# The Electricity Sector overview

## Electricity Demand-Supply 2011-2025

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</thead>
<tbody>
<tr>
<td><strong>Energy (GWH)</strong></td>
<td>2276</td>
<td>2461</td>
<td>2696</td>
<td>2817</td>
<td>2934</td>
<td>3038</td>
<td>3141</td>
<td>3239</td>
<td>3327</td>
<td>3424</td>
<td>3630</td>
<td>3757</td>
<td>3885</td>
<td>4013</td>
<td>4141</td>
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<tr>
<td><strong>Peak Power (MW)</strong></td>
<td>414</td>
<td>430</td>
<td>450</td>
<td>464</td>
<td>475</td>
<td>484</td>
<td>497</td>
<td>509</td>
<td>518</td>
<td>535</td>
<td>548</td>
<td>561</td>
<td>573</td>
<td>586</td>
<td>599</td>
</tr>
</tbody>
</table>

- Capacity demand growth is 2.0% presently and is forecasted to be 2.5% on average.
- Energy demand growth is 2.5% presently and is forecasted to be 3.8% on average.
The Electricity FUEL-MIX

Fuel Mix

Year

- Bagasse
- Coal
- Fuel Oil
- Hydro
Electrical Energy Demand = **2433** GWh
Peak Power Demand = **413** MW
Current Available Supply Power Capacity

- Capacity Available:
  - Base Capacity: 180 MW Coal / Bagasse (IPP) and 128 MW Slow speed diesel (CEB).
  - Semi-base Capacity: 117 MW Medium speed diesel (CEB)
  - Peak Capacity: 74 MW Gas Turbines (CEB)

CEB has a total of 59 MW of Hydro is installed. An average of 20MW yearly only can be considered as firm.
Maurice Ile Durable

In response to the global energy crisis in 2007, Government became fully conscious of the importance of promoting renewable energy and sustainable development for the wellbeing of its citizens. As such, in 2008, the Prime Minister, Dr. The Honourable Navinchandra Ramgoolam announced the Maurice Ile Durable (MID) concept, as being the new long term vision for making Mauritius a sustainable island.

“Maurice Ile Durable (MID) is essentially a vision that seeks to transform the environmental, economic and social landscape of our country”.

“MID seeks to build up capital, not only for our generation but for generations to come. The MID vision is embedded in a strategic framework embracing five development pillars, namely Education, Environment, Energy, Employment and Equity.”
### Long Term Energy Strategy 2009-2025

<table>
<thead>
<tr>
<th>Fuel Source</th>
<th>Percentage of Total Electricity Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td><strong>Renewable</strong></td>
<td></td>
</tr>
<tr>
<td>Bagasse</td>
<td>16%</td>
</tr>
<tr>
<td>Hydro</td>
<td>4%</td>
</tr>
<tr>
<td>Waste to energy</td>
<td>0</td>
</tr>
<tr>
<td>Wind</td>
<td>0</td>
</tr>
<tr>
<td>Solar PV</td>
<td>0</td>
</tr>
<tr>
<td>Geothermal</td>
<td>0</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>20%</td>
</tr>
<tr>
<td><strong>Non-Renewable</strong></td>
<td></td>
</tr>
<tr>
<td>Fuel Oil</td>
<td>37%</td>
</tr>
<tr>
<td>Coal</td>
<td>43%</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>80%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>
Mare Chicose Landfill Site

- Operational since 1997 and had approximately 3.6 million tons of waste in place as of March 2009 and receives approximately 400,000 tonnes of waste per year
- A basic gas collection and flaring system started operation in 2001
- Sotravic, in a joint venture (JV) with the German consortium Bilfinger Berger, took over the management of the Mare Chicose landfill in December 2006 after winning a government bid for the new concession. It will be operated by the JV until December 2016.
- Flaring installation was improved in 2008 and 2009 in order to cope with amount of methane generation.
- It is a fully managed site with leachate collection system and a leachate basin
- landfill, as well as generate electricity and sell to the Electricity Utility (CEB) through a 2 to 3 MW generator sets.
- It is estimated that 95,433tCO2e will be reduced annually over the entire crediting period (PDD July 2009) on average.
Landfill Gas to Energy Plant

- Project Promoter: Sotravic Ltd
- Electricity purchaser: Central Electricity Board
- Fuel Gas – Landfill Methane
- Installed Capacity 3.3MW (3 units IC Engines)
- Annual Generation 22 GWH
- Term of the contract 5 years (2011-2016)
- Project cost 3.5 million USD
Landfill Gas to Energy Plant
Process overview
## Feasibility study

<table>
<thead>
<tr>
<th>Year</th>
<th>LFG generated (m³/yr)</th>
<th>LFG generated (m³/hr)</th>
<th>LFG collectable (m³/hr)</th>
<th>Theoretical Number of 1MW Units</th>
<th>Number of Effective Gas Wells</th>
<th>Minimum Gas Collected (m³/hr)</th>
<th>Maximum Gas Collected (m³/hr)</th>
<th>Proposed Number of 1MW Units</th>
<th>Expected Unit Operational Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>34,274,409</td>
<td>3,913</td>
<td>2,602</td>
<td>3</td>
<td>20</td>
<td>400</td>
<td>600</td>
<td>1</td>
<td>No.1</td>
</tr>
<tr>
<td>2009</td>
<td>37,863,912</td>
<td>4,322</td>
<td>2,874</td>
<td>4</td>
<td>60</td>
<td>1,200</td>
<td>1,800</td>
<td>2</td>
<td>No.2</td>
</tr>
<tr>
<td>2010</td>
<td>41,310,091</td>
<td>4,716</td>
<td>3,136</td>
<td>4</td>
<td>80</td>
<td>1,600</td>
<td>2,400</td>
<td>2</td>
<td>No.3</td>
</tr>
<tr>
<td>2011</td>
<td>44,621,291</td>
<td>5,094</td>
<td>3,387</td>
<td>4</td>
<td>80</td>
<td>1,600</td>
<td>2,400</td>
<td>3</td>
<td>No.1</td>
</tr>
<tr>
<td>2012</td>
<td>42,022,750</td>
<td>4,797</td>
<td>3,190</td>
<td>4</td>
<td>80</td>
<td>1,600</td>
<td>2,400</td>
<td>3</td>
<td>No.2</td>
</tr>
<tr>
<td>2013</td>
<td>39,575,535</td>
<td>4,518</td>
<td>3,004</td>
<td>4</td>
<td>100</td>
<td>2,000</td>
<td>3,000</td>
<td>3</td>
<td>No.3</td>
</tr>
<tr>
<td>2014</td>
<td>37,270,835</td>
<td>4,255</td>
<td>2,829</td>
<td>4</td>
<td>100</td>
<td>2,000</td>
<td>3,000</td>
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<tr>
<td>2015</td>
<td>35,100,351</td>
<td>4,007</td>
<td>2,665</td>
<td>3</td>
<td>90</td>
<td>1,800</td>
<td>2,700</td>
<td>3</td>
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<tr>
<td>2016</td>
<td>33,056,266</td>
<td>3,774</td>
<td>2,509</td>
<td>3</td>
<td>86</td>
<td>1,720</td>
<td>2,580</td>
<td>3</td>
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<tr>
<td>2017</td>
<td>31,131,219</td>
<td>3,554</td>
<td>2,363</td>
<td>3</td>
<td>82</td>
<td>1,640</td>
<td>2,460</td>
<td>3</td>
<td>No.1</td>
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<tr>
<td>2018</td>
<td>29,318,277</td>
<td>3,347</td>
<td>2,226</td>
<td>3</td>
<td>78</td>
<td>1,560</td>
<td>2,340</td>
<td>3</td>
<td>No.2</td>
</tr>
<tr>
<td>2019</td>
<td>27,610,914</td>
<td>3,152</td>
<td>2,096</td>
<td>3</td>
<td>74</td>
<td>1,480</td>
<td>2,220</td>
<td>2</td>
<td>No.3</td>
</tr>
</tbody>
</table>
Currently two generating of 2.2 MW are operational. A third generator will be installed and operational by January 2013 for a total installed capacity of 3.3 MW.

The 2 gas engines running consume about 1200Nm3/hr of gas for an approximate methane concentration of 50-55%.

Gas is extracted from gas wells drilled into the waste mass on the landfill. The drilling depth is between 25-30m.

Each gas well delivers approximately a flow of 25-30Nm3/hr.

Gas is extracted from the landfill by applying a negative pressure on the gas well heads. A negative pressure of about -20mbar is maintained by an assembly of blowers found on the degassing plant.

Filtration and condensate removal of the gas is also carried at the degassing plant.

Fifteen gas wells are connected to each manifold making a total of approximately 75 gas wells connected.

Gas from the landfill is filtered and removed from condensate before entering gas engines.
Landfill Gas to Energy Plant
Salient features (2/2)

- Methane present in the landfill gas is fed to power the gas engines. The gas is compressed and ignited through a series of spark plugs
- 400V delivered by gen-sets is stepped up to 22kV via installed transformers
- 22 kV switchgear panel of Schneider make for switching between LFGTE power plant and the national grid.
Current Operation of the Plant

SCADA View

Daily Generation: 53,000 kWh
Estimated Ann. Gen: 22 GWh
⇒ 0.75% of the Energy Mix

Mare Chicose
Landfill Gas to Energy plant
Central Electricity Board

Energy Supply and Purchase Agreement

Sotravic Ltee
Salient Features of the Energy Supply and Purchase Agreement

- The Project
- The Obligations
- The Facility
- The Agreement term
- The Tariff
- The Carbon Credits
- The MIDF contribution
1 The Project

✓ Sotravic Ltée will to develop, finance, design, construct, commission, test, own, operate, and maintain a landfill gas to energy facility to be located at Mare Chicose, which would collect the otherwise dispersible methane gas to operate gas engines for generating electrical energy (“Facility”).

✓ The Heads of Term Agreement was signed on the 6th March 2009. Following a series of negotiations by the CEB Negotiating Panel, the Draft agreement was finalised on the 15th June 2011.

✓ CMcK assisted the Panel during the negotiations on legal matters.
2 The Obligations

- CEB has agreed to purchase all the electrical energy that may be exported from the Facility to the CEB system during the Term in accordance with and subject to the conditions specified in the ESPA.

- Sotravic Ltee will only get paid for electricity exported to the grid and no capacity charge is applicable.

- The CEB will only pay for deemed energy for non-dispatched energy due to unavailability of the CEB grid due to outage except force majeure.
3 The Facility

- The Facility will be of 2 MW as from the target commissioning date of 31 July 2011 and will be increased to 3 MW in July 2012.

- The Facility will generate about 22 GWH of electrical energy yearly to be exported to the CEB grid.

- Consist of Three Gas Engines (Each 1MW) manufactured by Caterpillar, model G3516LE. Each engine is a 4-stroke-cycle and spark-ignited engine operating.
4 The Agreement term

✓ The term of the contract is from July 2011 (or the execution date) and will be for a duration of five (5) years. The parties may negotiate an extension of at least six (6) months at the end of the term, subject to mutual agreement.
5 The Tariff

✓ The agreed tariff is at Rs X (base year 2010) and indexed over the project life (2011 to 2016). Indexed to inflation, exchange rate and lube oil.

✓ Payment will be effected subject to energy being delivered at normal tariff and an excess tariff of only 20% of the nominal tariff for energy above the contractual quantity of 110,388,810 kWh.

✓ The Project IRR has been calculated about 19% based on the submission. It is largely influenced by the Gas availability and Sotravic Ltée assumes that risk.
Proposed Tariff by Sotravic was higher than the average marginal cost of generation by CEB’s plants.
6 The Carbon Credits

- Sotravic Ltée has entered into an Emission Reduction Purchase Agreement dated 28 June 2007 ("ERPA") for the sale of the Environment Attributes (carbon credits) generated by the Project.

- The LFG capture and flaring component, ACM0001 Version 11, adopted at EB47, "Consolidated baseline and monitoring methodology for landfill gas project activities."

- They have also entered into an agreement dated 28 May 2009 with the Government in respect of payment of the amounts due to Seller on account of sale of Environmental Attributes under ERPA ("Government Agreement"). CEB has negotiated for 7.5% of the Carbon credit revenue, should the project be registered under the CDM process.
7 The MID Fund contribution

Given that the tariff is above the CEB average avoided cost, the Maurice Ile Durable Fund (MIDF) has approved the financing of Rs 100 million to the project. The funds will be made available to the CEB in five tranches of Rs 20 million yearly. An agreement has been signed by the CEB and the MIDF.
THANK YOU

Your Questions are welcomed

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