ENERGY TRANSITION INITIATIVE
Islands

Playbook Lesson Learned
Phase 2: Assessing Opportunity Pathways

Tailored Approach Boosts Accuracy of Electricity Demand Forecasting in Saint Vincent and the Grenadines

In 2017, the Government of Saint Vincent and the Grenadines (SVG) and St. Vincent Electricity Services Limited (VINLEC) led an integrated resource planning process as part of developing a National Energy Transition Strategy. Rocky Mountain Institute - Carbon War Room (RMI-CWR), through the Islands Energy Program,[1] provided independent technical support. This process led to a successful assessment of SVG's opportunity pathways and created a strong opportunity for project implementation.

A view of the new Argyle International Airport, located on the windward coast of Saint Vincent Island, on its opening day.
Photo from Fidel Neverson

Challenge

A key first step in any energy planning process for islands is forecasting how electricity use patterns might change and grow for varying consumer classes over the long term. While utilities around the world forecast electricity demand, islands can face unique challenges in accurately forecasting their future electricity.

Like most Caribbean islands, SVG has experienced very little growth in gross domestic product (GDP) during the past decade, due in large part to the world economic crisis of 2009 and the associated impacts to its interconnected and open economy. Likewise, energy demand has remained relatively flat. This will change as a result of significant new development, however. The construction and commissioning SVG's Argyle International Airport in February 2017 provides a compelling case study of how to conduct demand forecasting under unique circumstances. While SVG already participates in the global economy, the airport dramatically increases SVG's potential for tourism and trade. Increased tourism could have significant and unprecedented impact on energy demand growth for the islands. In this case, the magnitude of growth in electricity use has the potential to be significant enough to materially alter plans to expand electricity generation resources. This pointed to the need to adopt a tailored demand forecasting methodology designed to take this shift into account.

[1] The Islands Energy Program is funded by the Dutch Postal Code Lottery and the Global Environment Facility with support from the United Nations Development Program Office for Barbados and the Eastern Caribbean.

In addition, SVG's electricity system is a combination of several independent electric grids. VINLEC serves five islands: Saint Vincent, Bequia, Canouan, Mayreau, and Union Island. Each island is unique, and each has the potential to follow a different trajectory for electricity demand in the coming years. As a result, SVG needed to produce demand forecasts for each island in anticipation of the new airport.

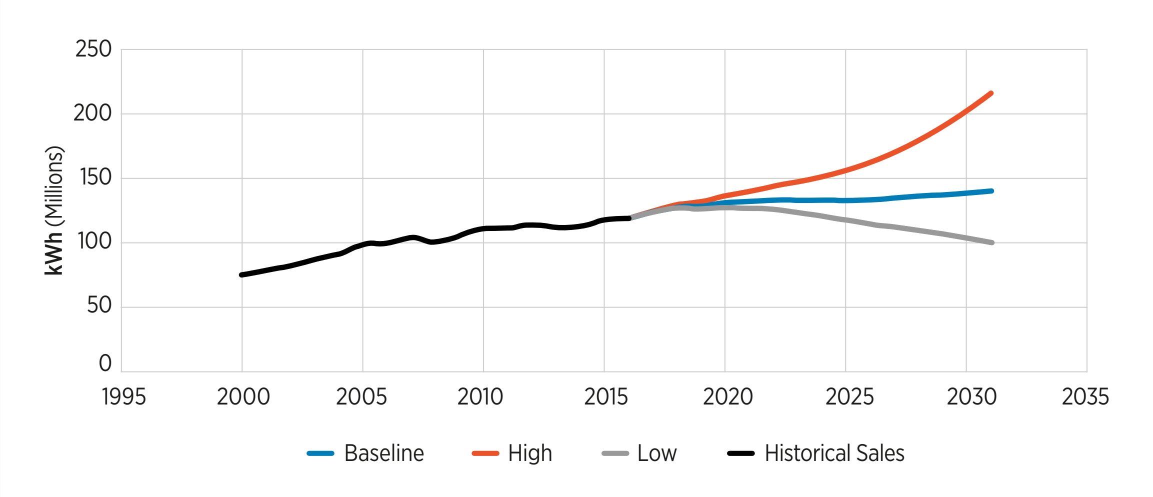
Solution

Electricity demand forecasting exercises often take a bottom-up or top-down approach, depending on the specific situation. Top-down approaches rely on the relationships between socioeconomic factors, such as population and GDP, and corresponding inputs to electricity demand, such as the number of utility customers and their average consumption. Bottom-up approaches rely on customer-level assumptions to build up a demand profile, such as understanding the pipeline of planned commercial projects and their energy use characteristics.

Given the potential impact of the airport, SVG's demand forecast combined top-down and bottom-up analysis in a hybrid approach. To determine demand growth from existing conditions, a top-down, econometric model linked GDP and population growth to energy demand growth on each of the five islands.

A second, bottom-up model added demand from each island's anticipated projects stemming from the airport opening. These included planned hotel and other developments and, of course, the new international airport itself (which had not yet opened when the demand forecast was conducted). A key shortcoming of the bottom-up approach was the 5-year planning horizon of most commercial projects—and the variability that typically exists between the development schedule and project completion. Changes in tourism rates were not included in the model, since electricity demand and tourism have not been linked in a predictable way historically.

A baseline demand forecast was created, along with low and high forecasts to account for uncertainties in both the underlying trends (GDP and population) and the timelines for anticipated commercial projects.



Saint Vincent Island projected electricity demand growth in baseline, high-, and low-growth scenarios

Key Takeaways

Creating a demand forecast methodology to fit the unique situation and challenges in SVG, given its new international airport and its multiple islands, was a key first step in successfully assessing energy options. Focusing on each island individually ensured a deeper understanding of the potential electricity needs of the respective islands. Through an iterative process of incorporating both historical trends and the potential impacts of near-term projects like the new airport, the demand forecast became more and more accurate.

As a set of small islands, SVG has grids characterized by a relatively small peak compared to many other countries. Commercial projects represent a significant fraction of demand growth. With several developments happening as a result of the new airport, bottom-up analysis is key to important decisions during the planning process. Conversely, the use of macro indicators helps avoid challenging data collection restrictions when using a top-down approach, while providing a realistic base for demand growth.

The integrated resource planning process led by both SVG and VINLEC addressed a common challenge of performing an accurate electricity demand forecast when assessing opportunity pathways by tailoring the methodology to SVG's unique circumstances. In addition, the strong results of SVG's demand forecast allow for properly sizing microgrid projects for the Grenadines with high stakeholder confidence, which will set SVG up well for project implementation.

This lesson learned is one of many provided in the Energy Transition Initiative Islands Playbook—an action-oriented guide to help island communities successfully initiate, plan, and complete a transition to a clean energy system and eliminate dependence on imported fuels. See the full Islands Playbook at **www.eere.energy.gov/islandsplaybook**.

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