Inclusiveness in an Integrated Resource Plan

CASE STUDY OF SAINT LUCIA

Bermuda Energy Summit – November 15, 2017

Objective

Discuss multi-stakeholder approach to integrated resource planning, utilizing St. Lucia as a case study

Who We Are

Clinton Climate Initiative (CCI) & Rocky Mountain Institute-Carbon War Room (RMI-CWR) joined forces in 2015 to accelerate the transition of small island economies from fossil fuels toward reliable, cost-effective, and clean energy systems

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- Working in 14 island states in Caribbean and Indian Ocean Regions
- Grant funded by international development agencies and individual donors (e.g. Global Environment Facility, Norwegian Agency for Development Cooperation, Dutch Postcode Lottery, etc.)
- Independent of all technology suppliers, governments, and private entities

St. Lucia Energy Transition

Population ~180,000

Currently ~60 MW peak served by 87 MW diesel generation

- Some diesel assets due for retirement in the short to medium term

Planned/Announced R.E. Investments include:

- 3 MW Solar PV
- 12 MW Wind
- 30 MW Geothermal

Other potential:

- Additional Solar PV
- Battery storage
- Energy Efficiency
- Other

Changing energy landscape driven by economics and energy targets

Requires careful technical analysis to make informed policy and investment decisions, along with **alignment of key stakeholders**

Conventional Utility Planning

- Least-cost generation planning
  - Utility-led
  - Generation focused
- Alternative approaches:
  - Keep public beyond informed – and engaged
  - Lowest societal cost
  - Increased energy independence
  - Minimized environmental and social impact
  - Energy efficiency as a resource
  - Disruptive, but proven technologies

National Energy Transition Strategy – informed by IRP

- **National Energy Transition Strategy** signed jointly by Government of St. Lucia (MSDEST) and St. Lucia Electricity Services Limited (LUCELEC) in January 2016
- Inclusive process involving key partners – Government and LUCELEC – at each stage of results and decision making
- Informed by an Integrated Resource Plan (IRP), with public input through stakeholder consultation sessions

Early Challenges: Agreeing to an Inclusive Process

- Narrative in the region describing a future of reduced rates from competition in the electricity sector and high levels of decentralized renewables
- Government had announced energy targets of 35% by 2020, utility found them unrealistic
- Government pushed specific renewable energy projects, bringing in outside developers
- Utility preferred hiring their own consultants for an IRP for energy planning

Solution: Agreeing to an Inclusive Process

- Government recognized the need to understand the fundamentals of the energy system in order to make informed policy decisions
- Government also stated that a successful evolution of the sector could not happen without the collaboration of the incumbent utility
- Satisfying the Government that an IRP could answer the questions they are holding
- Satisfying LUCELEC by developing the IRP proposal through an iterative process, and adjusting to meet their Terms of Reference – then agreed by both parties
- Commitment by parties on inclusiveness – where the result mattered less than the process, and outcomes could be "in favor" of either party

Integrated Resource Plan (IRP)

An Integrated Resource Plan (IRP) looks at **forecasted loads** over a 10- to 20-year period and assesses the **least-cost supply and demand side** options to **reliably** meet that load.

Why an IRP?

- In certain jurisdictions, they are mandated.
  In Saint Lucia, this is not the case.

IN THE CONTEXT OF ENERGY TRANSITION

- Renewable energy and energy efficiency are complementary alternatives to conventional generation, but… Transitioning to them requires a thoughtful and iterative process
- Must ensure the core needs of the system – stability, reliability, and financial viability – are met.

Why Inclusive?

- Public animosity towards utility as a traditional monopoly
- Government recognition that utility financial viability was a core requirement for the electricity sector – provider of reliable service, employer for high-skilled jobs, national insurance investments, etc.
- Utility recognition that Government and public involvement key to counterbalance the anti-monopoly utility narrative, in particular to educate and inform realistic targets for transition
- New regulator – National Utilities Regulatory Commission (NURC) set up in 2016, but not yet with the full capacity to make informed regulations – an objective, inclusive IRP builds confidence for the NURC

The Importance of Independent, Objective Analysis

Throughout the process, the CCI and RMI team aimed to:

- Challenge all potential options for energy production or demand reduction
- Balance the interest of all stakeholders involved (Government, utility, customers, etc.)
- Identify a mix of resources that will meet near and long-term energy needs in a reliable manner at the lowest reasonable cost

Kickoff Meeting – Partners and Key Stakeholders

- Strive to build alignment, and agree on expectations for the process
- Set goals and strategic objectives
- Begin to collect data
- Sign an agreement to do an IRP together

Planning team members in Saint Lucia, January 2016

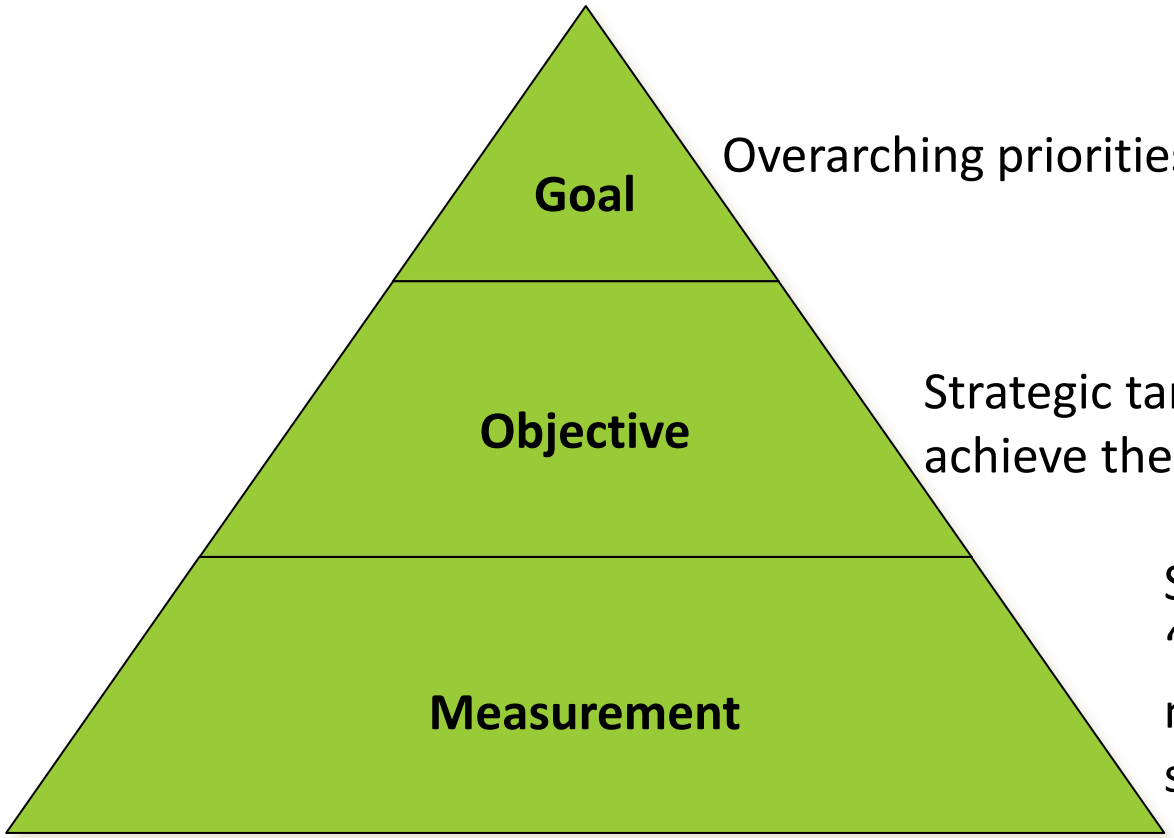
Planning team members with VINLEC and the Energy Unit in SVG, October 2016

Initial Public Consultation

- Opportunity to get input, and build trust with the community
- Balance of giving credit to the Utility and Government (or Regulator) for leading this process, while emphasizing our team's independent and third-party analysis

Community members participating in the IRP public meeting in SVG, February 2017

What do Key Stakeholders Actually Want to Achieve?



Overarching priorities for electrical system

Strategic targets set by both partners to achieve the goals

Specific metrics (such as 'Projected Rates' or 'SAIDI'), measured across all examined scenarios

Goal Development with Stakeholders (St. Lucia Example)

1. "**Reliability**" → quickly agreed by both parties, cannot be sacrificed, needs to be same or better
2. "Least Cost" → "**Cost Containment**"
   a. Cost reduction includes many uncertainties and embedded assumptions
   b. Financial viability of the utility was not to be compromised
   c. Reduction of customer's total cost/bill, not just per-unit cost
3. "Renewable energy" → "**Energy Independence**"
   a. True goals of reducing reliance on imported fuels
   b. Announced targets secondary objective

Stakeholder Engagement in Modeling

1. Load Forecast Model (LFM)

- Stakeholders agree on economic or other data inputs; energy efficiency potential

2. Least Cost Supply Model (LCSM)

- Stakeholders agree on resource costs, financing structure, discount rates, etc.

3. Grid Integration Models (GIM)

- Stakeholders informed of transmission and distribution system limits or upgrades

4. Utility Business Model (UBM)

- Stakeholders informed of utility financial impact

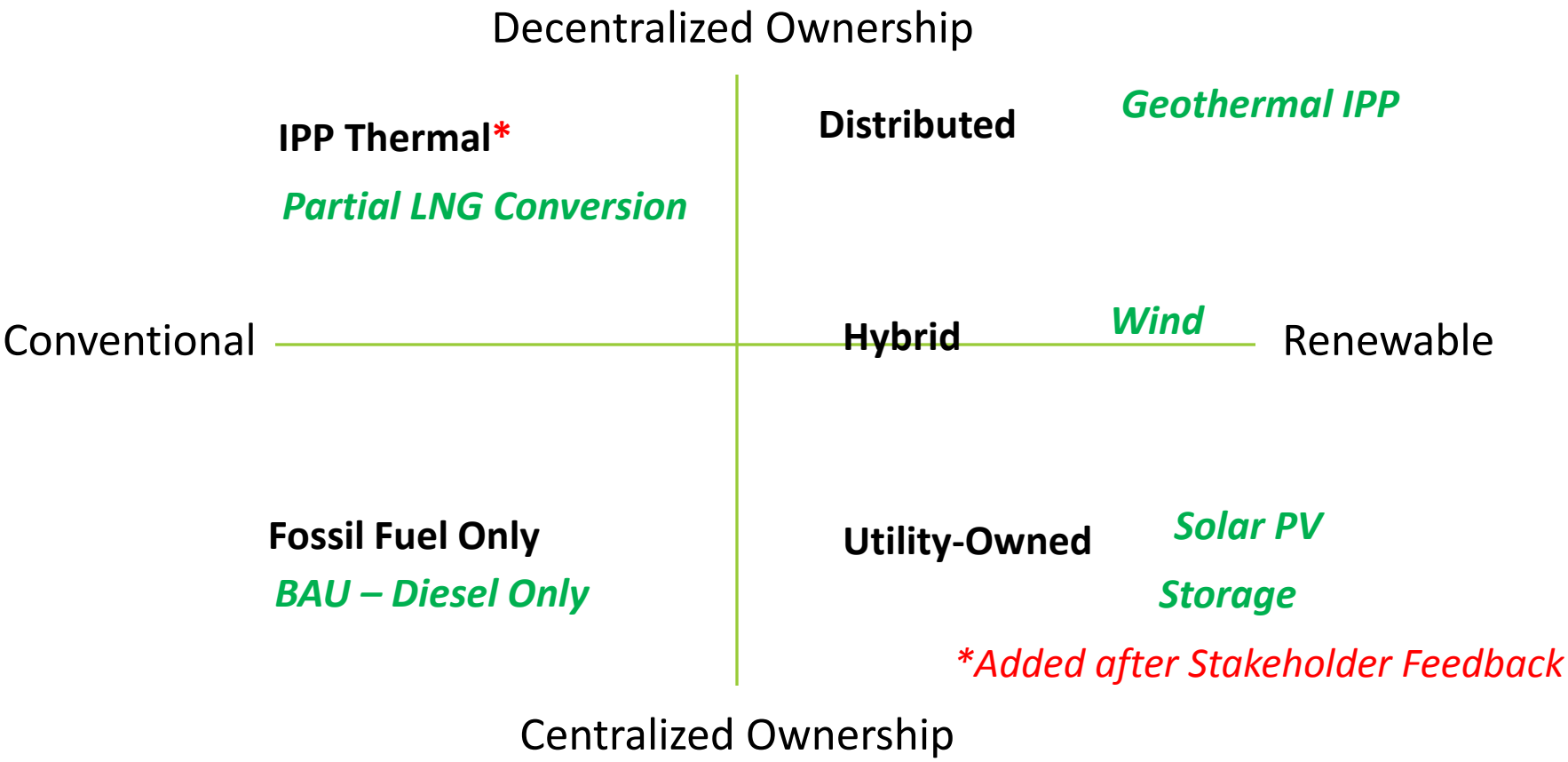
5. Rate Impact Model (RIM)

- Stakeholders informed of impact on consumer rates over the years; e.g. rate shock with existing tariff / cost recovery structure

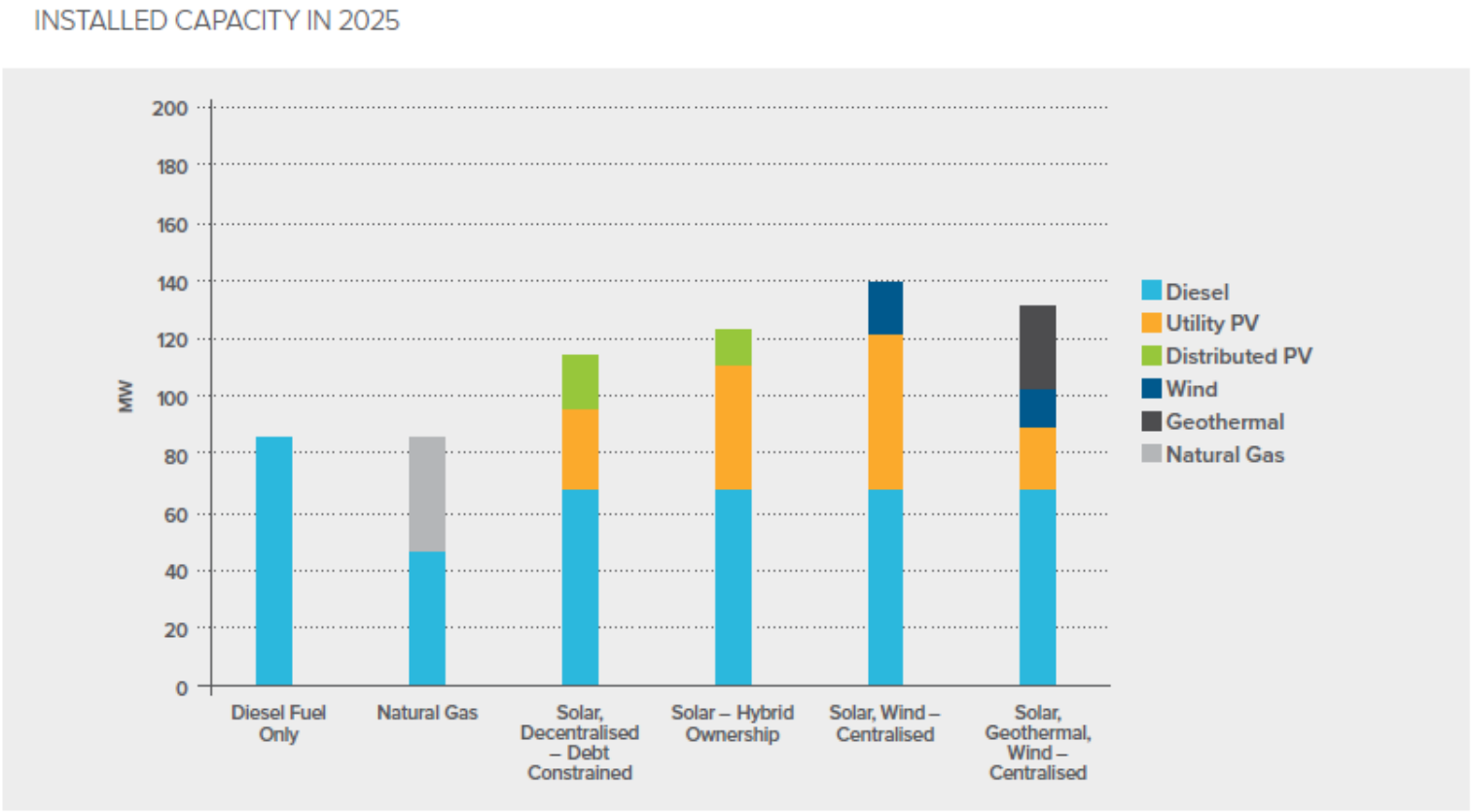
Building Scenarios: Stakeholder Engagement

- Each scenario evaluated is essentially a mix of renewable & conventional energy investments spread over the 20-year time period
- Scenarios represent possible conditions, but do not attempt to predict the future
- Joint development of scenarios helps to prevent polarization or biased scenario selection
- Agreement on sensivities to test robustness of preferred scenario(s), e.g. fuel prices, capex, etc.
- Getting early input from key stakeholders and then from the public will create buy-in to these scenarios, that they are differentiated yet exhaustive

St. Lucia Scenario Selection



Deep Analysis Scenarios



Different Stakeholders Have Access To Different Data

- Involvement of multiple parties allowed for more accurate cost assumptions
  - Non-public fuel hedging data from LUCELEC
  - Wind development by LUCELEC and external partner (who held actual met tower data)
  - Government providing concessions and securing grant funding for Geothermal development
  - RMI / CCI had Caribbean cost data for solar
  - External consultants/technical experts bring in industry pricing data for storage

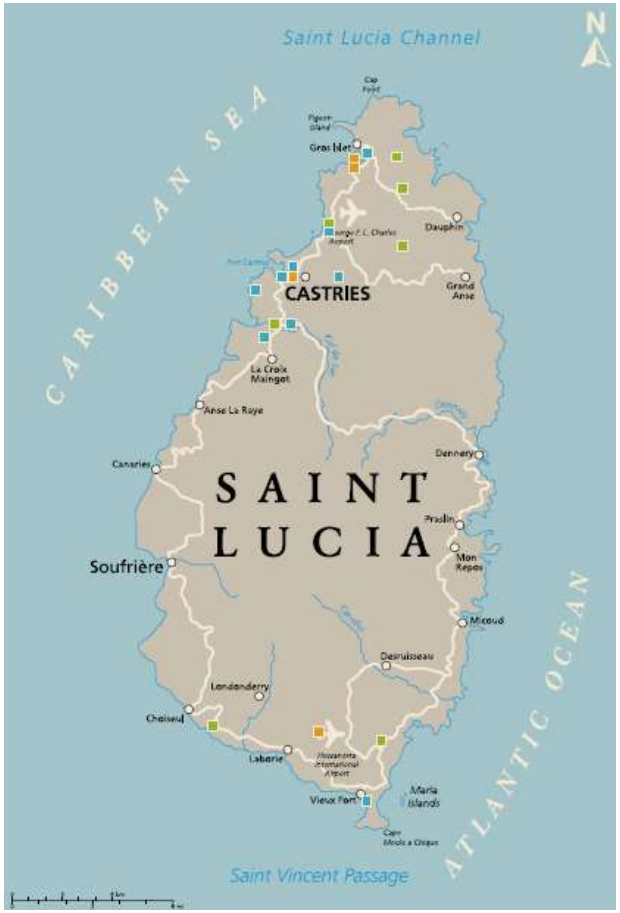
Interim Meetings with Partners

- Check in with partners and stakeholders regularly to provide emerging answers and gauge initial reactions
- Ensure that the results provided are aligned with the questions stakeholders sought to answer through the IRP
- Continue to refine, and align all data sources and assumptions throughout modeling effort

Partners in discussion in Saint Lucia

Solar Resource Assessment: "Land is a Premium"

- Solar can be land intensive
- Recommendations from least cost modeling that identify solar PV as a top resource must be verified as feasible
- Two objectives for assessment:
  - High-level overview of total space potential for PV
  - Identification of high-potential sites for near-term project development
- Assessed rooftop, carport, and ground-mount solar PV



Ground-Mount Solar: Stakeholder Feedback

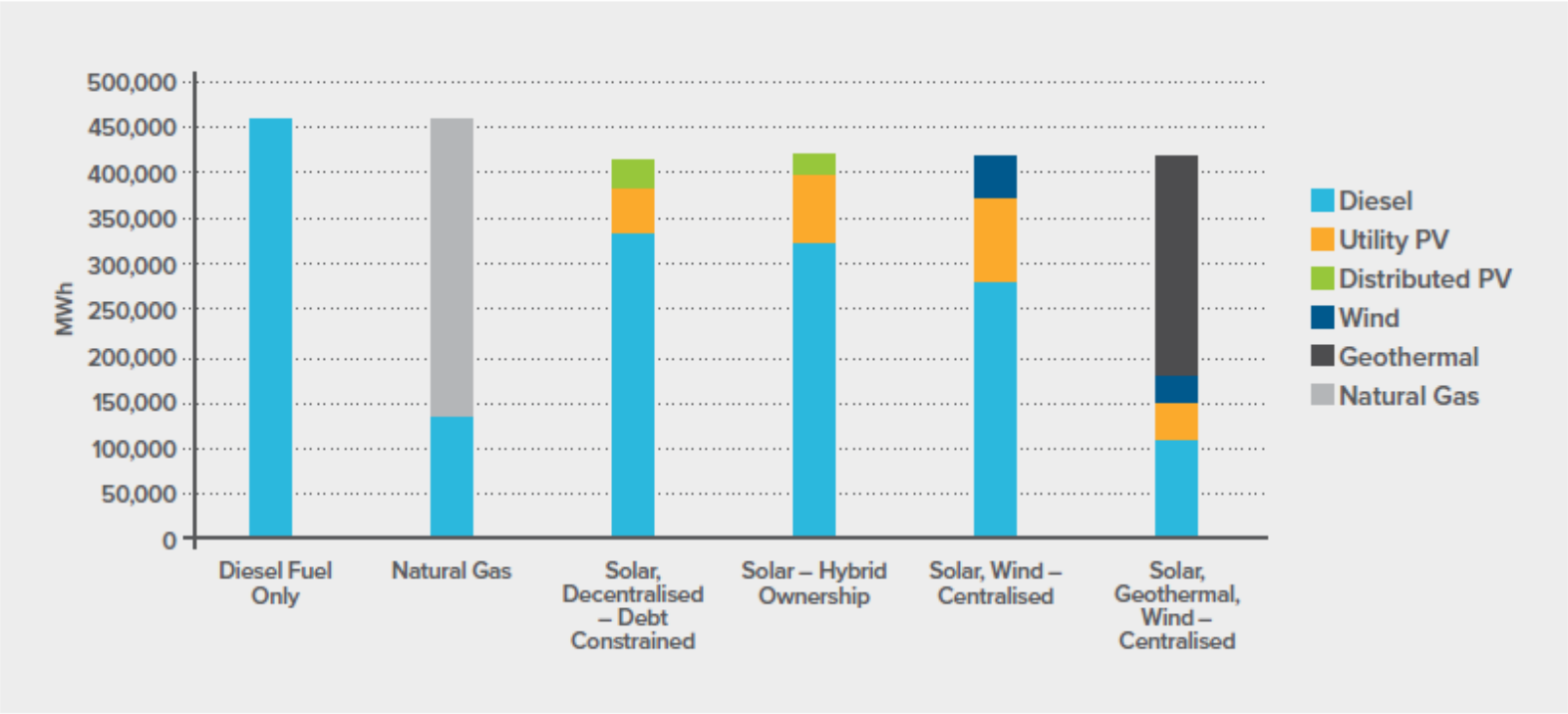
1. GIS assessment (constructability parameters)
2. Initial list of ground-mount (> 5 MW) sites produced
3. **Detailed consultation** with: LUCELEC; Renewable Energy Division; Forestry; Agriculture; Planning; Invest St. Lucia
4. Narrowed sites to Tier 1 (No major concerns), Tier 2 (Potential concerns around competing land use), and Tier 3 (Environmentally sensitive, Protected Areas, Slated for Development, or Farming)
5. Result: Over 85 MW of "Tier 1" solar sites identified

Stakeholder Feedback

Results: Energy Production

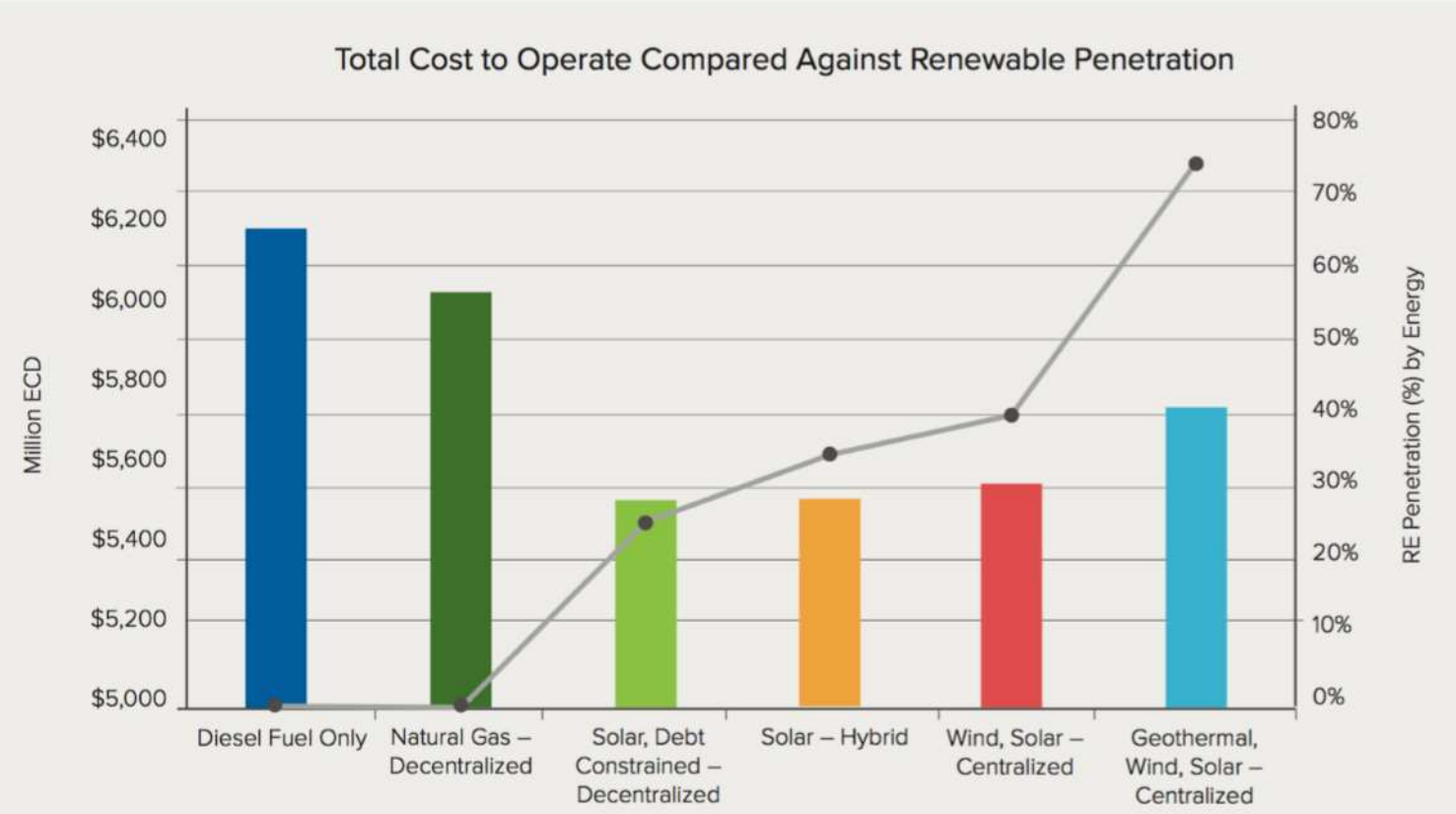
Diesel continues to play a role to meet reserve requirements and maintain reliability

ENERGY PRODUCTION IN 2025 BY SCENARIO



Results: Cost to Operate

Multiple pathways exist that can help St. Lucia reach energy goals AND reduce utility cost to operate



Lesson Learned: Energy Efficiency

- Energy efficiency a key component of the IRPs, and always shows up as the least cost resource
- However, without regulatory oversight and involvement, utility sees energy efficiency only as lost revenue
- For a successful utility energy efficiency program, regulator must allow for cost recovery for any utility investments on the demand side

LESSONS LEARNED:

- Willingness of utility decision makers to develop new revenue streams, and willingness for regulators to adapt to changes in business models needs to be discussed early
- Otherwise, it becomes a recommendation in the IRP that requires too much effort to implement

What is Missing without Multi-Stakeholder Involvement

- While an IRP may assess alternative resource scenarios, they may bear resemblance to "business as usual" in their investment strategies
- New commercial technologies are either not incorporated, or their costs and resource potential are not assessed appropriately due to lack of familiarity
- Demand side management is not seen as a resource – when often energy efficiency is the cheapest resource available
- Non-wire alternatives such as energy storage not assessed for multiple value streams (e.g. T&D deferral, reduced renewable energy curtailment, in addition to spinning reserves)

NOTE: These are not necessarily *intentionally* left out, but are reflections of internal biases that any single stakeholder might have

An Inclusive Approach is a Holistic Approach

In St. Lucia the past…

- Utility commissions individual studies (e.g. biomass, heat recovery, alternative fuels)
- Government sets renewable energy targets or pushes development of a new technology

The National Energy Transition Strategy, informed by the IRP process…

- Assessed multiple technology options simultaneously, including their interaction with each other and their impact on grid and economics
- Allows utility to develop investment strategy AND government to make long-term policy decisions, at the same time and on the same basis
- Creates a transparent and trusting environment for all involved stakeholders and the public, and confidence for the NURC

Thank You

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