Probability of risk occurring

Institutional capabilities of executing agencies of sub-projects. Given the small size of the countries and the consequent scarcity of management resources for projects, weak institutional capabilities of executing agencies could affect the effectiveness of projects.	Technical and operational	Medium (5.1-20% of project value)	Low
Mitigation Measure(s)			
To mitigate this risk the Programme will ensure through Component 2 the transfer from third party technical expertise to develop local competencies as well as the availability of specific training and advisory services as required by the EA and the projects.			

H.1. Logic Framework.

Please specify the logic framework in accordance with the GCF's Results Management Framework and Performance Measurement Framework.

H.1.1. Paradigm Shift Objectives and Impacts at the Fund level[23]

Paradigm shift objectives	
Shift to low-emission sustainable development pathways	This project will have a transformational effect for the ECC by replacing power generation currently based on liquid fossil fuels with geothermal power, a renewable energy source. Not only will carbon emissions be reduced, but the electricity cost for final users will be reduced boosting the region's competitiveness. In addition to the GE development that will be supported by the programme in these five countries, the ECC have the potential to develop an additional GE plant in DOM to export to neighboring islands. Depending on the results of SVG's exploration, if successful, more GE could be developed to export to Barbados. Also, in SKN the programme has the potential to scale up to a second phase, to add additional 25MW in order to supply St Kitts from Nevis through a subsea cable. SKN could also develop more GE to export to the neighboring islands (Saba and Montserrat). The successful implementation of the GeoSmart Initiative will generate a wealth of experience that can be shared through south-south cooperation between SIDS from the Caribbean and the Pacific. Facing similar conditions and barriers than the ECC, the Pacific islands have an important untapped geothermal resource potential, in particular Papua New Guinea, Vanuatu, Samoa, Tonga, N. Marianas Islands. Fiji, Solomon Islands and New Caledonia.

Expected Result	**Indicator**	**Means of Verification (MoV)**	**Baseline**	**Target**		**Assumptions**
				Mid-term (if applicable)	Final	
Fund-level impacts						
M1.0 Reduced emissions through increased low-emission energy access and power generation	*Tonnes of carbon dioxide equivalent (t CO2 eq) to be reduced or avoided* per year	Reporting of annual energy produced in MWh per year from each supported GE plant	0	1,542,104	9,402,621	This targets are based on the assumption that 60 MW of GE capacity are installed

[23] Information on the Fund's expected results and indicators can be found in its Performance Measurement Frameworks available at the following link (Please note that some indicators are under refinement): http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf

H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme level						
Expected Result	**Indicator**	**Means of Verification (MoV)**	**Baseline**	**Target**		**Assumptions**
				Mid-term (if applicable)	Final	
Project/programme outcomes	**Outcomes that contribute to Fund-level impacts**					
M6.0 Increased number of small, medium and large low-emission power suppliers	MWs of low-emission energy capacity installed, generated and/or rehabilitated as a result of GCF support	Report from CDB with information from 5ECC and private project sponsors.	0	7.5	60 MW	Field Development (plant) will be financed by the Programme in 5 countries (10MW/country in DOM, GRE, Nevis, SVG and 20MW in SL)
M5.0 Strengthened institutional and regulatory systems	# of low-emission policies, laws, strategies and plans supported by the fund	Cabinet approval of GE developmen t bills	1 (Nevis)	1	4	Countries will prepare geothermal development bills and present them to parliament for approval
Project/programme outputs	**Outputs that contribute to outcomes**					
1.1 Drilling Exploration	# of drilling exploration campaigns	Report from CDB with information from 5ECC and private project sponsors.	0	1	2	Drilling Exploration campaign will be financed by the Programme in at least 2 countries
1.2 Production Drilling	# of production drilling campaigns	Report from CDB with information from 5ECC and private project sponsors.	0	1	4	Production Drilling campaign will be financed by the Programme in 4 countries
1.3: Electricity production	MW of geothermal capacity.	Report from CDB with information from 5ECC and private	0	7.5	60 MW	Field Development (plant) will be financed by the Programme in 5 countries (10MW/country in

		project sponsors.				DOM, GRE, Nevis, SVG and 20MW in SL)
	Reduction of the average electricity tariffs, as a result of generation costs reduction (US$/kwh)	Information on electricity tariffs from the utility	US$0.35/ kWh	NA	US$0.28 /kWh	Reduction of the average electricity generation cost and, if generation cost reductions are passed on to customers, this should lead to an average decrease in tariffs from US$0.35/kWh in 2015 (at a fuel price of US$70 per barrel) to US$0.28/kWh[24].
2.1 Regulatory framework	# of countries that have GE legal and regulatory frameworks.	Cabinet approval	1	1	4	4 countries will receive support from the Programme to develop and adopt Geothermal development bills and PPP structure.
2.2: Institutional strengthening and capacity building	# of public institutions and/or private sector geothermal developers trained in GE development	Report from CDB with information from 5ECC	0	2	10	Capacity building and technical assistance activities will be provided to the CDB and to DOM, SL, SVG, GRE and SKN in order to strengthen their capacity to

[24] For each country, the estimated average tariff when geothermal generation is introduced is calculated as the weighted average of the current average tariff (2014) and the estimated 'tariff with geothermal'. The weights are the contribution of geothermal and diesel (or HFO) generation to the total projected generation in each country when geothermal comes online. The 'tariff with geothermal' is the sum of two components: the geothermal PPA rate, plus the portion of the current tariff, that is not generation cost, that will still be charged to customers when geothermal comes online. The geothermal PPA rate is the rate at which the geothermal projects need to sell each kwh of electricity to be able to service their debts and provide equity investors with a 15 percent real return. The portion of the current tariff that is added to the PPA rate is an estimate of the costs not related to generation, which are charged to customers via tariff regardless of the generation technology used. 4 Such costs include an estimate of transmission and distribution costs, administrative and other non-generation OpEx, and other costs.

						implement the programme

Activities	**Description**	**Inputs**	**Description**
Activity 1.1.1	Drilling of full size exploration wells	• Drilling contract • Drilling campaign designed/defined	Based on surface studies and technical information, the developer selects drilling sites and procures specialized drilling services
Activity 1.1.2	Feasibility studies and Environmental and Social Impact Assessments (ESIA) for production drilling	• Consulting services to define drilling site • Pre-feasibility studies (3G)	Pre-feasibility studies (3G) will serve as a basis to conduct feasibility studies and environmental and social assessments on selected sites.
Activity 1.2.1	Drilling of production wells	• Feasibility studies • Environmental and Social Impact Assessments (ESIA) • Procurement process and contracts for drilling companies	Based on feasibility studies and ESIA, contract will be executed to conduct well drilling.
Activity 1.2.2	Drilling of reinjection wells	• Feasibility studies • Environmental and Social Impact Assessments (ESIA) • Procurement process and contract for well reinjection	Contract execution for well reinjection.
Activity 1.3.1	Engineering and construction of steam gathering system	• Proven resource and resource data collection • Procurement process and contract to construct steam gathering system	Based on resource data, developers will construct steam gathering system
Activity 1.3.2	Engineering and construction of power plants	• Process to select Engineering, Procurement and Construction (EPC) contractor	Based on proven and tested resource, engineering contractor will design, procure, construct, commission and handover power plants

Activity 1.3.3	Construction of substations and transmission lines	• EPC Contractor	EPC Contractor will provide detailed engineering of substations and transmission lines
Activity 2.1.1	Technical assistance will be provided to support for the 5ECC in developing an effective legal, policy, regulatory, and environmental framework for the implementation of GE projects	• Consulting services to review and upgrade current legal, policy, and regulatory frameworks, as well as environmental requirements, in the ECC	It is expected that all the participating countries develop and adopt geothermal development bills. Currently the only country of the 5ECC which has a Geothermal Bill approved is SVG. The other countries are at different stage of development and approval of the regulatory framework for exploration and other phases of GE development
Activity 2.2.1	Training on GE technology development.	• Workshops and training	Training to be provided to all personnel that may be involved with GE development
Activity 2.2.2	Training on project management and execution	• Software, as needed • Training personnel	System readiness and personnel assessment will be carried out to target training
Activity 2.2.3	Training on sub-loan evaluation and execution.	• Capacity building and transactional advisory services for the Executing Agency (EA)	This will assist staff in successfully evaluating and executing sub-loans
Activity 2.2.4	Consulting services to provide specific skills and advisory services as and when required for sub-project preparation	• Consulting services to provide support to EA	Consulting services to provide support to EA
Activity 2.2.5	Drafting of legal documents (i.e. loan contracts for GE sub-loans)	• Specialized legal support	This support may be necessary and will assist ECC institutions in developing legally sound documents
Activity 2.2.6	Transaction advisory support to structure projects and negotiate with private partners	• PPP and innovative financing mechanisms training	Personnel in relevant ECC public institutions and CDB will be trained in PPP and innovative financial mechanisms, as necessary.

H.2. Arrangements for Monitoring, Reporting and Evaluation

The CDB will monitor and supervise operations based on their policies and procedures and provide IDB with the necessary information for IDB to monitor and evaluate the program as well as to comply with its reporting obligations to the GCF and CTF.

Progress reports. The results of CDB's monitoring and supervision will be reported to the IDB through semi-annual progress reports submitted no later than 60 days after the end of each semester. These reports will be used to provide the GCF with the required information to submit the Annual Performance Report annual performance reporting requirements. These reports will indicate the degree of fulfillment of the output indicators and progress toward the outcomes of the Results Matrix, making it possible for the IDB to monitor these indicators using the IDB's Project Monitoring Report. They will also include for each individual operation: (i) a report on its consistency with the sub-loans eligibility criteria, environmental and social safeguards criteria as detailed in the operating manual; (ii) CDB financial statements of the individual operation and summary updates on its situation, the problems encountered and measures taken to address them; and (iii) data on the outcome and outputs of the results matrix of the individual operation. The latter will be based on information in the CDB's Project Supervision Reports, copies of which will be annexed to the reports.

External control and reporting. In accordance with the IDB's Financial Management Guidelines, external audit requirements will be met through: (i) submission of the Annual Audited Financial Statements (AFS) of the CDB. These reports are to be presented to the IDB within 180 days following the end of CDB's fiscal year end; (ii) submission of an assurance report on the process of preparation and submission of disbursement requests. These reports will be conducted by an independent audit firm that is eligible to the IDB, and the report submitted within 180 days following the end of CDB's fiscal year end. The CDB may utilize the services of its auditors, once they are eligible to the IDB; and (iii) submission of semi-annual unaudited financial reports of the Programme 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 do not include project specific information.

Midterm project review. Once 50% of loan resources are disbursed, or after 4 years from the initiation of program execution, whichever is earlier, a midterm review will be jointly conducted by the CDB and the IDB by an independent evaluator.

Project Completion Report (PCR). A PCR will be prepared evaluating the impact and results obtained by the program and each sub-project completed. As part of the PCR an ex post cost benefit analysis of the program will be developed. It is recommended that the PCR be conducted once 100% of the program is completed. The PCR will include the progress in meeting the project results as defined in the results matrix, information on the execution of the program and lessons learned.

Final Evaluation. A final evaluation will be carried out six months after the closing date of the program. Both evaluations will be contracted by independent consultants hired by IDB.

I. Supporting Documents for Funding Proposal

☒ NDA No-objection Letter (St Vincent & Grenadines; other letters are being processed)

☒ Feasibility Study

☒ Integrated Financial Model that provides sensitivity analysis of critical elements (xls format) ☒ Confirmation letter or letter of commitment for co-financing commitment

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☒ Term Sheet

☒ Environmental and Social Impact Assessment (ESIA)

☒ Appraisal Report or Due Diligence Report with recommendations

☒ Evaluation Report of the baseline project

☒ Map indicating the location of the project/programme

☒ Timetable of project/programme implementation

☐ Project/programme confirmation (see the template in Annex I to the Accreditation Master Agreement)

** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*