Bioenergy Development in Jamaica

Global Bioenergy Partnership
Bioenergy Week
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Brasilia, Brazil
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Ministry of Science, Technology, Energy and Mining
Jamaica
Jamaica Overview: Selected Indicators - 2011

- Population: 2,709,300
- GDP (nominal): J$ 1,266.6 billion (US$14.2 billion)
- Inflation: 8%
- Trade Balance: US$ -1.9 billion
- Oil Imports: 21.2 million barrels of oil
- Oil Import bill: J$205 billion (US$2.24 billion)
- Electricity Generation: 4,137GWh per annum
- Renewable Energy Inputs: 2,012,000 boe p.a.
- Value of Renewable Energy: J$18.3 billion (US$205 million)
- Sugar Exports: J$5,535.8 million (US$62.2 million)
- Unemployment Rate: 12.6% (male 9.3%, female 16.7%)

Sources:
The Planning Institute of Jamaica, Economic and Social Survey of Jamaica, 2011 and PCJ's Centre of Excellence for Sustainable Energy Developments
Renewable Energy in Jamaica

Energy Source Shares

- Petroleum Imports (90%)
- Renewable Consumption (9%)
- Other Energy (coal) (1%)
Renewable Energy in Jamaica

- Fuelwood: 57%
- Bagasse factories: 24%
- Hydro: 5%
- Wind: 2%
- Ethanol: 11%
- Solar: 1%
## Renewable Energy Barrels of Oil Equivalents

<table>
<thead>
<tr>
<th>Categories</th>
<th>Sources</th>
<th>2005 Actuals</th>
<th>2011 Actuals</th>
<th>2015 Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydropower generation</td>
<td>JPS</td>
<td>105,104</td>
<td>94,228</td>
<td>138,996</td>
</tr>
<tr>
<td>Waste to Energy generation</td>
<td>NSWMA</td>
<td>0</td>
<td>0</td>
<td>288,114</td>
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<tr>
<td>Bagasse for factories &amp; cogeneration</td>
<td>MoAF &amp; SIRI</td>
<td>529,553</td>
<td>427,380</td>
<td>706,107</td>
</tr>
<tr>
<td>Solar energy generation</td>
<td>Vendors</td>
<td>9,618</td>
<td>30,285</td>
<td>44,411</td>
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<tr>
<td>Wind energy generation</td>
<td>WWFL &amp; JPS</td>
<td>34,532</td>
<td>57,000</td>
<td>77,128</td>
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<tr>
<td>Fuelwoods – includes local coal and charcoal use - p</td>
<td>MSTEM &amp; Forestry Dept.</td>
<td>1,001,000</td>
<td>1,120,370</td>
<td>1,120,370</td>
</tr>
<tr>
<td>Biofuels Use for Transport - Bioethanol &amp; Biodiesel</td>
<td>Petrojam &amp; PCJ</td>
<td>0</td>
<td>371,947</td>
<td>427,940</td>
</tr>
<tr>
<td>TOTAL (Boe)</td>
<td></td>
<td>1,679,807</td>
<td>2,101,210</td>
<td>2,803,066</td>
</tr>
</tbody>
</table>
Jamaican Bioenergy Usage

- Cooking: charcoal / fuel wood
  - ~11% of homes in 2001; ~15% in 2011
  - Large consumption in the food service industry
  - Linked to deforestation? 1% per year since 1999

- Industrial cogeneration: bagasse
  - Seasonal production of ~1.5M tons cane (down from 3.5 M TC)
  - 30,000 ha under cultivation (down from >80,000 ha)
  - ~400,000-500,000 tons of bagasse
  - Low productivity, low conversion efficiency

- Transportation fuels: ethanol
  - 10 % blend in gasoline since 2008
  - 70M litres, all imported
Sugar Sector

- **SUGAR ESTATES**
  - Appleton Estates
  - Worthy Park
  - Pan Caribbean Sugar
    - Frome,
    - Monymusk and
    - Bernard Lodge
  - Golden Grove (St. Thomas Sugar)
  - Everglades
    - Long Pond
    - Hampden

- Estates produce 65% of cane and
- 10,000 cane farmers produce 35% of cane.
Sugar Sector Lands
Energy from Biomass in the Sugar Industry

Specific export of electricity

<table>
<thead>
<tr>
<th>kW/h/TC</th>
<th>Present setup</th>
<th>Good Practice Jamaica</th>
<th>Option 20 bar</th>
<th>Option 40 bar</th>
<th>Option 80 bar</th>
<th>International benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-20</td>
<td>-30</td>
<td>-50</td>
<td>-70</td>
<td>-90</td>
<td>-110</td>
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</tbody>
</table>

International benchmark
Policy Overview

- The National Energy Policy (2009 – 2030) was approved by Cabinet and promulgated.
- Ethanol in gasoline (E10) was established as a national fuel formulation in 2008.
- Jamaica has suitable lands for the revitalization of the sugar industry and the production of ethanol for 10% blending in gasoline.
- Some of these lands can support biomass and biodiesel crops for supplemental fuel to ensure economic cogeneration and biodiesel operations.
- Government has privatized its 71% holdings in the sugar sector.
- The fluctuation in sugar prices and the changes in quotas and marketing approach related to international trade agreements presents an opportunity for sugarcane diversification.
- Oil price volatility has served to heighten public awareness and interest in pursuing alternative energy options.
Gearing Up

Policies & Agreements

Entrepreneurial Actions

Research and Development
Legislative and Regulatory Framework

- E10 Mandate & ASTM E10 Fuel Standard
- Biofuels Policy (2010-2030) - *draft*
- B5 ASTM Biodiesel Fuel Standard – *draft*
- Vehicle Importation Tax Regime
Agreements

- Changes to the Sugar Protocol under the Cotonou Agreement of the World Trade Organization (WTO)
- Jamaica’s Country Strategy I (2006 – 2013) and Accompanying Measures
- Trilateral Memorandum of Understanding, Jamaica-Brazil-USA
- Jamaica’s Country Strategy II (2006 – 2020) and Accompanying Measures
- E10 exemption for fishing vessels.
- Sugar Sector Privatization Agreements
- Research Partnership Agreements with the Ministry of Agriculture and Fisheries Bodles Agricultural Research Station and the Caribbean Agricultural Research and Development Institute
THE NATIONAL ENERGY POLICY

OVERVIEW

Jamaica’s National Energy Policy (NEP) 2009 – 2030, approved by Cabinet in October 2009, is designed to ensure that by 2030 Jamaica achieves the vision of a:

“a modern, efficient, diversified and environmentally sustainable energy sector providing affordable and accessible energy supplies with long-term energy security and supported by informed public behaviour on energy issues and an appropriate policy, regulatory and institutional framework.”

The policy aims to facilitate the establishment of a comprehensive program of efficiency improvement and energy diversification to provide high quality, affordable, environmentally friendly energy and to reduce the country’s dependence on high cost imported oil.
GOALS THAT RELATE THE SUGAR CANE INDUSTRY

- **Goal 3:** Jamaica realizes its energy resource potential through the development of renewable energy sources and enhances its international competitiveness, energy security whilst reducing its carbon footprint.

- **Goal 4:** Jamaica’s energy supply is secure and sufficient to support long-term economic and social development and environmental sustainability.
THE BIOFUELS POLICY

- The Draft National Biofuels Policy seeks “to develop a sustainable biofuels industry that is capable of meeting local demand for biofuels, whilst contributing to rural economic development; generating employment opportunities; reducing environment degradation; providing safeguards for food production, and harnessing indigenous energy sources.”

- The development of a Draft National Biofuels Policy will facilitate the implementation of goals 3 and 4 of the NEP, and will enhance the economic, environmental and energy security priorities for Jamaica.
BIOFUELS POLICY

- To increase and diversify indigenous agro-industry earnings from ethanol, biodiesel and co-products (e.g. bagasse cogeneration, biogas, fertilizer from vinasse, glycerol).

- To ensure that clean renewable electricity and cogeneration of electricity for the grid are inextricably linked to the sugarcane industry.

- To ensure increased biofuels production will not impact negatively on the availability of lands for food production.
Research and Development

E10

- Country Strategy for the Adaptation of the Sugar Industry
- Muhkerji Sugar Ethanol Study, 2004
- United Nations Economic Commission for Latin America and the Caribbean’s Renewable Energies Potential, 2005
- United States Trade Development Association’s Biofuels Assessment, 2010

2011

- Technical Assistance for Biofuels Development by Winrock International
- Llandel Mills Biomass Assessment for the Sugar Sector
- Carbon Emissions Reduction Project Identification & Notifications
- FAO, Food and Agriculture Biofuels Report: prospects, risks and opportunities

2012

- Office of Utilities Regulation’s Renewable Energy Bidding Guideline
- Feed-In Tariff (FIT) Assessment by Trama TechnoAmbiental
Entrepreneurial Actions

E10
- Establishment of Ethanol Distillation Plants by:
  - Petrojam Ethanol Ltd., 1985
  - ED&F Man, 1997
  - Jamaica Broilers Ethanol Ltd., 2005
- Ethanol trade with the USA and Brazil under the Caribbean Basin Initiative (CBI), 1985
- E10 distribution to local consumers through Petrojam and Marketing Companies, 2008
Entrepreneurial Actions

B5

- Biodiesel feedstock cultivation, harvest and processing
- Waste Vegetable Oil collection and processing plants:
  - National Bakery,
  - Happy Foods Ltd.,
  - University of the West Indies,
  - RYCO
  - others
Structural Changes

2006
- Government owned 71% of the sugar estates.
- Unit cost of production was 26 cents per lb.
- Sugar price 13.09 cents per lb.
- Industry cane productivity was 67 tonnes per hectare
- Oil Imports for Transport Sector were 6.4 million barrels

2011
- Government privatized its sugar estate holdings
- Unit cost of production was ≈23 cents per lb.
- Sugar price 20.18 cents per lb.
- Industry cane productivity was 54.7 tonnes per hectare
- Oil imports for transport sector were ≈5.6 million barrels
Capacity Building

- Private Sector Champions
- Public Sector Agencies:
  - Ministry of Science, Technology, Energy and Mining (MSTEM),
  - Ministry of Agriculture and Fisheries (MoAF),
  - Petroleum Corporation of Jamaica (PCJ),
  - Jamaica Cane Product Sales Ltd.
  - Sugar Industry Research Institute (SIRI),
  - Caribbean Agricultural Research and Development Institute (CARDI).
Community Based Bioenergy Pilot Demonstration

- The OAS/YABT partnering with MSTEM to establish community based bioenergy pilot demonstration project.
- Other Partners:
  - RADA-Rural Agricultural Development Association
  - JAS-Jamaica Agricultural Society
  - PCJ-Petroleum Corporation of Jamaica
  - IICA-Inter-American Institute for Cooperation on Agriculture
OBJECTIVES

- Job creation through community based bioenergy development using castor beans and vetiver grass.
- Training of youths in business development and the creation of value added products
- Development of community based tourism
- Social Forestry Programme
Financial Support

- Germany Embassy in Kingston
- OAS, Department of Sustainable Development

ISSUES:
- Rural Community
- Lack of employment opportunities
- Erosion and deforestation
Worst Deforested Area = 382 Ha (Source: Prof. Silva 2012)
Planting Site – Bodles Agricultural Research Station (BARS), St. Catherine

Google imagery and ground view of planting site.
Germinated castor and Jatropha seedlings are examined by BARS representatives.
Next Steps:

- Seek additional funding for Biodiesel Development Initiatives
- Expand the varietal trials, using the best varieties
- Incorporate waste vegetable oil processing into demonstration projects
- Collect cost information to support financial analyses
- Meet with Associations of small farmers to share best practice information
Next Steps:

- Strengthened Bilateral and Multi-laterals Relations.
- Sourcing of extra-budgetary funding for capacity building and implementation of a pilot demonstration project for bioethanol and biodiesel production.
THANK YOU

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