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Waste-Based Energy
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Agenda

- OPA Background
- Waste-Based Energy (Renewable vs. Non-Renewable)
- Renewable Waste-Based Energy:
  - Renewable Energy Supply (RES)
  - Renewable Energy Standard Offer Program (RESOP)
  - Feed-in-Tariff Program
- Non-Renewable Waste-Based Energy:
  - EFW Challenges
  - Energy from Waste Pilot Demonstration Project (EFW PDP)
  - Durham York EFW
  - Future OPA EFW Initiatives
- Questions
OPA Background

- Until 1998, Ontario Hydro managed most of Ontario’s generation, transmission and conservation efforts.

- In 1998, Government enacted the Electricity Act, replacing Ontario Hydro by several business entities, including:
  - Ontario Power Generation (OPG)
  - Hydro One
  - Independent Electricity Market Operator (IMO), now known as IESO

- The OPA was established by the Electricity Restructuring Act, 2004
OPA Background

- The OPA is responsible for ensuring a reliable, long-term supply of electricity for Ontario

- Key areas of focus:
  - leading & coordinating conservation efforts across the province
  - planning the power system for the long term, and
  - ensuring development of needed generation resources
Waste-Based Energy (Renewable vs. Non-Renewable)

• Differentiation between renewable and non-renewable

• Renewable fuels for waste-based energy include:
  – Biomass
  – Biogas
Waste-Based Renewable Energy: Biomass

- Defined in Ontario Regulation 328/09, made under the Electricity Act
- Organic matter, other than source separated organics, that is derived from a plant or animal, is available on a natural renewable basis
- Includes waste:
  - waste from harvesting or processing agricultural products or waste from processing forestry products
  - agricultural waste
  - organic waste materials from a greenhouse, nursery, garden centre or flower shop,
  - waste from food processing, distribution and preparation operations
  - sewage biosolids
  - hauled sewage,
  - waste from the operation of a sewage works
  - woodwaste
- Municipal solid waste is excluded from Biomass definition
Waste-Based Renewable Energy: Biogas

• Defined in Ontario Regulation 328/09, made under the Electricity Act
• Biogas means a gaseous fuel that is,
  1. landfill gas, or
  2. a gas made from the anaerobic digestion of, or any combination of,
     a) biomass,
     b) source separated organics, or
     c) organic matter, other than biomass, that is derived from a plant or animal and that is available at a farm operation
Renewable Waste Based Energy – OPA

• Currently Renewable Generating Facilities are contracted under the FIT program
  – wind, solar (PV), Biomass, Biogas, or waterpower

• In the past Renewable Generating Facilities have been contracted under the
  – Renewable Energy Supply (RES), and
  – Renewable Energy Standard Offer Program (RESOP)
Renewable Energy Supply I (RES I)

- Ministry of Energy issued RFP for up to 300MW of Renewable Energy Supply projects in 2004
- 10 contracts were awarded, 3 are waste-based energy
- Proponents submitted a proposal price and projects were selected starting with the lowest proposal price
RES I – Waste Based Energy Contracts

• Trail Road Landfill Generating Facility
  – 5.3MW facility in Ottawa
  – Operational since Jan 2007

• Hamilton Digester Gas Cogeneration Plant
  – 1.6 MW facility in Hamilton
  – Uses digester gas produced as by-product of the process at wastewater treatment facility
  – Operational since July 2006

• Eastview Landfill Gas Energy Plant
  – 2.8 MW facility in Guelph
  – Operational since August 2005
Renewable Energy Standard Offer Program (RESOP)

- Program was operational from Nov 2006 to May 2008

- For < 10MW projects that make use of wind, solar photovoltaic (PV), thermal electric solar, renewable biomass, biogas, biofuel, landfill gas or waterpower

- 20 year contracts with base rate of 11¢/kWh

- A total of about 1400MW has been contracted, of which 87 MW is bio-energy

- 26.1MW in commercial operation as of Q3 2009
RESOP Examples

**Anaerobic Digestion**

- Fepro Farms (Klaesi Farm)
  - 499 kW capacity
  - Project city: Cobden

- Vandermeer Greenhouses Biogas
  - 335 kW power and 402 kW thermal capacity
  - Project city: Niagara-on-the-Lake

**Landfill Gas**

- Glanbrook Landfill Gas Power Plant
  - 2.1MW capacity
  - Project city: Hamilton

- Sudbury Landfill Gas
  - 1.6MW capacity
  - Project city: Sudbury
Feed in Tariff (FIT) Program

• Replaced RESOP

• A comprehensive guaranteed pricing structure for renewable electricity production launched Oct 1, 2009

• Open to various technologies
  – Solar PV
  – Waterpower
  – Wind
  – Bio-energy: Biogas, Biomass

• Different prices for different technologies and project size

• 20 year contract terms (40 year for hydropower)
## FIT Price Schedule

<table>
<thead>
<tr>
<th>Renewable Fuel</th>
<th>Size Tranches</th>
<th>Contract Price $/KWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>≤ 10 MW</td>
<td>13.8</td>
</tr>
<tr>
<td>Biomass</td>
<td>&gt; 10 MW</td>
<td>13</td>
</tr>
<tr>
<td>Biogas: On-Farm</td>
<td>≤ 100 kW</td>
<td>19.5</td>
</tr>
<tr>
<td>Biogas: On-Farm</td>
<td>&gt; 100 kW ≤ 250 kW</td>
<td>18.5</td>
</tr>
<tr>
<td>Biogas</td>
<td>≤ 500 kW</td>
<td>16</td>
</tr>
<tr>
<td>Biogas</td>
<td>&gt; 500 kW ≤ 10 MW</td>
<td>14.7</td>
</tr>
<tr>
<td>Biogas</td>
<td>&gt; 10 MW</td>
<td>10.4</td>
</tr>
<tr>
<td>Landfill gas</td>
<td>≤ 10 MW</td>
<td>11.1</td>
</tr>
<tr>
<td>Landfill gas</td>
<td>&gt; 10 MW</td>
<td>10.3</td>
</tr>
</tbody>
</table>

- Peak Performance Factor applied to promote generation during On-Peak hours

- For more information and to apply please visit: [http://fit.powerauthority.on.ca/](http://fit.powerauthority.on.ca/)
Non-Renewable Waste Based Energy - OPA

• Limited primarily to Energy From Waste

• Since municipal solid waste is composed of both organic and inorganic materials EFW facilities are not considered renewable

• Environmental Assessment Act:
  – “thermal treatment site” means a waste disposal site where thermal treatment is used
  – “thermal treatment” includes incineration, gasification, pyrolysis or plasma arc treatment
Alternative:

"thermal treatment site" is a waste disposal site where incineration, gasification, pyrolysis or plasma arc treatment is used

Ali Golriz, 11/12/2009
EFW Challenges

- EFW electricity price should not subsidize waste disposal
  - Minimize waste disposal & maximize waste diversion

- Waste management first with electricity as by-product
  - Contract structure
  - Separation of waste management and electricity generation
  - Appropriate pricing

- EFW facilities are generally baseload supply
Energy from Waste Pilot Demonstration Project (EFW PDP)

- Ministry of the Environment initiative to facilitate the testing and evaluation of EFW technologies,
  - obtain information about the associated environmental impacts

- The goal of the initiative is to encourage development of new or improved EFW technologies with improved environmental performance.
  - reduce the amount of residual waste (e.g. the waste which remains after recycling or composting) that would otherwise need to be landfilled

- February 25, 2008 OPA received direction from Minister of Energy to procure net electricity from EFW pilot or demonstration projects participating in initiative
  - contract price of $10/kWh
EFW PDP

- The project or facility must be approved under Part V of the Environmental Protection Act (EPA) and in compliance with Section 5.0.1 of Regulation 347 made under the EPA
  - PDP facility must process 75 tonnes or less of municipal waste per day
  - 3 year term that can be extended up to 5 years
Durham-York EFW

• December 19, 2008 OPA received direction from Minister of Energy and Infrastructure to negotiate the procurement of electricity from the Durham-York facility
  – Procurement should be at a price of 8 ¢/kWh and other agreed upon terms

• Directive requirements:
  – must obtain all required licenses and approvals for commercial operation as an EFW electricity generation facility in Ontario
  – meet or exceed the emissions, waste diversion and any other requirements established by the Ontario Ministry of the Environment for the purposes of the Initiative
  – must be capable of connecting to, and conveying electricity into, out of and through, either a local electricity distributor’s distribution system or the IESO controlled grid, without additional cost to that system or the grid
Durha-York EFW Facility Details

• Located in Clarington

• Initial capacity of 140,000 tonnes MSW/year and 20MW

• Capability of expansion to 400,000 tonnes/year and 40MW

• Could potentially also provide district heating and cooling

• Makes use of state-of-the-art emission control

• Construction begins 2010; completion and commissioning in 2013
EFW Going Forward

• EFW PDP Initiative anticipated for Q1 2010

• EFW initiative for commercial facilities
  – OPA has not received direction to date
  – If emerges, would most likely be similar to terms of Durham-York directive
Questions?