



# SUSTAINABLE ENERGY FOR ALL

Rapid Assessment  
Gap Analysis  
Grenada



# Grenada: Rapid Assessment and Gap Analysis

## EXECUTIVE SUMMARY

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There is significant unrealized potential for sustainable energy gains in Grenada. The Government of Grenada recognizes this potential, and has set out objectives and measures to increase the uptake of renewable energy and energy efficiency. These targets are in line with the goals of Sustainable Energy for All (SE4ALL).

Grenada has achieved near universal access to energy, the first goal of SE4ALL; but high energy costs restrict the ability of households and businesses to access energy that is reasonably priced for sustainable economic growth and welfare. There is very little use of renewable energy for electricity generation; however, the country is planning to increase the share of renewables in its electricity generation mix, with an objective to supply 20 percent of all electricity and transport consumption by 2020, and 100 percent by 2030. These targets exceed the SE4ALL goal of doubling the global share of renewable energy from 15 percent to 30 percent by 2030.

The Government of Grenada has also recognized the need to increase energy efficiency. Although it has not set nationwide targets for energy efficiency, the Government plans on implementing several measures to promote energy efficiency and conservation—including setting energy efficiency standards; requiring energy audits in government buildings; mandating the compilation and publication of benchmarking data on energy consumption and efficiency; providing fiscal incentives; and developing public information, education, and awareness campaigns and programs.

To achieve its goals, Grenada recognizes that it must strengthen its institutional framework; educate sufficient sustainable energy technicians and engineers; increase awareness among the public through public awareness campaigns; and facilitate the provision of reasonably priced funding for sustainable energy investments in the public and private sectors. However, further work will be required to define and implement measures to achieve these targets. Partnering with SE4ALL will benefit both parties by ensuring that Grenada will have the resources to follow through with its plans and achieve the goals it shares with SE4ALL.

## Section I: Introduction

### 1.1 COUNTRY OVERVIEW

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#### 1. Basic socio-economic data: population, GDP/capita, key economic sectors, poverty rate (current and trend)

- **Demographics<sup>1</sup>**
  - Population: 109,011 (2011 estimate)
  - Age Structure
    - 0-14: 25.4 percent
    - 15-64: 65.7 percent
    - 65 and Over: 8.9 percent
- **Economy<sup>2</sup>**
  - GDP (PPP): US\$1.47 billion
  - GDP per Capita: US\$7,780 (2011)<sup>3</sup>
  - GDP Breakdown by sector:
    - Services: 80.5 percent

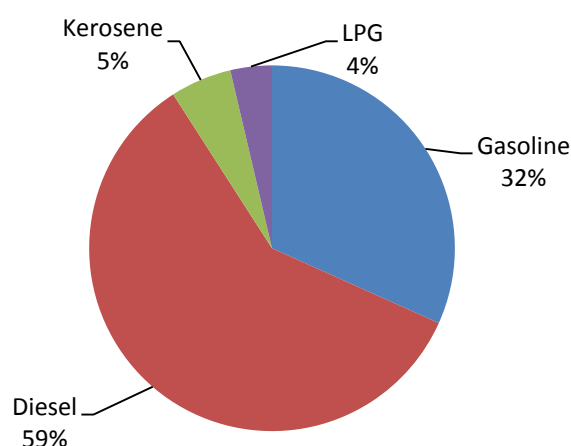
- Industry: 14.2 percent
- Agriculture: 5.3 percent
- Poverty Rate: 38 percent (2008)
- Inflation Rate: 4 percent (2011 estimate)
- Unemployment: 25 percent (2008)

## 1.2 ENERGY SITUATION

### 2. Energy supply (energy mix, export/import)

- **Primary energy sources**

**Grenada's Primary Energy Sources\* (2008)**<sup>4</sup>



\*Excludes wood-fuel and other biomass sources, for which data is unavailable

The figure presented above represents Grenada's primary energy mix in 2008. It shows that petroleum-based products represented 100 percent of Grenada's primary energy sources. As of 2012, Grenada is still almost completely reliant on petroleum products for energy supply (renewable energy accounts for less than one percent of electricity supply).<sup>5</sup>

The table below shows Grenada's energy imports between 2001 and 2008. Grenada does not export any energy products.

**Grenada's Primary Energy Supply\* in Tonnes of Oil Equivalent (2001-2008)**<sup>6</sup>

Fuel Type	2001	2002	2003	2004	2005	2006	2007	2008
Gasoline	19,786	17,874	22,280	20,202	20,368	27,518	37,910	36,746
Diesel	34,021	34,853	16,456	8,320	16,086	51,864	62,033	68,597
Kerosene	90	179	90	90	4,217	6,281	5,922	6,281
LPG	5,362	5,430	6,143	4,736	3,754	3,785	3,145	4,250
<b>TOTAL</b>	<b>59,259</b>	<b>58,337</b>	<b>44,969</b>	<b>33,348</b>	<b>44,426</b>	<b>89,447</b>	<b>109,009</b>	<b>115,874</b>

\*Excluding wood-fuel and other biomass sources, and renewable energy.

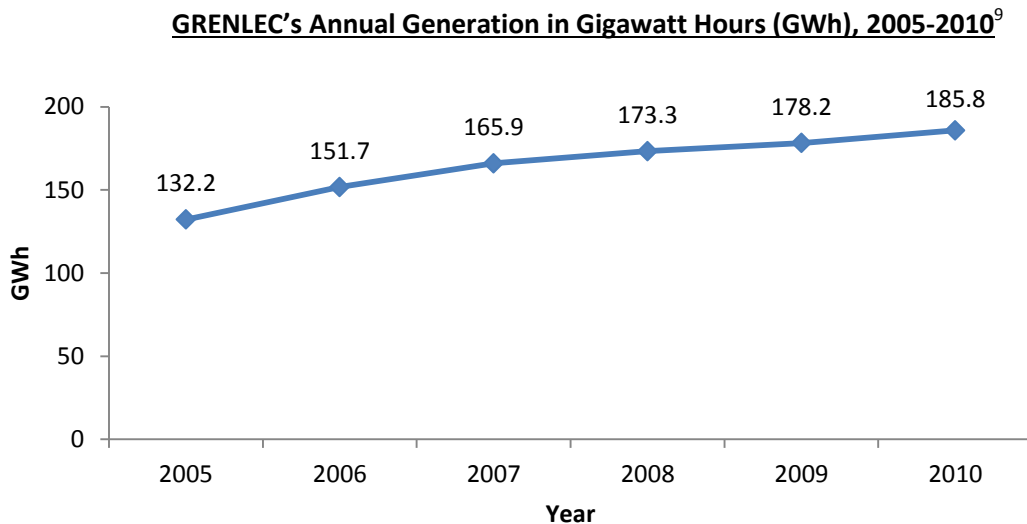
- **Power sector (installed capacity, annual generation, import/export)**

GRENLEC, the electric utility, has a total installed capacity of around 52.4 megawatts (MW) of diesel generation capacity.<sup>7</sup> There is also about 380kW of small-scale, distributed generation operated by households, businesses and hotels—including around 300 kW of solar PV systems, and 80 kW of wind energy. Several households and businesses also

reportedly own small diesel generator—but only use these as a backup option in the case of power cuts.

Grenada’s electricity grid is not interconnected with any other country. Therefore, Grenada neither imports or exports electricity. Imported diesel constitutes the source of 99 percent of electricity generated by GRENLEC; the remaining one percent is generated with small-scale solar photovoltaic and wind systems, as mentioned above.<sup>8</sup>

The figure below shows GRENLEC’s annual generation between 2005 and 2010.



### **3. Energy demand (overview of main consuming sectors, industry, residential, agriculture, transport)**

Primary energy demand in 2008 consisted of the following:<sup>10</sup>

- Power generation: 40 percent
- Transportation: 50 percent
- Other: 10 percent (this includes fuel used for cooking).

The breakdown of electricity consumption in 2010 was as follows:<sup>11</sup>

- Commercial: 55 percent (102.0 GWh)
- Residential: 39 percent (72.1 GWh)
- Industrial: 3 percent (6.3 GWh)
- Street lighting: 2 percent (4.5 GWh).

Peak electricity demand was 30.8 MW in 2010.<sup>12</sup>

### **4. Energy and economic development: share of energy sector in GDP; share and absolute amount of public spending on energy, including for energy subsidies; energy security (share of energy imports in balance of payment)**

In 2008 Grenada’s GDP was US\$832 million.<sup>13</sup> Total expenditure on oil imports was US\$25.8 million, meaning oil imports amounted to around three percent of GDP. Oil imports represented seven percent of Grenada’s total imports, and were equal to 76 percent of Grenada’s total annual export revenues.<sup>14</sup> Grenada does not subsidize energy consumption—but expenditures on electricity, fuel, and petrol accounted for 4.8 percent of the Government’s annual budget in 2011.<sup>15</sup>

## 5. Energy strategy and relevant targets (access, capacity, generation, energy security)

Physical access to energy in Grenada is near universal. However, the high cost of electricity—which is largely driven by the cost of imported fossil fuels—affects the amount of energy affordable to citizens—as well as the country’s economy, and energy security. The high cost of electricity is particularly an issue for households with low income levels, as well as hotels and businesses in the tourism sector, which have been affected by the global economic downturn over the past five years.

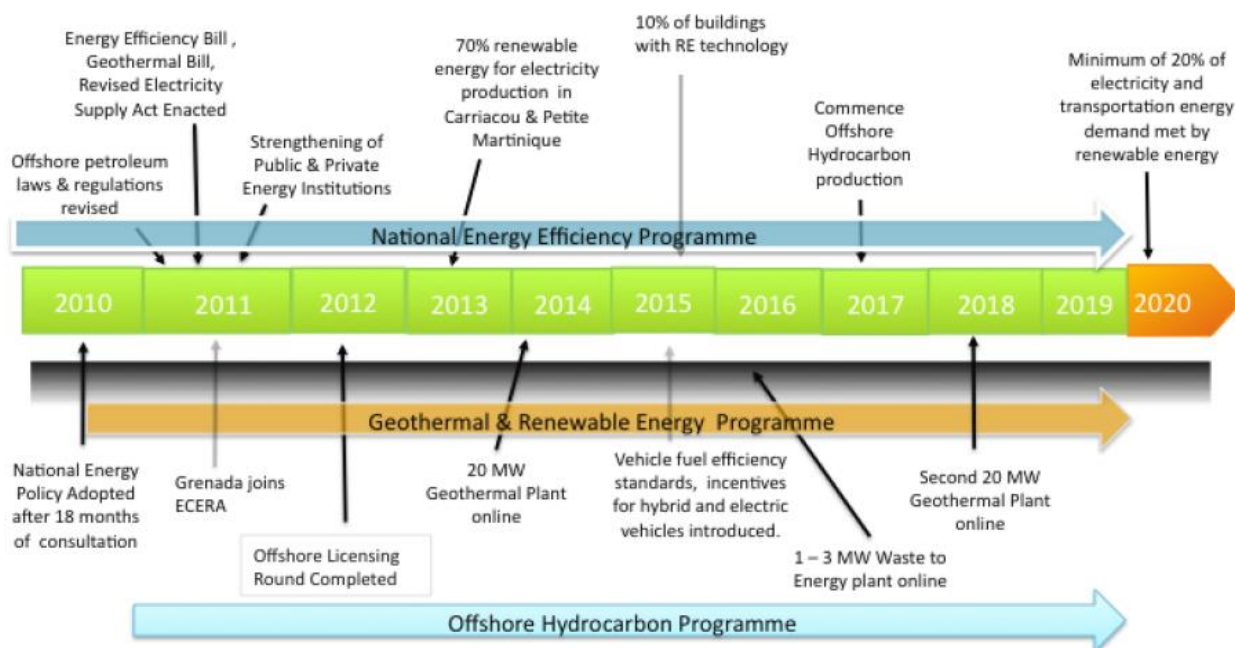
Grenada’s National Energy Policy (GNEP)—which the Cabinet approved in early 2011 and published in November 2011—sets out the Government’s objectives for shaping the energy sector in Grenada, with an overarching objective to “ensure access to affordable, equitable, and reliable energy sources and services to drive and secure national development, and improve the quality of life for all [of its] citizens”.<sup>16</sup> The GNEP is based on seven core principles: energy security, energy independence, energy efficiency, energy conservation, environmental sustainability, sustainable resource exploitation, minimizing energy prices, and energy equity and solidarity.<sup>17</sup>

The GNEP calls for a minimum of an economy-wide 20 percent reduction below ‘Business As Usual’ greenhouse gas emissions by 2020. This voluntary commitment has now been inscribed in the Barbados Declaration along with commitments from approximately 20 other Small Island Developing States (SIDS).

The GNEP sets out a specific target for renewable energy: to provide 20 percent of all domestic energy used for electricity and transport by 2020. The GNEP also calls for the implementation of various measures to encourage energy efficiency and conservation in Grenada—although it does not include specific targets for energy efficiency or energy conservation. Nevertheless, the Minister of Finance, Planning, Economy, Energy and Cooperatives (MFPEEC) proposed as part of Grenada’s 2012 budget a 20 percent cut in government expenditure on electricity, as well as a 10 percent cut on fuel/petrol expenditure. To achieve these reductions, the Waste Reduction Unit in the Ministry of Finance has designed an energy conservation campaign called “Cut the Waste, What Gets Measured Gets Done!”.<sup>18</sup>

The figure below presents the 10-year Sustainable Energy Action Plan (SEAP) set out in the GNEP.

**Grenada’s Sustainable Energy Action Plan, 2010-2020<sup>19</sup>**



As of July 2012, the Government had not passed legislation to make the measures outlined in the GNEP legally binding. The Government is currently drafting a concession law for the exploration and exploitation of geothermal resource in Grenada.

Further to the publication of the GNEP, the Government recently proposed to establish a 100 percent renewable energy target for both the electricity and transport sectors for 2030, entitled the 'Greenada Vision 2030'. The Government announced this plan—entitled the 'Greenada Vision 2030'—in June 2012 during the launch of 'Vision 2030', a private-public venture aiming to assist island states in reducing their reliance on fossil fuels by 2030. As a first step to determining the pathway towards this objective, a consortium comprising specialized firms and GRENLEC would conduct a '100 percent renewable energy showcase study'. The Cabinet approved the Greenada Vision and the signing of a Memorandum of Understanding with a German Consortium to conduct the 100% Renewable Energy Showcase study on August 10, 2012.

GRENLEC has also set objectives for renewable energy generation, which are consistent with the GNEP. These objectives are to supply 10 percent of electricity demand with renewable energy by 2013, and 30 percent of demand by 2016 (GRENLEC, 2012). GRENLEC has also set up a net billing program for distributed generation, under which the utility buys all the power generated by distributed generation technologies at the avoided fuel cost of electricity generation (GRENLEC offers two pricing options: a fixed price of EC\$0.45 per kWh for a period of 10 years, and a price adjusted annually based on the average avoided fuel cost). This program is currently limited to a maximum generation of up to 2.5 percent of total electricity demand (previously, GRENLEC was offering a net metering policy limited to a maximum generation of up to one percent of total electricity demand).

## Section 2: Current situation with regard to SE4ALL goals

### 2.1 ENERGY ACCESS vis-à-vis GOAL OF SE4ALL

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#### 6. Overview and assessment

Of the three main objectives of SE4ALL, Grenada is strongest in access to energy. Both thermal and electric energy access are near universal in Grenada. Costs, however, are high relative to larger countries. High energy costs lead some individuals (particularly those with low income) and businesses to curtail energy usage, thereby reducing quality of life and production in Grenada.

#### 7. Modern energy for thermal applications (cooking, heating)

- **Physical access: share of households without access to modern cooking/heating, industrial/agricultural use**

- Physical access to modern cooking appliances is near universal. In 2007, an estimated 96.5 percent of households used gas for cooking, and 0.6 percent used electricity. The remainder used wood (1.4 percent), coal (0.6 percent), kerosene (0.4 percent), and other sources (0.5 percent).<sup>20</sup>
- Heating for the home is not applicable in Grenada due to its tropical climate. However, solar water heaters—a modern and cost-effective sustainable energy technology—are applicable and accessible in Grenada, but are not used widely by households.<sup>21</sup>

- **Availability/quality of supply: status of domestic supply chain**

There is universal availability of quality cooking appliances and solar water heaters in Grenada.

- **Affordability: fuel prices, cost/affordability of efficient cooking stoves and fuel supplies (e.g. % of household monthly income)**

Most households in Grenada use Liquefied Petroleum Gas (LPG) for cooking. A 20 pound cylinder of LPG costs approximately US\$16 in Grenada; a 100 pound cylinder costs around US\$75. For a household with two incomes that are equivalent to the average monthly wage<sup>1</sup>, LPG expenditure would constitute approximately 2.5 percent of monthly income—assuming that a household consumes two 20 pound cylinders of LPG per month. For a household with only one wage earner and an income right at the poverty line<sup>2</sup>, and given the same consumption, expenditure on LPG would make up 8.7 percent of monthly income.

- **Sustainability: share of sustainable biomass and other RES, % household with access to efficient stoves**

The use of biomass for cooking is very limited in Grenada. As mentioned above, few households use wood for cooking in Grenada (only 1.4 percent of households in 2007).<sup>22</sup> Sustainable use of biomass is therefore not a major concern in Grenada.

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<sup>1</sup> US\$1,297 per month.

<sup>2</sup> The poverty line in Grenada is around US\$370 per month.



## 8. Access to electricity

- **Physical access: grid connection, urban/rural areas, target group: areas/category of population with minimum level of physical access**

Access to electricity is near-universal in Grenada, with 99.5 percent of the population having access to electric service.<sup>23</sup>

- **Availability and reliability of supply: frequency/duration of black-outs, load shedding (if officially practiced)**

In 2010, the combined duration of blackouts per customer in Grenada was 364 minutes, and there was an average of seven power supply interruptions per customer. During that year, average annual brownouts per customer were zero.<sup>24</sup>

- **Affordability: tariffs, share of utility bills in household incomes, subsidies**

**Electric Rate Composition (in US Dollars, 2012)**

Charge	Domestic	Commercial	Industrial	Street Lighting
Non-fuel Charge	US\$0.1536/kWh Minimum - \$4.00	US\$0.1656/kWh	US\$0.1214/kWh	US\$0.1387/kWh
Fuel Charge	Calculated Monthly	Calculated Monthly	Calculated Monthly	Calculated Monthly
Floor Area Charge	N/A	US\$0.0741 per 50 sq. feet floor area	N/A	N/A
Horsepower Charge	N/A	N/A	US\$0.0741 per horsepower; minimum US\$3.70	N/A
Environmental Levy	-Less than 99 kWh: US\$0 -99 to 149 kWh: US\$1.85 -Over 150 kWh: US\$3.70	N/A	N/A	N/A
Value-Added Tax	15% of non-fuel charge after first 99 kWh consumed	15% of non-fuel charge	15% of non-fuel charge	15% of non-fuel charge

Note: The floor charge for commercial users is meant to serve as a capacity charge, with the reasoning that floor space correlates with total potential power demand. The horsepower charge for industrial users is based on the potential power demand of the facility—it serves as a capacity charge, similarly to the floor space charge.

Source: GRENLEC, 2012.

A domestic customer using 100 kWh per month in Grenada paid US\$35.08 for their monthly electricity supply in December 2010. The average monthly demand in Grenada (including both residential and commercial) is higher however, at 352 kWh per month.<sup>3</sup> A domestic customer consuming 400 kWh per

<sup>3</sup> In 2010 GRENLEC produced a total of 185.5 GWh. Divided among its 43,699 customers this yields an average use of 352 kWh per month.

month in December 2010 paid US\$136.61 for their electric service. This means that a dual income household consuming 400 kWh per month spends approximately five percent of its monthly income on electric service.<sup>4</sup> A single wage household earning a monthly income equal to the poverty line<sup>5</sup> with electricity demand of 100 kWh per month spends approximately 10 percent of their income on electricity service. The Government's "Energy for the Poor" program has provided gas stoves and propane cylinders to qualifying families, but does not include provision for electricity subsidies.<sup>25</sup>

- **Sustainability: share of renewable energy sources (RES) in power mix**

RES currently represent less than one percent of Grenada's power mix.<sup>26</sup>

## 9. Modern energy for productive uses

- **Energy needs and access: energy demand in productive sectors; share of enterprises, industrial/agricultural, with access to modern energy sources**

The productive sectors (commercial, industry, agriculture) in Grenada have universal access to electricity. Total annual demand by sector (in GWh, for 2008) is shown on page 3.

- **Availability: quality of local supply chain and availability of required technologies for productive applications**

The productive sectors in Grenada are universally connected to the electric grid. GRENLEC's electric service is reliable and allows the productive sector to operate with little disruption due to outages.<sup>6</sup>

Solar photovoltaic systems, solar water heaters, and wind turbines are also sold locally and already in use by some entities in the productive sectors. All hotels use solar water heaters, and some are also using energy efficiency technologies, such as energy efficient air conditioning, Compact Fluorescent Lights, or Light Emitting Diode (LED) lights.<sup>27</sup>

- **Affordability and access to capital: fuel prices, cost/affordability of technology**

High electricity prices have been reported as an issue, particularly for the tourism and hospitality industry—yet, despite the potential for cost savings through renewable energy and energy efficient technologies, the uptake of such technologies in the productive sector is very limited. This is likely due to a lack of access to capital for sustainable energy technologies, which have high upfront cost compared to conventional technologies—particularly since businesses in the tourism sector have been badly affected by the global crisis, and are reportedly not making sufficient profit margins to make investments.<sup>28</sup>

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<sup>4</sup> Given GDP per capita of US\$7,780 and assuming two wage earners per home, average household income can be estimated at US\$1,297 per month.

<sup>5</sup> The poverty line in Grenada is around US\$370 per month, depending on the district (Government of Grenada Poverty Reduction Strategy, 2011).

<sup>6</sup> For information on the quality of electric service see section 8.

## 2.2 ENERGY EFFICIENCY vis-à-vis GOAL OF SE4ALL

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### 10. Overview and Assessment

Many energy efficiency technologies would constitute economically and commercially viable ways to reduce the cost of energy for businesses and households. Such technologies include:

- Energy Efficient lighting (including intelligent lighting)
- Premium Efficiency Motors
- Efficient Air-Conditioners
- Efficient Refrigerators
- Efficient LCD Computer Monitors and Television Monitors.

Despite these technologies representing viable energy efficiency options, energy efficient equipment uptake in Grenada appears to be limited to some energy efficient lighting and efficient air-conditioners, mostly in the tourism sector. There is vast room for improvement.

### 11. Energy intensity of national economy

In 2008 total primary energy supply was 115,874 barrels of oil equivalent (BOE).<sup>29</sup> Total GDP in the same year was US\$832 million.<sup>30</sup> This corresponds to US\$7,183 of GDP per BOE in 2008. There is not any sign of decoupling in Grenada. For example, for the period of 2005-2010 energy consumption grew at an average rate of 7.1 percent. GDP growth in the same period averaged 1.85 percent per year.<sup>31</sup>

- **Industrial and commercial energy use and potential for energy saving**

The industrial sector in Grenada consumed 6.3 GWh in 2010, which represented only three percent of total electricity demand. The commercial sector is the biggest consumer—in 2010 this sector consumed 102.0 GWh, and accounted for 55 percent of total electricity demand. Based on estimates carried out in the region, it is reasonable to expect that a gradual uptake of energy efficient technologies leading to a 50 percent market penetration of such technologies by 2027 could lead to a 13 percent decrease in industrial sector demand, and a 16 percent in commercial sector demand by 2017, compared to a ‘business-as-usual’ scenario where there is no additional uptake in energy efficiency, and assuming a growth in demand of four percent per year.<sup>32</sup> This would correspond to 1.6 GWh of energy savings in the industrial sector in 2017, and 32.0 GWh of energy savings in the commercial sector.

- **Household energy use and potential for energy saving**

Households consumed 38 percent of electricity in Grenada in 2008. This equated to a total consumption of 64.1 GWh in that year. It is estimated that a gradual uptake of energy efficient technologies leading to a 50 percent market penetration of these technologies by 2017 could lead to a decrease in residential sector demand of around 14 percent compared to a business-as-usual scenario in 2017 (assuming a ‘business-as-usual’ average annual growth in residential electricity sales of 4 percent). This corresponds to an estimated potential in energy savings of 19.0 GWh for the year 2017.

## 2.3 RENEWABLE ENERGY vis-à-vis GOAL OF SE4ALL

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### 12. Overview and Assessment

Grenada, Petite Martinique, and Carriacou have untapped sources of renewable energy that could be competitive with diesel generation. GRENLEC is pursuing wind, waste-to-energy, solar photovoltaic, and

geothermal options. The regulatory changes and measures proposed in the GNEP may spur greater renewable energy development in the near term.

### 13. On-grid and off-grid renewable energy

There is no utility scale renewable energy generation in Grenada, despite the fact that geothermal, solar PV, wind and waste-to-energy could be commercially viable. There is some distributed generation, but it makes up less than one percent of total generation capacity (in 2011, distributed generation comprised of 300 kW of solar photovoltaic and 80 kW of wind energy). Because of near universal access to the grid, there are no off-grid renewable energy projects in Grenada.

### 14. Use of renewable energy sources (RES) for thermal applications (cooking/heating)

4,500 solar water heaters were imported to Grenada between 2000 and 2008.<sup>33</sup> Assuming that importation levels between 2009-2011 were at 2008 levels (circa 900 units annually), there may be at least 7,200 solar water heaters in use in Grenada, in addition to any that may have been imported prior to the year 2000. There is no indication of renewable energy being used for cooking applications in Grenada—aside from a small number of individuals using solar cookers and driers.<sup>34</sup>

### 15. Use of RES for productive activities

A hotel operates the only wind turbine (80 kW) in Grenada. The Maca Bana Villas Hotel has installed a 10 kW (peaking) solar PV system.<sup>35</sup> Other hotels have also installed renewable generation technologies such as solar water heaters.

**16. Consolidated Summary:** Grenada is fortunate to have 99.5 percent of its population connected to the electric grid. However, the cost of energy in Grenada is relatively high. This affects the energy consumption of households and businesses, in addition to the entire country's economy. To address this problem, the Government of Grenada intends to implement measures for increasing the uptake of economically and commercially viable energy efficiency and renewable energy technologies.

## 2.4 SE4ALL GOALS

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### 17. Goals

- **Energy access**

Energy access is near-universal in Grenada. As stated in the GNEP, the objective of the Government is to ensure access to “affordable, equitable, and reliable energy sources and services.”<sup>36</sup> The Government intends to achieve this by implementing programs and measures to expand the use of sustainable energy.<sup>37</sup>

- **Energy efficiency**

As stated in the GNEP, the Government plans to enact an Energy Efficiency Act. The goal of this act will be to “reduce the national rate of energy consumption while increasing the economic growth (decoupling), by adopting best practices in energy efficiency and conservation” through targeting specific regulatory, information, and financial barriers to energy efficiency.<sup>38</sup> However, the Government has not set out a target for energy savings in Grenada.

- **Renewable energy**

In the GNEP, the Government has set the following goals: (i) ten percent of buildings in Grenada to be equipped with renewable energy technology by 2015; and (ii) renewable energy sources to provide 20 percent of all domestic energy usage (for both transport and electricity) by 2020.<sup>39</sup>

The Government also recently proposed to adopt a 100 percent renewable energy target for 2030 (the 'Greenada Vision 2030')—which the Cabinet approved in August 2012.

GRENLEC has also set objectives for renewable energy, including an objective for renewable energy to supply ten percent of electricity demand by 2013, and 30 percent of demand by 2016.<sup>40</sup>

## Section 3: Challenges and opportunities for achieving SE4ALL goals

### 3.1 INSTITUTIONAL AND POLICY FRAMEWORK

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#### 18. Energy and development

- **Energy in national development and poverty reduction strategies and plans**

The Government of Grenada sees reduction of energy prices as a key driver of future economic growth and job creation. A key principle of the GNEP is energy equity and solidarity. The goal is to “ensure that all sectors of society have access to affordable and reliable energy services.”<sup>41</sup>

- **Energy governance: institution(s) in charge of energy sector within the context of economic and social development in the country**

The Ministry of Finance, Planning, Economy, Energy, and Cooperatives (MFPEEC) is responsible for ensuring adequate, reliable, and economical energy services to sustain economic development.<sup>42</sup> Specifically, the Department of Energy and Sustainable Development within the MFPEEC is responsible for:

- Ensuring "adequate, reliable and economical energy services to sustain economic development, while satisfying the current and projected demands"
- Encouraging and promoting the use of renewable energy technologies, as well as energy efficiency, and energy conservation
- Promoting and facilitating petroleum exploration and development in a sustainable manner
- Ensuring that Grenada meets its objectives for the Chlorofluorocarbon (CFC) phase-out agreed to under the Montreal Protocol.

#### 19. Thermal energy for households

- **Relevant targets, policies, strategies, plans**

The Government has removed import duties on solar water heaters.<sup>43</sup> The GNEP also calls for the provision of fiscal and other incentives to promote the use of solar water heating in new and existing homes.<sup>44</sup>

- **National institutions/capacities (mandate/capacities of relevant governmental institutions and market regulators, fuel tariffs, specifically for households)**

The MFPEEC updates fuel prices every month using a pre-determined formula.

#### 20. Power sector

- **Relevant targets, policies, strategies, plans**

The Government plans to achieve the goal of supplying 20 percent of Grenada’s electricity demand using renewable energy sources by 2020 by:

- **Adding renewable energy capacity:** a 1.1 MW wind farm on Carriacou, a 2 MW solar photovoltaic plant, a 20 MW geothermal plant in 2014, a 1 to 3 MW waste-to-energy plant by 2016, and another 20 MW geothermal plant by 2018<sup>45</sup>

- **Improving the regulatory framework:** through the creation of a regulatory body responsible for licensing, regulation, oversight, and rate setting.<sup>46</sup> For this role, the Government is considering the Eastern Caribbean Energy Regulatory Authority (ECERA, an organization initiated by the World Bank that would represent an energy regulator for several countries in the Eastern Caribbean).<sup>47</sup> The Government also envisages to create a regulatory framework that will foster high efficiency of electricity generation, transmission, and distribution, and provide incentives for the use of renewable energy technologies, and standards for their integration of the national electricity system
- **Updating the legal framework for electricity supply and renewable energy:** in the GNEP, the Government calls for a revision of the Electricity Supply Act, with changes such as the creation of renewable portfolio standards, and any modifications required to ensure consistency with the regulatory framework.<sup>48</sup> The Government is also currently preparing a bill based on terms for geothermal exploration and exploitation agreed to with GRENLEC. The Government and GRENLEC will sign the bill once it has been approved by the Cabinet
- **Improving the institutional framework:** including through the creation of a National Sustainable Energy Office, the development of appropriate architecture to access and manage development financing mechanisms, the provision of up-to-date information on energy technologies and statistics, and the creation of educational programs for public sector staff.

The Government also recently set an additional objective for renewable energy to supply all of Grenada's electricity by 2030. The Government envisages the following initiatives to prepare for this objective:

- A '100 renewable energy showcase study' to be conducted by a consortium of firms and specialists, including GRENLEC
  - A Renewables Readiness Assessment focused on policy, regulation, infrastructure, and finance, to be conducted by the International Renewable Energy Agency
  - A potential partnership for Island Economies through the Global Sustainable Energy Islands Initiative, 'Vision 20/30'.
- **National Institutions/capacities (Ministry of Energy/Power, existence/capacity/mandate of market regulator for power sector, market structure in power sector, power tariffs)**

GRENLEC, a private, vertically-integrated utility, is the sole provider of electricity services in Grenada. The Senior Energy Officer within the MFPEEC is currently responsible for reviewing electricity rate adjustments.<sup>7</sup>

For more information on the MFPEEC, see page 18. For a breakdown of Grenadian power tariffs, see page 7.

## 21. Modern energy for productive sectors

- **Relevant targets, policies, strategies, plans**

GRENLEC's net billing provision allows the utility's customers to sell power generated with renewable energy back to the grid. The National Energy Policy also calls for policies relevant to the hotel and commercial sector to:<sup>49</sup>

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<sup>7</sup> The Public Utilities Commission Act of 1994 establishes a Public Utilities Commission (PUC) to regulate the energy sector and approve any rate adjustments—however, the PUC was never appointed.

- Recognise and promote the greening efforts of businesses to make them models of best practices for other companies
- Evaluate the mandatory use of solar water heaters in all new hotel construction
- Provide incentives for small hotels to become certified by internationally recognized certification standards
- Conduct inspections to ensure compliance with policy objectives.

- **Institutions/capacities**

The MFPEEC includes an office of private sector development. Its responsibilities include:

- Coordinating key private sector reforms
- Facilitating a dynamic partnership between government the private sector, and civil society
- Improving the business climate
- Giving policy direction to investment initiatives.

## **22. National monitoring framework for SE4ALL**

- **Proposed indicators to measure and monitor achievement of national SE4ALL goals**

- Energy use in households:
  - Household income spent on fuel and electricity
  - Household energy use by income, broken down by energy source
  - Average energy use per household
- Energy production and consumption:
  - Electricity generated from renewable energy systems (MWh/year, MWh to date generated)
  - Investment in renewable energy, access to finance
  - Electricity saved through energy efficiency technologies (MWh/year, MWh to date saved)
  - Fossil fuels saved through an increased uptake of renewable energy and energy efficiency technologies (barrels of oil equivalent)
  - Energy intensity in Grenada's energy matrix (broken down by sector)
- Energy policy: policy documents and legislation for sustainable energy approved (documents)
- Institutional strengthening for sustainable energy: number of positions filled and created
- Awareness on sustainable energy: number of public events or programs

- **Data requirements, gaps and associated capacity development needs**

- Household energy use by income
- Household income spent on fuel and electricity
- Monitoring of energy intensity
- Monitoring adoption of energy efficiency technologies by the private sector.



## 3.2 PROGRAMS AND FINANCING

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### 23. Thermal energy: programs and financing to improve access, efficiency and use of RES for cooking and other household needs

- **Supply: programs and investment to develop domestic manufacturing capacities, including access to capital and know-how for supply chain stakeholders**

The Government has no plans to develop local manufacturing of solar water heaters.<sup>50</sup> There does not appear to be any private sector initiative or plan to develop manufacturing capacity in Grenada.<sup>51</sup>

- **Demand: financial support schemes to improve affordability of modern energy for end-users, as well as build their knowledge and capacity**

The United Nations Industrial Development Organization (UNIDO), in partnership with the Organization of American States, provided a long term loan of US\$65,000 to the Grenada Public Service Co-operative Credit Union for providing loans for solar water heaters. The program included a public outreach component to inform consumers of the financing options available to them. Credit Union employees were also trained in administering solar water heater loans. The program's goal was to serve as a catalyst for greater lending for solar water heaters by building public awareness and institutional capacity.<sup>52</sup>

In 2011 the Government launched the "Energy for the Poor" program, under which eligible citizens can receive a gas stove and free cooking gas for approximately six months or on six occasions. About 150 families benefited in the first phase of the program. The program began in 2011 and has an allocated budget of US\$74,000.<sup>53</sup>

- **Sustainability: programs aimed at improving environmental sustainability of energy supply for cooking, such as forest plantation and sustainable charcoal production**

Near universal access to modern cooking technology means this is not a critical issue for Grenada. As such, the Government has no current plans.

### 24. Power sector: programs and financing to improve access, efficiency and use of RES for power supply

- **Physical access (electrification)**

Access to electricity is near universal in Grenada (over 99.5 percent)

- **Availability (new capacity)**

One of the objectives set out in the GNEP is to "provide incentives for the introduction by electricity generators of renewable energy technologies and fuel sources that reduce dependency, increase energy conservation efficiency and lower greenhouse gas emissions."<sup>54</sup> The Government has not implemented such incentives yet, but it is currently drafting a geothermal concession law to enable the development of the nation's potential geothermal resources. For information on new renewable energy capacity, please refer to the section on Sustainability below.

- **Reliability (grid maintenance/upgrade)**

Grenada has relatively reliable electric service compared to many of its neighbours. In 2010, the combined duration of blackouts per customer in Grenada was 364 minutes, and there was an average of seven power supply interruptions per customer. During that year, there were no brownouts.<sup>55</sup> GRENLEC has managed to achieve significant reductions in electricity losses over the past few years, from around 14 percent in 2008 to 8 percent in 2012.

- **Sustainability (investment in renewable energy, on-grid and off grid, and energy efficiency)**

Current plans for investment in sustainable energy include:

- **Construction of a geothermal plant:** In the GNEP, the Government has set an objective to have feasibility studies completed and a 20 megawatt plant constructed by the end of 2014. This completion date has been pushed back to the end of 2015. A second geothermal plant of the same size is planned for the second quarter of 2018<sup>56</sup>
- **Construction of a 2 megawatt solar photovoltaic plant:** Either the Grenada Hotel and Tourism Association (GHTA) or GRENLEC—depending on the GHTA’s ability to secure funding for the plant—will develop this plant by 2013<sup>57</sup>
- **Construction of a 1.1 megawatt wind farm on Carriacou by end of 2014:** the European Union has given Grenada a US\$3.1 million grant for developing this project, which will supply a significant portion of Carriacou’s power<sup>58</sup>
- **Construction of a 1 to 3 megawatt waste-to-energy plant by end of 2016:** The Grenada Solid Waste Management Authority (GSWMA) is planning on procuring this project in cooperation with GRENLEC. The GSWMA received 13 expressions of interest for this opportunity in 2011, and is confident that such plant is feasible.<sup>59</sup> The GSWMA is now looking for funding to obtain technical assistance for the drafting of a Request for Proposals and provision of transaction advice
- **Energy efficiency:** The Government has included energy efficiency as part of its Sustainable Energy Action Plan. There is no official target as of yet, but a doubling of energy intensity has been suggested as a goal for 2020 (using the period 2000-2010 as a baseline).<sup>60</sup> The Government launched a public sector conservation program in 2010, with an objective to reduce energy consumption (including electricity and transport fuels) by 10 percent by the end of 2012.<sup>61</sup> The Government of China has also provided some financing (circa US\$300,000) for energy efficient lighting and cooling technology.<sup>62</sup>

## 25. Modern energy for productive use: programs and financing to improve access, efficiency and use of renewable resources in productive sectors

- **Supply: programs and investment to develop domestic manufacturing capacities, including access to capital and know-how for productive applications**

The Government has no plans to develop domestic renewable energy or energy efficiency manufacturing, and private sector entities do not appear to have any such plans either.<sup>63</sup>

- **Demand: financial support schemes to improve affordability of modern energy technologies for industrial and agricultural enterprises, as well as build their knowledge and capacity**

The Government is working to secure a line of credit for the installation of renewable energy or energy efficient technologies in hotels. However, this work is still at an early stage.<sup>64</sup>

The GNEP also calls for building “institutional architecture to access and manage development financing mechanism and international resources destined to national energy initiatives.”<sup>65</sup>

Training programs to capacitate public sector staff to work in the energy sector are also included in the GNEP.<sup>66</sup>

- **Sustainability: programs aimed at improving environmental sustainability of energy supply, such as demand-side energy efficiency and use of renewable energy**

See section 24.

### **3.3 PRIVATE INVESTMENT AND ENABLING BUSINESS ENVIRONMENT**

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#### **26. Thermal energy for households**

- **Private sector actors involved in supply chain (energy supply companies, technology providers, financiers)**
  - A Barbadian solar water heater company, Solar Dynamics, sells its products through distributors (Hubbards Ltd. and The Creative House, Ltd.) in Grenada<sup>67</sup>
  - George F. Huggins and Company, a Grenadian distribution company, sells solar water heaters<sup>68</sup>
  - The Grenada Public Service Co-operative Credit Union has financed solar water heaters in Grenada with support from the Trust for the Americas<sup>69</sup>
- **Barriers to private investment in modern energy supplies and technologies for cooking and other thermal applications**

Many households in Grenada do not require significant amounts of hot water, and may prefer to invest in small gas water heaters, which have a lower purchase price (although higher operating costs), and provide hot water on demand.<sup>70</sup> Further barriers to private investment in solar water heaters in Grenada include:

- **Limited access to capital:** Many households in Grenada would need to borrow to purchase a solar water heater, and may not find financiers willing to lend to them, or may be charged interest rates that would make the investment unattractive. Programs to expand access to credit for solar water heaters, such as the program that has been implemented through the Grenada Public Service Co-operative Credit Union, will be key to increasing the uptake of solar water heaters in Grenada
- **Incomplete information:** consumers in Grenada may be unaware of the benefits of solar water heaters
- **Agency problems:** property owners may not have an incentive to invest in solar water heaters if they are renting their property.

#### **27. Power sector**

- **Private sector actors involved in supply chain (power generation and distribution companies, Independent Power Producers (IPPs), financiers, technology providers)**

GRENLEC provides all generation, transmission and distribution services in Grenada, Petite Martinique and Carriacou. GRENLEC was founded in 1961 and licensed to be the sole provider of electric services in Grenada until the year 2041. It was originally a subsidiary of the Commonwealth Development Corporation, with the Government of Grenada as a partial shareholder. The Government became the sole shareholder in 1982, but eventually privatized 90 percent of the shares through the Electricity Supply Act (ESA) of 1994.<sup>71</sup> To date, the Government of Grenada still retains a 10 percent ownership stake.

Grenada Solar Power Limited (GrenSol) is an independently owned and operated solar installer based in Grenada.<sup>72</sup> GrenSol has been selling solar photovoltaic (PV) panels in Grenada since 2005. As of November 2011, GrenSol had installed 40 grid-connected and standalone PV systems, with a total capacity of around 300 kW.<sup>73</sup> Another privately-owned firm, ELC Integration Company Solutions (ELCICS), recently started retailing and installing solar PV systems and small wind turbines in Grenada. ELCICS is also based in Anguilla and St. Martins.

- **Barriers to private investment in new on-grid and off-grid power generation capacity (especially for RES), grid extension/maintenance, demand-side management (DSM) and energy efficiency**

For barriers related to private investment in distributed scale generation and off-grid generation capacity, see sections 26 and 28.

GRENLEC holds the sole licence for electricity generation in Grenada. Any private investor seeking to develop a power generation project in Grenada must therefore do so in partnership with, or with agreement of, the utility. There is no clear process or requirements for private investors to partner with GRENLEC. Nevertheless, private sector participation in power generation may be possible even without further licensed investors, under design, building, operating, and maintenance (DBOM) contracts. Further, GRENLEC is envisaging partnerships for the geothermal and waste-to-energy plants, and possibly the solar PV plant mentioned in section 24 above.

Under the current tariff regime set out in the Electricity Supply Act, 1994 (ESA), GRENLEC is able to recover the cost of energy efficiency and renewable energy investments through the fuel charge. However, the ESA does not provide for any cost savings achieved from renewable generation or energy efficiency to be passed through to the utility's customers as lower prices. As such, electricity prices will continue to fluctuate while fuel is used in electricity generation, regardless of how much electricity is generated from cheaper sources—unless the ESA is amended, or another mechanism can be developed.

A lack of clear, specific planning or permitting processes for renewable energy may have held up utility-scale renewable energy projects. However, such processes may be defined as renewable energy projects are being developed over the next few years.

## **28. Modern energy for productive sectors**

- **Private sector actors on the demand and supply side (SMEs/agricultural enterprises, technology providers, financiers)**

There are an increasing number of technology providers that supply modern energy equipment and services in Grenada. Cooling Tech Ltd. is a Grenada-based retailer specializing in energy efficient air conditioners. See sections 26 and 27 for information on companies supplying solar water heaters and solar PV systems. For information on financing, see page 15.

- **Barriers to private investment in modern energy for productive and socio-economic uses with a focus on energy efficient and renewable energy technologies and solutions**
  - **Limited access to capital:** Sustainable energy technologies have a high upfront cost, and many businesses have limited access to capital, so that expensive equipment is unaffordable for them—particularly in times of economic crisis—even if the equipment

- would pay for itself overtime. Access to credit is made worse by the fact that financiers are unfamiliar with such technologies, and therefore often unwilling to lend against them
- **Incomplete information:** Many businesses are unfamiliar with sustainable energy technologies, their cost and benefits. For example, business owners may not be aware that solar photovoltaic panels have come down in price in recent years and may still consider them an uneconomical option. Further, incomplete information amongst financiers also affect the availability of loans to businesses for sustainable energy technologies
  - **Limited supply of equipment:** Given the limited uptake of sustainable energy technologies in Grenada, some of these technologies are not available, or may be sold at excessive prices. Limited availability and high costs in turn slow down uptake.

### 3.4 GAPS AND BARRIERS

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#### 29. Thermal energy for households

- **Governance (institutions, policies, enforcement capacities)**

There is a need for strengthening the institutional framework for sustainable energy in Grenada. The Government recognises this need. The GNEP calls for:

- The establishment of a National Sustainable Energy Office, to address the objectives of the GNEP
- The implementation of efficient institutional architecture to access and manage development financing mechanisms and resources for energy projects
- The creation of specialized professional educational programs for public sector staff
- The publication and continuous update of information on energy technologies and statistics.

However, the Government does not appear to have defined a specific action plan for implementing these measures. Technical and financial assistance may be required.

- **Supply chain (access to capital, technologies and know-how)**

Thermal energy technologies are accessible in Grenada. However, there may be limited competitiveness in the retailing of solar water heaters, due to limited uptake.

- **Households (capacities and access to capital/affordability)**

There is a lack of access to capital for modern energy technologies in the residential sector—particularly solar water heaters. Support from financing institutions would be helpful to enable access to low-cost financing to households (potentially through the Grenada Development Bank) for small solar water heaters.

#### 30. Power sector

- **Governance (existence of enabling regulatory framework for investment, enforcement capacities)**

The Government and GRENLEC are considering the potential for a tariff reform, in view of the renewable energy projects that GRENLEC is planning to develop. This may be done in conjuncture with the creation of ECERA.

Further, the definition of clear, effective planning and permitting processes for renewable energy projects will be important, particularly in view of the 100 percent renewable energy target for 2030. However, the Government does not currently have any plans to develop streamlined processes.

- **Supply chain (access to grid, capital, technologies, and know-how)**

Access to grid and technologies is sufficient. However, there is a lack of capital and technicians for installing and maintaining renewable energy technologies. Additional support is necessary for providing capital to invest in sustainable energy and better educating sustainable energy technicians. Under the GNEP, the Government calls for the provision of networks and incentives for developing local expertise to install, operate, and maintain renewable energy systems.

- **End-users (affordability and access to capital)**

End-users face significant barriers with regards to affordability and access to capital. Additionally, limited awareness of the benefits of RES has held back uptake of commercially and economically viable renewable energy technologies.

### 31. Modern energy for productive sectors

- **Governance (existence of enabling regulatory framework for investment, enforcement capacities)**

Although there is no regulatory body in place, there is an effective working relationship between government and the power utility on regulatory matters—as shown, for example, by on-going work to define the regulatory and commercial framework for geothermal development.

- **Supply chain (access to capital, technologies, and know-how)**

Access to distributed scale generation technologies is sufficient—although access to energy efficient technologies could be improved.

- **End-users, agricultural and industrial enterprises, SME (capacities and access to capital)**

A lack of access to capital and information is impeding the uptake of sustainable energy technologies in productive sectors. Additional support will be required to provide access to low-cost financing to businesses—particularly in the tourism sector.

### 32. **Summary:** key gaps, barriers and additional requirements

The main barriers preventing uptake of renewable energy in Grenada are imperfect information, inertia, and access to capital, which create a negative feedback loop. Citizens in Grenada are not fully aware of the financial benefits of renewable energy and energy efficient technologies. Citizens are unwilling to invest in these technologies when they do not understand their benefits—and also, for the most part, unable to pay for the high upfront costs of these technologies. In turn, banks are unwilling to lend to finance new technologies that they do not fully understand. As a result, there is a limited amount of qualified technicians and companies installing sustainable energy technologies. This limits information about available technologies, and prevents economies of scale from driving the price down.

## Annex 1 –Matrix of existing programs and required financing for achievement of SE4ALL goals

### 1.1 On-going initiatives by the Government and development partners

Title	Lead Agency	Financier	Relevant SE4ALL Goal(s) (Access/Efficiency/Renewable Energy)	Brief description and time frame	Value, US\$
Waste-to-Energy Development	Government of Grenada	Government of Grenada	Renewable Energy	The Government is accepting expressions of interest and will draft a TOR to procure consultants for developing framework; the goal is completion of a plant by mid-2016	Not Determined
Government Energy Efficiency Program	Government of Grenada	Government of Grenada	Energy Efficiency	Two year program (2010-2012) to reduce government electricity use by 10 percent	Not determined; should be revenue enhancing
Energy for Sustainable Development in Caribbean Buildings	Global Environment Facility (GEF)	GEF (lead financier), with six co-financiers	Energy Efficiency	48 month project, beginning November, 2012. The project will demonstrate technologies to achieve reductions of 20% of GHG emissions and put in place policies or programs to roll out these technologies to the marketplace	US\$1,170,000
Geothermal Program Development	Government of Grenada	Organization of American States	Renewable Energy	On-going technical and financial assistance for developing a geothermal program	US\$100,000
Carriacou Wind Energy Support	European Union Energy Facility	European Union	Renewable Energy	US\$6.55 million project to develop one to two megawatt wind farm on Carriacou. Commissioning planned for Q4, 2012	US\$6,550,000 million, of which US\$3,100,000 from the EU
AOSIS-China Climate Change Adaptation Pilot Programme (CAAP)	Government of China	Government of China	Energy Efficiency	Technology transfer program between 2012 and 2017 will provide public sector agencies with financing for the acquisition of hardware, equipment and training from China, with repayment linked to the savings in fuel imports	US\$2,000,000
Renewable Energy Readiness Assessment	International Renewable Energy Agency (IRENA)	International Renewable Energy Agency (IRENA)	Renewable Energy	Direct technical assistance	Not determined

Title	Lead Agency	Financier	Relevant SE4ALL Goal(s) (Access/Efficiency/Renewable Energy)	Brief description and time frame	Value, US\$
Sustainable Energy for Eastern Caribbean States	Inter-American Development Bank (IDB)	Inter-American Development Bank (IDB)	Renewable Energy	Direct technical assistance	Not determined

**1.2 An estimate and order of magnitude, if available, of the costs and investment requirements for making progress on the three goals of SE4ALL. It is understood that these are only rough estimates and using available data. A more detailed analysis would follow during the phase of preparation of the Action Plan for SE4ALL**

Government estimates that the total expenditure on renewable energy between 2012 and 2016 will be around US\$150 million, including US\$60 million for geothermal energy projects.<sup>74</sup> There is no estimate available for energy efficiency, as the Government has not set specific targets for energy efficiency.



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