

Description of specific climate change problem and how the project will address it

St. Vincent and the Grenadines (SVG) currently depends on high priced and volatile diesel fuel for power generation and other energy needs, resulting in electricity prices that are among the highest in the world and an annual petroleum import expense equivalent to 19% of its GDP. The project will support the installation of 2.4 MW solar and 550 kWh energy storage in the island of Bequia, part of SVG's energy transformation goal of reaching 80% renewable energy generation by 2021 and reduce nation-wide greenhouse gas (GHG) emissions by 22% by 2025.

Alignment with key country priorities and stakeholders engaged

The proposed project is in line with SVG's mitigation priorities to implement long-term sustainable energy solutions that will bring energy independence and control. These priorities have been outlined in SVG's SNCCC (2015), Intended Nationally Determined Contribution (INDC) (2015), the 2013-2025 National Economic and Social Development Plan (NESDP), the 2009 National Energy Policy (NEP), the 2010 National Energy Action Plan (NEAP), and the 2018 National Energy Transition Strategy (NETS). The NETS envisions electricity generation with local resources, and the stabilization of the cost of electricity while maintaining or improving the reliability of the five separate island grids served by VINLEC. To ensure country ownership, a broad-based consultative process (described in section B4) was designed to inform project design under the umbrella of the national plans, policies and strategies.

Key Stakeholders Engaged

A series of stakeholder consultations and feedback sessions were held to develop SVG-STEP, to obtain the necessary feedback, inputs and guidance and, more importantly, ensure country ownership. The national focal points for the development of SVG-STEP were the CEO of VINLEC, the head of the Energy Division, and the NDA. Successive in-person and phone meetings were held to obtain inputs and ensure alignment between all national stakeholders. In addition, a public consultation was held on February 7, 2017 at Frenches House. The public consultation was well-attended by relevant government ministries and departments, the private sector and community members.

Activities

Component 1: Investment for Sustainable Energy Transition in Bequia Island.

The goal of Component 1 is to deploy hybrid solar PV, storage, and diesel micro grids in the island of Bequia. The techno-economic study using microgrid-modeling software [HOMER](#) found that a hybrid solar PV, battery storage, and diesel micro grid in the Grenadines have a levelized cost of energy (LCOE) that is between 18% and 33% less than the baseline LCOE of the current system. The systems will be utility-owned because these are each very small electricity systems, servicing a total of 9,000 residents, so maintaining control of all

generation assets with VINLEC is most efficient both operationally and economically. Because of lower system operating costs, the capital costs for the GCF Project can be recovered within 5 to 12 years – depending on the amount of additional debt financing required. The NETS economic analysis of Grenadine micro grid options show that the decrease in the LCOE is expected to be 18% in Bequia, 33% in Canouan, 30% in Mayreau and 23% in Union Island. The project envisions two main activities:

- **Activity 1.1. Installation of grid-connected solar PV farm in Bequia.** The project will deploy 2,400 kW of solar PV in the Island of Bequia. Solar PV systems have been chosen for this project for their cost-attractiveness (falling prices and low operational cost), their speed of implementation and their public acceptance. The design of the system at the capacity stated above will ensure that diesel generators are only minimally used while ensuring that energy requirements for meeting the commercial and residential electric loads are comfortably met. This will reduce the amount of diesel imported from mainland the Grenadines (hence enhancing autonomy) and also improve the quality of life of the inhabitants through reduced noise / emission levels. Under this activity, the project will open a competitive bidding process to procure the solar PV and micro grid systems. In addition to cost considerations, emphasis is placed on bidder's qualifications, experience in the region, technical expertise, and equipment selection. Quantitative scoring will be performed for the technical considerations and equipment selection to incentivize the use of best available technologies. EPC contractor's' experience building solar and micro grid projects in the Eastern Caribbean region will be a requirement and shortlisted bidders will have their former Projects reviewed and references contacted to ascertain the quality of previous installations.
- **Activity 1.2. Installation of battery storage.** This activity will deploy 550 kWh of storage in the Island of Bequia. This activity will follow the same procurement procedures described in Activity 1.1.

As the micro grid projects of Mayreau and Union Island have already advanced first, their installation will provide learnings that will lead to lower soft costs as well as shorten the time to install and optimize system specifications for Bequia (and Canouan) microgrid systems. These lessons will help spread adoption of these technologies to other island nations through the SIDS-STEP community of practice. The combined 4,832 kW of renewable capacity across targeted Grenadines will provide key insights that will strengthen the case for additional renewable adoption on mainland St. Vincent (5MW solar PV and 5MW energy storage) by informing which of several pathways developed in the NETS will create the highest impact at the lowest risks. The microgrids on the Grenadines will also demonstrate additional benefits including grid reliability at high penetrations, reduced exposure to volatile fuel prices and

secondary economic benefits arising from cash reserves kept and recycled in the local economy.

Component 2: Energy Sector Capacity Building and Knowledge Management. To ensure the success of the Project and amplify its impact beyond the Grenadines, it is essential to build skills and capacity in a number of groups, including government institutions, VINLEC and the private sector. Doing so will also provide guidance to other island nations needing to build similar skills and capabilities. The SVG-STEP will focus on three core activities to increase the experience and knowledge of GoSVG, VINLEC, and the residents of SVG:

- **Activity 2.1. Technical training workshops and curricula on solar PV and storage.** Training workshops will support jobs training and local employment for both men and women, a critical need to encourage gender balance in this male dominated field. Participants will receive an international certification to construct and maintain solar PV and storage. SVG-STEP will have a series of solar PV and storage vocational training workshops that target teachers at the St. Vincent and the Grenadines Technical College. More specifically, the training workshops will train teachers in designing technical curriculum for renewable energy, such as solar PV and storage. The workshops will also provide solar PV and storage teaching materials;
- **Activity 2.2. Institutional capacity building.** The GCF's second edition of ELEMENTS notes the importance of innovation in increasing supply of clean energy and laments how much of much of the funding has not gone to innovation. The technical laboratory at St. Vincent and the Grenadines Technical College needs to be modernized to allow for training students and the technical workshop participants to receive their certificates. Also, the modernized laboratory presents an opportunity for faculty and students to develop island specific renewable energy innovations; and
- **Activity 2.3. Internship and Mentoring.** SVG-STEP will create internship and mentoring opportunities within the Energy Unit and VINLEC for students at the secondary and tertiary school level interested in engineering or energy and climate studies. Internships allow students to assist or observe with Project implementation and planning. SVG-STEP will actively work to solicit mentorship and workshop feedback and improve the quality of workshops delivered. This is essential to the collection and dissemination of learning material, which will be posted on the CARILEC Renewable Energy Community (CAREC) virtual platform and applicable GoSVG websites that ensures equitable outreach, information, and communication. The Energy Unit website will be upgraded and streamlined to facilitate the dissemination of the new solar PV and storage learning materials, including technical best practices and mentor programme materials.

Paradigm shift potential

Innovation. The best available technologies for solar PV, battery energy storage systems, and microgrids have been considered and will be applied. The development of the system is in line with best practices as highlighted and recorded in International Finance Corporation (IFC)'s Project Development Guide for Utility-Scale Solar PV Power Plants and further supplemented by the team's experience in renewable energy Project development both in the Eastern Caribbean and in the United States. Additionally, VINLEC has eight years of experience installing and operating solar PV systems in St. Vincent, with 557 kW installed PV capacity. Lessons learned and best practices applied in previous SVG solar PV Projects will be applied to the solar and microgrid project in Bequia. The supporting team will apply lessons learned and best practices from solar and microgrid development experience in Saint Lucia, Belize, Montserrat, and other similar projects in the region.

SVG-STEP will use an open, competitive bidding process to procure the solar PV and microgrid systems on Bequia. In addition to cost considerations, emphasis is placed on bidder's qualifications, experience in the region, technical expertise, and equipment selection. Quantitative scoring will be performed for the technical considerations and equipment selection to incentivize the use of best available technologies. EPC contractor's' experience building solar and microgrid Projects in the Eastern Caribbean region will be a requirement and shortlisted bidders will have their former Projects reviewed and references contacted to ascertain the quality of previous installations.

Contribution to the creation of an enabling environment. SVG has directly benefit from SIDS-STEP's centralized provision of resources, technical expertise, and tools that will further enable its' sustainable transition to low-emission energy generation. Most importantly, the Grenadines, and SVG as a whole, will benefit from an inclusive Theory of Change that will bring sustainability, independence, and control through the following mutually reinforcing SIDS-STEP components: i) Implementation of the Eastern Caribbean's first utility-scale hybrid solar PV, storage, and diesel system in the Grenadines for 4,832 kW of solar PV and 1,360 kWh of battery storage; and ii) Participation in a regional community of practice designed to support CARICOM countries to share lessons, create bottom-up momentum, and build long-term technical capacity among energy practitioners to establish local ownership over SVGs energy future.

Executing SVG-STEP will have a transformative impact well beyond the scope of the GCF Project for several reasons, that include: i) It will be one of a few examples that demonstrates that it is technically possible to power smaller islands with high penetrations of renewable energy using recently developed solar plus storage systems. These examples are a critical need for risk averse governments and utilities, and those citizens who must utilize the energy. These examples are also critical for the industry as a whole given that these technologies have only become available recently and are not yet fully proven - though very promising from a reliability and cost

effectiveness perspective; ii) It will provide the basis for cost reduction roadmaps and optimized operating performance; a critical need for these solutions to facilitate widespread adoption across island nations; iii) It will create much needed skills in the private sector to develop and deploy these systems that can be harnessed for other island nations; iv) Execution of SVG-STEP will provide one of the few examples of a comprehensive and complete package for deployment of renewable energy at high penetrations that can be used as a blueprint by other nations in SIDS-STEP. Currently, there are limited examples that demonstrate the power of a comprehensive solution that addresses market / financial, regulatory / legal and skills / capacity simultaneously in an island economy; and v) SVG will demonstrate that it is possible to rapidly overcome barriers, a critical global imperative if we are to address climate change challenges in a time frame commensurate with the need.

SVG-STEP will also demonstrate the leveraging power of GCF resources to jump-start renewable energy adoption in island nations that have traditionally been challenged by fiscal, economic, and societal constraints. In doing so, the GCF will demonstrate to the world that there is a strong global business case to invest in these islands rather than let them capitulate to the cruel realities of climate change. In other words, SVG-STEP will enable SVG to be climate solution provider and not a victim of climate change.

Potential for knowledge and learning. SVG-STEP will deploy the first high renewable penetration solar-storage microgrid in the Eastern Caribbean, and will serve as an opportunity to illustrate the process of project implementation to other islands around the world. The monitoring and evaluation of the GCF Project will require the collection of lessons learned at the different stages of project procurement and implementation. Throughout the process, stakeholders will be invited to respond to surveys and keep log of challenges and how these were handled. This information will be made available to VINLEC engineers and the Project Board and will be used as a model for replication. There will be focus group assessments conducted by the Project Teams during the different implementation stages to gather feedback from engineers, contractors, governmental teams, and energy end-user beneficiaries. This information will be consolidated into a document on lessons learned for sharing with other Caribbean islands. Also, the Project team will work in coordination with CARILEC to enable sharing of the lessons learned documents on CAREC - the online learning community launched by CARILEC on 2016 that enables utility engineers and energy practitioners to connect and collaborate through sharing best practices. CAREC promotes the WIRE Network, which will allow Vincentian women interested in STEM to connect with a network of professional engineers and share their experience with the Project. GoSVG and VINLEC will contribute to learning activities conducted by CAREC namely: webinars, conferences and virtual and in-person technical training sessions. All learning activities will be documented and made accessible to market actors through the CAREC community.

Contribution to regulatory framework and policies. The impact of the microgrids on VINLEC's cost of generation combined with the paths outlined in the NREAP will provide the GoSVG and VINLEC with options to reevaluate residential, commercial, and industrial electricity rates. The NREAP will include an independent third-party recommendation for the electricity rates in SVG in the medium- and long-term. As such, an enabling environment for tariff restructuring will be provided and the opportunities to amend the 1973 Electricity Supply Act to better reflect the technological context of the country. GoSVG and VINLEC can use the insights of the NREAP to plan for potential regulation given geothermal development and capacities. There will be consistent reassessment of tariffs and rate structures as incremental levels of capacity are installed to meet electrical demands. This mechanism will allow for the rights of electricity consumers to be considered as the country moves forward with development agendas.

GoSVG will work to incorporate the results into new actions, goals, and targets for renewable energy in the revision to the NREAP and set a target of 60% renewable energy penetration by 2020. This will also assist the GoSVG in meeting their UNFCCC objective of reducing GHG emissions by 22% compared to its BAU scenario by 2025. Energy legislation will be revised to better reflect the new energy landscape. Regulation will be assessed to create an enabling environment for greater public and private investment into low-emission pathways.

Potential for scaling-up and replication. The revised NREAP will assist the country in its efforts and planning of clean energy transformation in the long term taking into account the current energy mix, ongoing initiatives (such as the solar PV in other Grenadine island and the geothermal project in St. Vincent) and country's energy needs. GCF funding is not requested for the solar PV systems on St. Vincent because the completion of the hybrid system on the Grenadines sets example that is a critical to build the confidence of investors and banks – as they demonstrate to the industry as a whole given that these technologies are very promising from a reliability and cost effectiveness perspective. In turn, the cost of capital will become more attractive – further incentivizing more investment – through the development of both financial and policy instruments, a critical need for these solutions to be realized.

Finally, SVG-STEP will provide the GoSVG, VINLEC, and the private sector with the real-world knowledge and skills to scale and replicate solar PV and storage, such as a series of technical on the workshops where participant receive international certification to construct, assemble, and maintain solar PV and storage. Furthermore, the public awareness campaigns and activities planned for students and teachers, as well as the renovated technical laboratory, will inspire and train the next generation of engineers, policy makers, and innovators. The feedback and lessons learned from the GCF Project and beyond will further strengthen the market for renewable energy generation.