Improving Energy Efficiency & Lowering Costs in the Caribbean

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IDB  Energy / Infrastructure & Environment
A Problem
Residents of Caribbean nations face very high electricity and transportation fuel costs that have measurably negative impacts on its economic performance.
Source: OLADE (2012); EIA (2014)
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Reasons
What explains these high costs of energy?
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The Jamaican energy matrix illustrates the reasons for these prices.
Almost all generation capacity is thermal, based on fossil fuels – which are almost all imported.

<table>
<thead>
<tr>
<th>Country</th>
<th>Fuel Oil</th>
<th>Gas</th>
<th>Coal</th>
<th>Hydro</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominica</td>
<td>75%</td>
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<tr>
<td>St. Vincent &amp; the Grenadines</td>
<td>88%</td>
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<tr>
<td>Grenada</td>
<td>100%</td>
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<tr>
<td>St. Kitts &amp; Nevis</td>
<td>96%</td>
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<tr>
<td>Antigua &amp; Barbuda</td>
<td>100%</td>
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<tr>
<td>St. Lucia</td>
<td>100%</td>
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<tr>
<td>Guyana</td>
<td>100%</td>
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<tr>
<td>Barbados</td>
<td>100%</td>
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<tr>
<td>Haiti</td>
<td>80%</td>
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<tr>
<td>Suriname</td>
<td>49%</td>
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<tr>
<td>Bahamas</td>
<td>100%</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Jamaica</td>
<td>95%</td>
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<td></td>
</tr>
<tr>
<td>Trinidad &amp; Tobago</td>
<td>53%</td>
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<td></td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>53%</td>
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</tbody>
</table>

**Source:** IDB (2013) – Pre-Feasibility Study of the Potential Market for Natural Gas as a Fuel for Power Generation in the Caribbean
- All generation capacity is thermal, based on fossil fuels, which are almost all imported

- Thermal generation wastes on average around 2/3 of the energy input to generation

- Transport uses about ½ of total supply and it’s very difficult to shift transport away from oil products on a large scale

- Therefore, the realistic scope for generating efficiencies in energy applies to about half of current
Antigua & Barbuda 2009 (boe/day)

**Final Consumption by Sector**

- Industry: 601.1
- Transport: 721.3
- Residential: 390.7
- Commercial: 631.1
- Other: 300.5

**Final Consumption**

- Oil Products: 4,800
- Heat, Waste & Losses: 1,916.3

**Electricity**

- Input: 2,281.3
- Production: 0.0
- Imports: 0.0
- Exports: 239

**Electricity Consumption**

- Total: 2,279.8
- Residential: 365
- Commercial: 365
- Industry: 365
- Transport: 365
- Other: 365

Source: Own calculations based EIA, Castalia Consulting, GEF, Inter-American Development Bank, 2013

Author: Malte Humpert

Editor: Ramón Espinasa (INE/ENE)
A Solution
Turning to the scope for improving energy sector efficiency...
A Solution

Turning to the scope for improving energy sector efficiency... there is potential for:
A Solution

Turning to the scope for improving energy sector efficiency... there is potential for:
- Diversifying to other thermal
A Solution

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- Diversifying to other thermal
- Diversifying away from thermal
A Solution

Turning to the scope for improving energy sector efficiency... there is potential for:
- Diversifying to other thermal
- Diversifying away from thermal
  - Solar/wind → intermittency & storage
  - Geothermal → geological conditions
Divergent Gas & Oil Prices

Source: EIA
Potential Gas Sources

Source: IDB (2013) – Pre-Feasibility Study of the Potential Market for Natural Gas as a Fuel for Power Generation in the Caribbean
Potential Gas Import Ports

Source: IDB (2013) – Pre-Feasibility Study of the Potential Market for Natural Gas as a Fuel for Power Generation in the Caribbean
System Cost: Gas vs. Fuel Oil

Introducing natural gas for electricity generation can lead to savings between 20-30% for nearly all countries in the Caribbean.

Source: IDB (2013) – Pre-Feasibility Study of the Potential Market for Natural Gas as a Fuel for Power Generation in the Caribbean
System Cost: Gas vs Other Sources

Source: IDB (2013) – Pre-Feasibility Study of the Potential Market for Natural Gas as a Fuel for Power Generation in the Caribbean
Conclusions

• Scope for savings from **diversifying from fuel oil to non-conventional renewable sources** (small-scale wind, solar water heating, bagasse) exist in a small scale
  – Problems of **intermittency and reliability** remain very important with solar, wind
  – Geothermal is a very attractive solution for countries with the underground endowment

• **Only realistic large-scale diversification** would be from **fuel oil to natural gas**
  – Economies of scale of supply
  – Ability to replace fuel oil with gas for generation
  – Even expanding current NCR installed capacity to 10% of total, reliance on fuel oil remains around 70-90%