

# ORGANISATION OF EASTERN CARIBBEAN STATES (OECS)



## Geothermal Energy and OTEC Opportunities For the Caribbean

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**CARIBBEAN WORKSHOP ON “RENEWABLE ENERGY IN SMALL ISLANDS  
DEVELOPING STATES: HOW TO STRENGTHEN RESILIENCE AND  
ACCELERATE RENEWABLE ENERGY DEPLOYMENT?”**

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# Key Features of Energy in the Caribbean

- Primarily gross importers of fossil fuels
- Cost of energy is comparatively high and accounts for high percentage of GDP
- Transportation and Tourism Sectors amongst largest consumers of energy
- Good potential for Renewable Energy sources include solar, wind, geothermal, hydro and biomass
- Ocean Thermal Energy Conversion potential not quantified but could be significant and transformative



# Drivers for Geothermal Energy and OTEC

- Reducing region's dependence on imports of oil products for electricity generation
- Stabilizing and reducing electricity prices, and contributing to the sub-region's energy security



## Geothermal Energy in OECS

Member States actively pursuing geothermal Energy

-Dominica

-Grenada

-Martinique

Montserrat

-St.Kitts and Nevis

-Saint Lucia

-St.Vincent and the Grenadines

Guadeloupe-only geothermal plant in the region  
(currently negotiating OECS membership)



## Benefits of Geothermal

- Geothermal energy has the distinction of having high availability, and can be delivered 24 hours a day, 365 days a year.
- Geothermal energy plants can also operate continuously at up to 98% capacity because they have a constant source of “fuel” and require little downtime for maintenance.
- Provides baseload
- Electricity generation and direct use



# Benefits Geothermal Energy

- Small land foot print
- Modular
- Although geothermal projects are relatively capital intensive, a geothermal power plant has low and predictable operating costs.
- Resilience



# Caribbean Outlook for Geothermal Energy

- Geothermal represents significant opportunity for the region
- Require sizeable investment e.g US\$92 M for 10 MW in SVG



*Montserrat Geothermal Well #3*



# Caribbean Outlook for Geothermal Energy

<b>Country</b> (Estim. Plant Size)	<b>Status</b>
Dominica (7 MW)	<ul style="list-style-type: none"> <li>- Development company established</li> </ul>
Grenada (15 MW)	<ul style="list-style-type: none"> <li>- Project Management Unit</li> <li>- Test Well drilling to commence</li> <li>- Procurement of ESIA consultants</li> </ul>
Saint Kitts (18-36 MW) and Nevis (9 MW)	Saint Kitts: <ul style="list-style-type: none"> <li>- GE Agreement is being discussed</li> <li>- Surface studies completed in 2016</li> <li>- ESIA for test drilling stage to be done</li> </ul> Nevis: <ul style="list-style-type: none"> <li>- Additional testing to be done</li> </ul>
Saint Vincent and the Grenadines (10 MW)	<ul style="list-style-type: none"> <li>- Exploration/full size well drilling to commence</li> <li>- Drilling contractor already procured</li> <li>- PPA between developer SVGCL and VINLEC concluded</li> </ul>

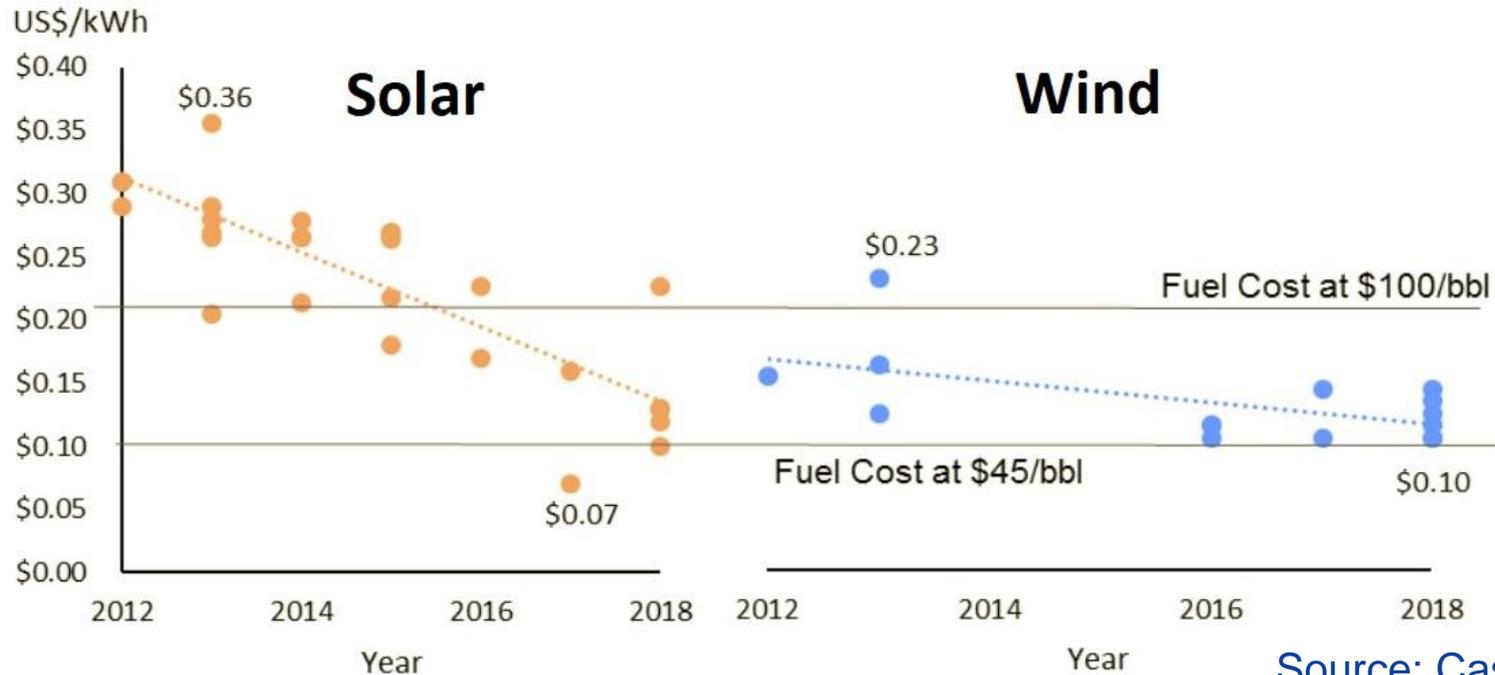


# Caribbean Outlook for Geothermal Energy

<b>Country</b> (Estim. Plant Size)	<b>Status</b>
Saint Lucia (25-30 MW)	<ul style="list-style-type: none"><li>- ESIA for test drilling completed</li><li>- Feasibility study finalised</li><li>- Next step is test drilling</li></ul>
Montserrat (2.5 – 3.5 MW)	<ul style="list-style-type: none"><li>- Two exploration well have successfully identified a resource</li><li>- 3<sup>rd</sup> well drilled</li><li>- Ongoing Early Market</li><li>- Engagement process for EPC and Partial Financing</li></ul> <div data-bbox="1151 876 1823 1233"></div> <p data-bbox="1182 1262 1711 1296"><i>Montserrat Geothermal Well # 1</i></p>



# Prices for Solar, Wind & Geothermal in the Caribbean



Source: Castalia 2017

**Geothermal: 0.13–0.19 US\$/kWh**  
(current planned projects)





## OECS Commission-Enabling Environment Survey

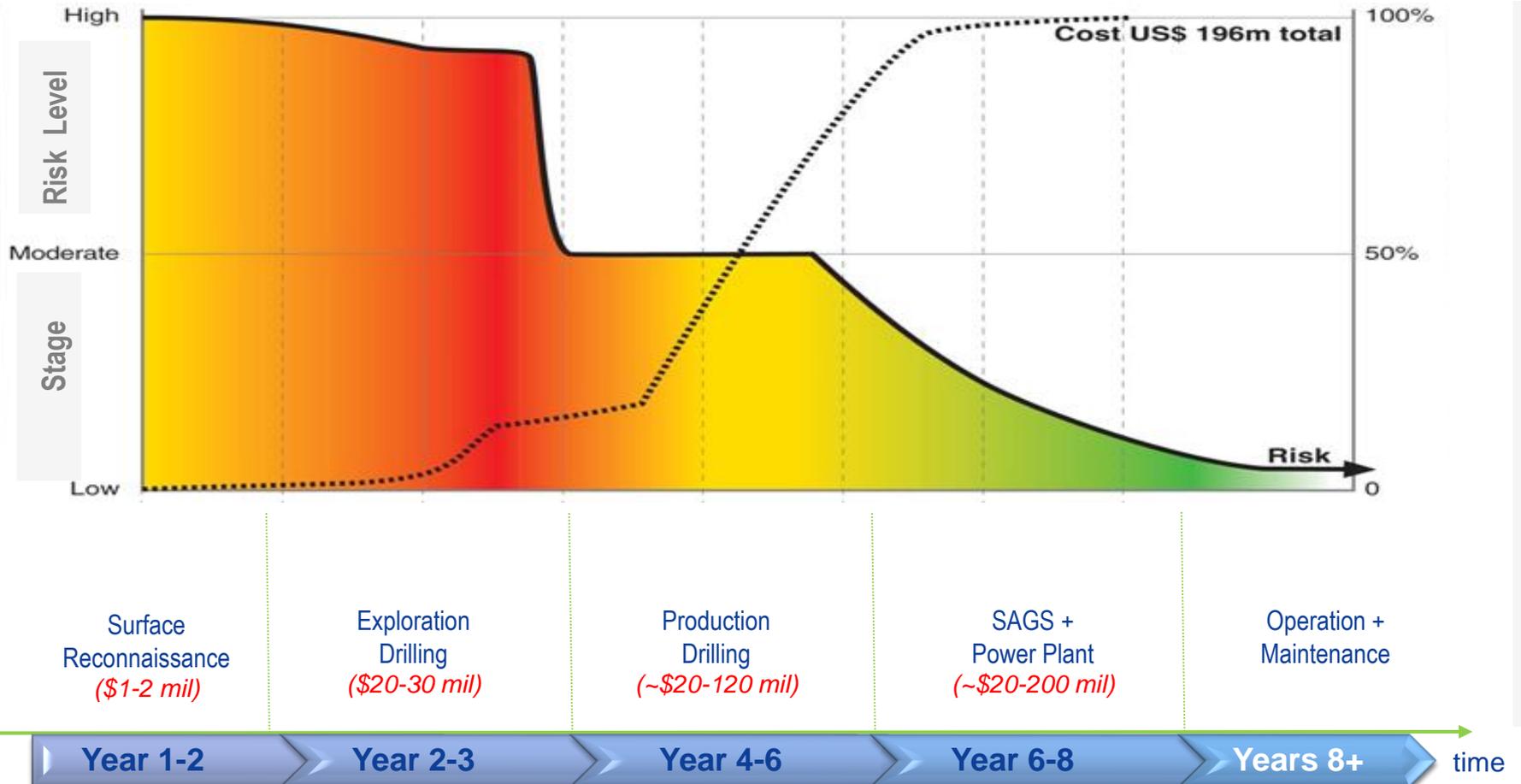
- In 2016 conducted stakeholder analysis to identify the main challenges to geothermal energy in the region.
- Surveyed geothermal stakeholders :governments, utility companies and private sector experts pursuing geothermal energy initiatives.
- The survey results:
  - ❖ **Finance** and **Government Policy** are the main challenges to geothermal energy development in the region.
  - ❖ These were followed closely by competition from other energy sources, and technological issues.



# Stages and Risks of Geothermal Development

Upstream Resource Development

Downstream Plant Construction/Ops



Cumulative Costs





# Financing of Geothermal Energy

- High cost of exploration
- Countries keen on securing national interest but not in position to take on additional debt
- Various business models in the Region
- Critical role for private sector including international investors
- Challenge of negotiating Power Purchase Agreements



# Financing-Caribbean Development Bank

## Financing facilities include:

- ❖ Sustainable Energy Facility (SEF) for the Eastern Caribbean Programme is a package of loan, grant and contingent grant resources with focus on geothermal energy
- ❖ The SEF is part of CDB's GeoSmart Initiative in that it provides resources mainly to Geothermal Energy development
- ❖ SEF-Expanded which included a co-financing from the Green Climate Fund (GCF) which was approved in October 2016
- To date , resources have been approved for Grenada (technical assistance), St Vincent and the Grenadines (investment grant for test drilling)



# Financing-Geothermal

- IRENA-Abu Dhabi Fund
- Multilateral Banks
- Private Investors
- Public Private Partnerships
- Other Emerging Options..



## Needs and Gaps

- Energy Policy and regulatory environment
- Alignment of other national policies to support geothermal
- Capacity building-specialised skills (technical, legal etc)
- Land use issues ( land acquisition, land use)
- Transaction Negotiations and Business models



# Regional Geothermal Energy Coordination

- Repeated calls for closer regional collaboration on geothermal energy
- OECS Commission views this as supportive of the single economic union and greater regional integration
- Benefits to be derived from inter-connection and regional energy interdependence
- Shared circumstances and challenges
- Currently being pursued under the INTERREG



# OECS Dialogue and UNFC Training

- Dates :5<sup>th</sup> -7<sup>th</sup> Dec. 2018 ,Saint Lucia
- Collaborative Effort: OECS Commission, IRENA, Internal Geothermal Association, Caribbean Development Bank, World Bank
- Dialogue aims to advance and initiate a regional cooperation mechanism for geothermal energy
- UNFC Training: Harmonized framework to qualify estimates of geothermal energy based on economic viability, technical feasibility and confidence,



# Ocean Thermal Energy Conversion

- Supportive of the Blue Economy
- Could hold significant potential when commercially available for marine states
- Potentially could provide reliable energy for baseload
- Co-benefits e.g fresh water production, aquaculture,
- Keen interest in pursuing OTEC .e.g Japan, France( including Martinique), South Korea, Philippines, the Bahamas, Hawaii



# OTEC-Challenges

- Lack of experience building OTEC plants at scale
- Large scale OTEC plants require high up-front capital costs, and the current prices per kWh are not competitive
- OTEC seems most suitable, and economically viable for island countries and remote island states in tropical seas where generation can be combined with other functions
- Environmental impact with respect to siting of OTEC projects, protection of marine bio-diversity and recreational activities and tourism



**Organisation of  
Eastern Caribbean States**

*Thank You*

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