“The State of EFW in Canada: An Overview of Policy Options and Political Challenges”

Presentation to the

Canadian Institute, Waste-Based Energy Conference

Toronto, Ontario

24 November 2009
Agenda

• Canadian Waste Market
• EFW Then and Now
• Case Studies
• International Developments
• Coalition Building, Advocacy, Education
• Government Initiatives
• Projects In Development
• Lessons Learned
• Arguments That Resonate
• Addressing the Opposition
• Progressive Public Attitudes
• Two Years From Today
Canadian Waste Market
## Canadian MSW Trends

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Disposal (kg/capita)</th>
<th>Annual Change (%)</th>
<th>Total Diversion (kg/capita)</th>
<th>Annual Change (%)</th>
<th>Total Generation (kg/capita)</th>
<th>Annual Change (%)</th>
<th>Diversion Rate%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>697</td>
<td></td>
<td>176</td>
<td></td>
<td>873</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>1998</td>
<td>688</td>
<td>-1.29</td>
<td>222</td>
<td>26.14</td>
<td>926</td>
<td>6.07</td>
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<tr>
<td>2000</td>
<td>753</td>
<td>9.45</td>
<td>199</td>
<td>-10.36</td>
<td>952</td>
<td>2.80</td>
<td>21</td>
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<tr>
<td>2002</td>
<td>769</td>
<td>2.12</td>
<td>212</td>
<td>6.53</td>
<td>980</td>
<td>2.94</td>
<td>22</td>
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<td>2004</td>
<td>791</td>
<td>2.86</td>
<td>223</td>
<td>5.19</td>
<td>1,037</td>
<td>5.81</td>
<td>22</td>
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<tr>
<td>2006</td>
<td>835</td>
<td>5.56</td>
<td>237</td>
<td>6.28</td>
<td>1,072</td>
<td>3.38</td>
<td>22</td>
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<tr>
<td>Overall Change (1996-2006)</td>
<td>19.80</td>
<td></td>
<td>34.70</td>
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<td></td>
<td></td>
<td>22.80</td>
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</table>

## Trends By Sector

<table>
<thead>
<tr>
<th>Category</th>
<th>Measure</th>
<th>2000</th>
<th>2002</th>
<th>2004</th>
<th>2006</th>
<th>% Chg '00-'06</th>
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<tbody>
<tr>
<td>Population</td>
<td>(m)</td>
<td>30.8</td>
<td>31.4</td>
<td>31.9</td>
<td>32.6</td>
<td>6%</td>
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<tr>
<td>Municipal Solid Waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Generation</td>
<td>Tones (m)</td>
<td>29.3</td>
<td>30.7</td>
<td>32.3</td>
<td>35</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td>Kg/Capita</td>
<td>952</td>
<td>980</td>
<td>1,037</td>
<td>1,072</td>
<td>13%</td>
</tr>
<tr>
<td>Disposal</td>
<td>Tones (m)</td>
<td>23.2</td>
<td>24.1</td>
<td>25.2</td>
<td>27.2</td>
<td>17%</td>
</tr>
<tr>
<td></td>
<td>Kg/Capita</td>
<td>753</td>
<td>768</td>
<td>791</td>
<td>835</td>
<td>11%</td>
</tr>
<tr>
<td>Diversion</td>
<td>Tones (m)</td>
<td>6.1</td>
<td>6.6</td>
<td>7.1</td>
<td>7.5</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>Kg/Capita</td>
<td>199</td>
<td>212</td>
<td>223</td>
<td>237</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>% Diversion</td>
<td>21</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>1%</td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generation</td>
<td>Tones (m)</td>
<td>11.2</td>
<td>12.2</td>
<td>12.3</td>
<td>13</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Kg/Capita</td>
<td>365</td>
<td>390</td>
<td>385</td>
<td>398</td>
<td>9%</td>
</tr>
<tr>
<td>Disposal</td>
<td>Tones (m)</td>
<td>9.1</td>
<td>9.4</td>
<td>9</td>
<td>9.2</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Kg/Capita</td>
<td>295</td>
<td>301</td>
<td>280</td>
<td>283</td>
<td>-4%</td>
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<tr>
<td>Diversion</td>
<td>Tones (m)</td>
<td>2.2</td>
<td>2.8</td>
<td>3.4</td>
<td>3.7</td>
<td>68%</td>
</tr>
<tr>
<td></td>
<td>Kg/Capita</td>
<td>71</td>
<td>89</td>
<td>105</td>
<td>115</td>
<td>62%</td>
</tr>
<tr>
<td></td>
<td>% Diversion</td>
<td>19</td>
<td>23</td>
<td>27</td>
<td>29</td>
<td>10%</td>
</tr>
<tr>
<td>Non-Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generation</td>
<td>Tones (m)</td>
<td>18.1</td>
<td>18.5</td>
<td>20</td>
<td>22</td>
<td>21.50%</td>
</tr>
<tr>
<td></td>
<td>Kg/Capita</td>
<td>587</td>
<td>589</td>
<td>626</td>
<td>674</td>
<td>15%</td>
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<tr>
<td>Disposal</td>
<td>Tones (m)</td>
<td>14.1</td>
<td>14.6</td>
<td>16.3</td>
<td>18</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td>Kg/Capita</td>
<td>458</td>
<td>467</td>
<td>508</td>
<td>552</td>
<td>20.50%</td>
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<tr>
<td>Diversion</td>
<td>Tones (m)</td>
<td>4</td>
<td>3.9</td>
<td>3.7</td>
<td>4</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Kg/Capita</td>
<td>129</td>
<td>123</td>
<td>117</td>
<td>123</td>
<td>-5%</td>
</tr>
<tr>
<td></td>
<td>% Diversion</td>
<td>22</td>
<td>21</td>
<td>19</td>
<td>18</td>
<td>-4%</td>
</tr>
</tbody>
</table>

Source: Alain David, Waste Reduction and Management Division, Environment Canada
National Performance...

...In A Global Context

- According to the Conference Board of Canada...
  - Canada’s overall environmental performance...
    - 15th out of 17 developed countries
    - “C” grade
  
  Canada’s waste generation record...
  - “D” grade (Poor performance)
  - Ranks in last place out of 17 countries
  - Behind: Japan, Belgium, Finland, Sweden, France, Italy, Austria, UK, Germany, Netherlands, Switzerland, Austria, Denmark, Ireland, US, and Norway

EFW Then and Now
Current Situation

• Seven (7) main installations
  - Five (5) with energy recovery
    • One (1) starved air plant in Prince Edward Island
    • One (1) mass burn plant in Quebec
    • One (1) starved air plant in Ontario
    • One (1) excess air plant in Alberta
    • One (1) mass burn plant in British Columbia
  - Two (2) without energy recovery
    • Two (2) step grate plants in Quebec
  - Range in capacity from 30 tpd to 920 tpd
  - Throughput totals approximately 763,000 tonnes per year
  - Energy generation (steam and electricity) from 96% of combusted waste
Past Notables

- **SWARU in Hamilton**
  - No RDF facilities still in operation since closure in 2002
  - “While 11 MSW incinerators were included in the (2000) inventory, most of the emissions from this sector were associated with the now closed SWARU facility in Hamilton.”

- **Ashbridge’s Bay (Commissioner’s Street) facility in Toronto**
  - Inner city plant closed in 2000
  - Rallying point for opponents, zero-wasters, and downtown residents
# Existing EFW Plants

**Canadian EFW Plants and Incinerators, 2000-2005**

<table>
<thead>
<tr>
<th>Type</th>
<th>2000</th>
<th>Waste Quantity</th>
<th>2005</th>
<th>Waste Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(Mg/yr)</td>
<td></td>
<td>(Mg/yr)</td>
</tr>
<tr>
<td>Municipal</td>
<td>11</td>
<td>950,711</td>
<td>7</td>
<td>762,793</td>
</tr>
<tr>
<td>Medical</td>
<td>101</td>
<td>5,579</td>
<td>42</td>
<td>8,082</td>
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<tr>
<td>Hazardous</td>
<td>7</td>
<td>163,208</td>
<td>9</td>
<td>204,418</td>
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<tr>
<td>Sewage Sludge</td>
<td>7</td>
<td>171,474</td>
<td>6</td>
<td>172,525</td>
</tr>
<tr>
<td>Federal Entities</td>
<td>62</td>
<td>1,235</td>
<td>30</td>
<td>1,087</td>
</tr>
<tr>
<td>Remote</td>
<td></td>
<td>22</td>
<td></td>
<td>3,320</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>188</td>
<td>1,292,207</td>
<td>116</td>
<td>1,152,225</td>
</tr>
</tbody>
</table>

## MSW EFW Facilities

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Heat Recovery</th>
<th>Capacity (# x [t/day])</th>
<th>APC System</th>
<th>Annual Throughput (Mg/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wainwright (MSW Feed)</td>
<td>Wainright, Alberta</td>
<td>3-stage excess</td>
<td>Basio</td>
<td>Yes</td>
<td>1 x 29</td>
<td>WSH/DS/PAC/FF</td>
<td>2,383</td>
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<tr>
<td>Greater Vancouver RD</td>
<td>Burnaby, BC</td>
<td>Mass burn</td>
<td>Martin</td>
<td>Yes</td>
<td>3 x 240</td>
<td>SNCR/WSH/DS/PAC/FF</td>
<td>275,000</td>
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<tr>
<td>Algonquin Power EFW</td>
<td>Brampton, Ontario</td>
<td>2-stage starved</td>
<td>Consumat</td>
<td>Yes</td>
<td>5 x 100</td>
<td>WSH/DS/FF/PAC/SCR</td>
<td>140,000</td>
</tr>
<tr>
<td>Trigen</td>
<td>Charlottetown, PEI</td>
<td>2-stage starved</td>
<td>Consumat</td>
<td>Yes</td>
<td>3 x 33</td>
<td>WSH/DS/PAC/FF</td>
<td>32,000</td>
</tr>
<tr>
<td>Centre de traitement des residue urbains</td>
<td>Quebec City, PQ</td>
<td>Mass burn</td>
<td>Von Roll</td>
<td>Yes</td>
<td>4 x 230</td>
<td>ESP/WSH/DS/PAC/FF</td>
<td>280,000</td>
</tr>
<tr>
<td>La Regie internunicipale de Gestion Rive Sud</td>
<td>Levis, PQ</td>
<td>Step grate</td>
<td></td>
<td>No</td>
<td>1 x 80</td>
<td>WSH/DS/PAC/FF</td>
<td>24,310</td>
</tr>
<tr>
<td>MRC des Iles de las Madelaine</td>
<td>Dune-du-Sud, PQ</td>
<td>Step grate</td>
<td></td>
<td>No</td>
<td>1 x 31</td>
<td>WSH/DS/PAC/FF</td>
<td>9,100</td>
</tr>
</tbody>
</table>

### APC System Key
- ESP - Electrostatic precipitator for particulate matter removal
- WSH - Evaporator cooling tower or wet spray humidifier
- DS - Dry reagent addition or dry scrubber
- PAC - Powdered activated carbon addition
- SNCR - Selective non-catalytic reduction for NOx control
- SCR - Selective catalytic reduction for NOx and PCDD/F control
- FF - Fabric filter particulate control

International Developments
## EFW In Global Context

<table>
<thead>
<tr>
<th>Country</th>
<th>Diversion (per cent of total)</th>
<th>Landfill (per cent of total)</th>
<th>Incineration (per cent of total)</th>
<th>Waste per capita (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>65</td>
<td>3</td>
<td>32</td>
<td>624</td>
</tr>
<tr>
<td>Austria</td>
<td>59</td>
<td>31</td>
<td>10</td>
<td>627</td>
</tr>
<tr>
<td>Germany</td>
<td>58</td>
<td>20</td>
<td>22</td>
<td>600</td>
</tr>
<tr>
<td>Belgium</td>
<td>52</td>
<td>13</td>
<td>35</td>
<td>469</td>
</tr>
<tr>
<td>Sweden*</td>
<td>44</td>
<td>5</td>
<td>50</td>
<td>464</td>
</tr>
<tr>
<td>Denmark</td>
<td>41</td>
<td>5</td>
<td>54</td>
<td>696</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>36</td>
<td>23</td>
<td>41</td>
<td>668</td>
</tr>
<tr>
<td>Spain</td>
<td>35</td>
<td>59</td>
<td>6</td>
<td>662</td>
</tr>
<tr>
<td>Ireland</td>
<td>31</td>
<td>69</td>
<td>0</td>
<td>869</td>
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<td>Italy</td>
<td>29</td>
<td>62</td>
<td>9</td>
<td>538</td>
</tr>
<tr>
<td>Finland</td>
<td>28</td>
<td>63</td>
<td>9</td>
<td>455</td>
</tr>
<tr>
<td>France</td>
<td>28</td>
<td>38</td>
<td>34</td>
<td>567</td>
</tr>
<tr>
<td>UK</td>
<td>18</td>
<td>74</td>
<td>8</td>
<td>600</td>
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<td>Greece</td>
<td>8</td>
<td>92</td>
<td>0</td>
<td>433</td>
</tr>
<tr>
<td>Portugal</td>
<td>3</td>
<td>75</td>
<td>22</td>
<td>434</td>
</tr>
<tr>
<td>United States</td>
<td>33</td>
<td>54</td>
<td>13</td>
<td>763</td>
</tr>
<tr>
<td>Canada</td>
<td>24</td>
<td>74</td>
<td>2</td>
<td>1,037</td>
</tr>
</tbody>
</table>

A Global Solution

EfW = 0.2 billion tons
Recycling = 0.5 billion tons
Landfill = 1.0 billion tons

- U.S.: ~90 EfW facilities, ~30 million TPY
- Western Europe: ~400 EfW facilities, ~65 million TPY
- Asia: ~325 EfW facilities, ~55 million TPY
The Bottom Line

EFW is

“a clean, reliable, renewable source of energy...with less environmental impact than almost any other source of electricity”

- US Environmental Protection Agency (EPA)
US EPA Perspective

“I have never witnessed such issue polarization, in the public, in states, in the Federal government, in NGOs...yet...getting energy from material that would otherwise be lost is such a straightforward concept...We can turn a waste management problem into an energy (and climate change) solution.”

Rick Brandes
Chief, Energy Recovery Branch
Office of Resource Conservation and Recovery
U.S. EPA
Greener Fields

• **EFW is expanding in Europe**
  - Over 400 plants operational
  - 100 new plants planned for construction in Europe by 2012
  - Increasing required capacity by 13 million tonnes (which is equivalent to Ontario’s annual demand)
  - Amendment to classify “incineration” as recovery approved unanimously (42-0) by European Parliament’s Environment Committee

• **EFW is growing in US**
  - Expansions underway in “snowbird” country, including Lee County and Hillsborough County, Florida
  - New greenfields projects are emerging in Carroll County and Harford County, Maryland
  - Projects under serious consideration in Los Angeles and Sacramento, California; Port St. Lucie and Tallahassee, Florida; and Hawaii

• **US EPA will...**
  - Define energy recovery as a source of renewable energy
  - Establish balanced recycling, composting, and energy recovery goals
  - Promote the “integrated materials management strategy”
  - 45-45-10 (?)
Livable Cities

Nine of the thirteen most livable cities in the world use EFW

<table>
<thead>
<tr>
<th>Mercer's Quality of Living Survey, 2009</th>
<th>The Economist's World's Most Livable Cities, 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Vienna * Austria 108.6</td>
<td>1 Vancouver * Canada 98.0</td>
</tr>
<tr>
<td>2 Zurich * Switzerland 108.0</td>
<td>2 Vienna * Austria 97.9</td>
</tr>
<tr>
<td>3 Geneva * Switzerland 107.9</td>
<td>3 Melbourne Australia 97.5</td>
</tr>
<tr>
<td>4 Vancouver * Canada 107.4</td>
<td>4 Toronto Canada 97.2</td>
</tr>
<tr>
<td>4 Auckland New Zealand 107.4</td>
<td>5 Perth Australia 96.6</td>
</tr>
<tr>
<td>6 Dusseldorf * Germany 107.2</td>
<td>5 Calgary Canada 96.6</td>
</tr>
<tr>
<td>7 Munich * Germany 107.0</td>
<td>7 Helsinki * Finland 96.2</td>
</tr>
<tr>
<td>8 Frankfurt * Germany 106.8</td>
<td>8 Geneva * Switzerland 96.1</td>
</tr>
<tr>
<td>9 Bern * Switzerland 106.5</td>
<td>8 Sydney Australia 96.1</td>
</tr>
<tr>
<td>10 Sydney Australia 106.3</td>
<td>8 Zurich * Switzerland 96.1</td>
</tr>
</tbody>
</table>
Coalition Building, Advocacy, and Education
Situational Imperative

- Municipalities face an unprecedented waste management crisis related to capacity shortfall and risk of a border closure.
- Escalating costs of conventional fossil fuels sparking interest in alternative energy sources.
- Overwhelming scientific evidence validates EFW value proposition.
- Strong public opinion polling shows growing support for EFW.
- EFW can enhance supply mix option and address power supply shortage.
- Prudent planning dictates investigation of all options in an integrated system.
"The Canadian Energy-From-Waste Coalition, an organization of industry, associations, and stakeholders committed to sustainable environmental policies, stands for the promotion, adoption, and implementation of ER/EFW technology for the management of residual materials within the context of an integrated solid waste management system. Recognizing that ER/EFW technologies are compatible with proactive recycling and other diversion efforts, the coalition seeks to promote the merits of the thermal treatment of waste and garner support for waste derived fuels."
Coalition Principles

• **Social Sustainability**
  - Operate within the context of local circumstances, preserving community sustainability

• **Environmental Sustainability**
  - Reduce overall environmental burden by complementing, not competing with, recycling and diversion programs

• **Economic Sustainability**
  - Balancing costs and benefits most advantageous and acceptable to end-users, customers, and host communities
## Organizational Matrix

<table>
<thead>
<tr>
<th>Municipalities</th>
<th>Labour</th>
<th>Emerging Tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>Industry</td>
<td>Academia</td>
</tr>
<tr>
<td>W/E Alliances</td>
<td>Diplomats</td>
<td>Engineers</td>
</tr>
<tr>
<td>Lawyers</td>
<td>Real Estate</td>
<td>Operators</td>
</tr>
</tbody>
</table>
## Membership Matrix

### Vancouver, Peel, Edmonton, Hamilton
- AE&G VonRoll
- ERC, OWMA, SWANA, ASME
- Borden Ladner Gervais, Willms & Shier

### Power Workers Union
- Canadian Cement Association, Canadian Plastics Industry Association
- Sweden, Italy, Netherlands, Denmark, France, Germany, Spain

### AlterNRG
- ERC, OWMA, SWANA, ASME
- Golder Associates, GENI VAR, EarthTech, Ramboll

### WTERT
- Golder Associates, GENI VAR, EarthTech, Ramboll

### Aquilini Renewable Energy
- Covanta, Veolia, Wheelabrator/WMI

### Covanta, Veolia, Wheelabrator/WMI
- Aquilini Renewable Energy
- Golder Associates, GENI VAR, EarthTech, Ramboll

## Canadian Energy-from-Waste Coalition
Coalition Activities

Education and Promotion
- Raising association profile
- Maintaining website
- Speakers bureau
- Engaging key stakeholders, audiences
  - Outreach to public health officials
- Membership recruitment

Media Engagement
- On-going national campaign
  - Editorial boards
  - Op-ed
  - Rebuttal letters and articles

Government Relations
- Ontario
  - Pursuing standard offer program
  - Advocating for clear emissions standards
  - Participating in technology peer review
- British Columbia
  - Working Group on Waste
  - Municipal relationship building

Project Monitoring
- Advocacy and support
  - Where warranted, needed
  - Where allowed
- Opposition and arguments
  - Getting closer to the truth
  - Correcting the nonsense
Government Initiatives
Shared Jurisdictions

- **Jurisdictional Roles**
  - *Municipal*
    - Responsible for the collection, diversion, and disposal of MSW from residential sources
    - Upper and lower tier division of responsibilities
  - *Provincial/Territorial*
    - Movements of wastes within jurisdiction
    - Licensing of generators, carriers and treatment facilities
    - Extended producer responsibility
  - *Federal*
    - International agreements
    - Trans-boundary movements of hazardous waste, hazardous recyclable material, and non-hazardous waste
    - Federal lands and operations

- **Areas of Cooperation**
  - Developing national initiatives
  - Promoting of technical expertise and supporting innovation
  - Gathering statistics, performing analyses, disseminating information
  - Building capacity
Policy Drivers

• **Convergence of factors**
  - Waste capacity crisis
  - Risk of border closing
  - Need to manage material at home
  - Recognition that zero waste is far off
  - Acknowledgement that technology works
  - Appreciate changing public attitudes

• **Supporting municipal priorities**
  - Without interfering in municipal decision-making
  - Considerable provincial political support at high levels
    - Proven elsewhere
    - Represents innovation
  - Need projects to acquire independent municipal approval
    - Must stand on own merits
    - Leave political risk at local level
  - Implement policies (eg. pricing) to support one-off projects
  - Develop comprehensive position once toehold established
Project Facilitation

- **Air Emissions Guidelines**
  - Guideline A7 review
  - Designed to exceed European standards
  - Tough but manageable
  - Will allow emerging projects to proceed with confidence...
  - While retaining/building/elevating public trust

- **Preferred EFW Pricing**
  - In December 2008, Minister of Energy and Infrastructure (MEI) issued Directive to Ontario Power Authority (OPA) setting EFW power price at $0.08
    - Good precedent, clear direction for the future in absence of a formal EFW policy
    - Subject to Durham project meeting environmental guidelines established by Ministry of Environment (MoE)
    - Contingent on municipality meeting 50% diversion target
  - Need for standard offer program
    - Must recognize EFW as renewable
    - Offer accelerated price for exceeding environmental objectives
Setting Priorities

- **Streamlined environmental assessment process**
  - Comprehensive analysis and review of alternatives still required
  - But fewer public meetings
  - More cost effective and timely
  - Encourages alternative approaches
  - Involvement of local distribution companies
  - Extensive work undertaken by unregulated energy affiliates

- **Waste Diversion Act**
  - Sympathetic to zero waste lobby
  - Promotes extended producer responsibility
  - Recognizes the integrated waste hierarchy
  - Limited definition of diversion to exclude EFW
A Tactical Effort

**Life Cycle Analysis**

- Review of landfill gas versus gasification
  - Intended to initiate a “plug-and-play” policy tool
  - Seeking a “silver bullet”
- Theoretical conclusions
  - Proprietary gasification technology should work
    - Based on design specifications
    - Parts of a Cadillac in the driveway
  - But no operational data
    - Plant shut down for extended period during review
    - Nominal amount of electricity to grid (less than three hours)
    - Did not recognize unusual inputs
- Project oversold and under-performed
  - Study in abeyance
  - Layoffs imminent
- Province now looking at decision-support parameters
Vision Before Policy

British Columbia Working Group on Waste

• Provinces taking different approaches
  – Coordinated effort to produce vision in multiple policy areas under auspices of Climate Action Secretariat (CAS)
  – Want to establish an over-arching framework to guide future choices

• Diverse stakeholders in all areas of waste
  – Waste water, project development, landfill, plastics manufacturers, associations (recycling, construction), municipalities
  – Presentations from key influencers, including zero waste

• Final recommendations by Fall 2009
  – Report to Premier and Cabinet through CAS in June 2009
  – Support integrated waste management hierarchy
  – Recognize that waste is a resource
  – Acknowledge there are limits to zero waste in practice
Case Studies
National Overview

- Edmonton
- Metro Vancouver
- Peel Region
- Dufferin County
- Hamilton
- Durham Region
Case Study: Peel Region

- Opened under public ownership in 1992
  - Sold to private investors in 1999
- Five (5) units, 100 tonnes each
  - Rated at 182,000 tonnes/year
  - Operates at 160,000 tonnes/year
- Waste agreement up for renewal in 2012
- EFW a municipal (upper tier) priority
  - Green field opportunity under investigation
  - Consulting work complete
  - Own and operate a critical area of focus
- Willing host but “unwilling” customer
- Selling steam to paper company, Norampac
Case Study: Burnaby

- Began commercial operation in March 1988
  - Owned by Metro Vancouver (an upper tier municipality)
  - Operates with philosophy of continuous improvement
  - 47 employees
  - First plant in Canada, 2nd in North America with ISO14,000 certification
- Three (3) boiler lines processing approximately 300,000 tons/yr
  - Averaged 94% plant availability over 21 years
  - Past 2 years at 95%
- Processed over 6 million tons of MSW on a 5-acre footprint
- Sold over 8.5 million tons of steam to recycle paper mill
  - Equivalent of 6 million barrels of oil
- Contributed over 700,000 megawatt hours of electricity to provincial grid since July 2003
- Enhanced Metro Vancouver’s 55% recycle rate by recovering 185,000 tons of ferrous metal
  - Metro Vancouver landfills have buried over 1 million tons of recyclable steel in the same time frame
Beautiful Burnaby, BC
Projects In Development
### Major Metropolitan Areas

- **Capital (2004 est.)**
  - Ottawa, Ontario: 1,142,700

- **Largest cities (2004 est.)**
  - Toronto, Ontario: 5,203,600
  - Montreal, Quebec: 3,606,700
  - Vancouver, British Columbia: 2,160,000
  - Edmonton, Alberta: 1,101,600
  - Calgary, Alberta: 1,037,100
  - Quebec City, Quebec: 710,700
  - Hamilton, Ontario: 710,300
  - Winnipeg, Manitoba: 702,400
  - Mississauga, Ontario: 550,000
  - London, Ontario: 459,700
  - Kitchener-Waterloo, Ontario: 450,100
A Familiar List

- Montreal (3.6 million)
- Metro Vancouver (2.2 million)
- Ottawa (1.2 million)
- Edmonton (1.1 million)
- Hamilton (710,000)

- Durham-York Region (1.1 million)
- Peel Region (600,000)
  - Mississauga (550,000)
- Sault-Ste. Marie (70,000)
- Dufferin County (60,000)
Case Study: Durham

- **Ten year waste management planning exercise**
  - Shared process (and costs) with York Region
  - Extensive consultation

- **Regional commitment to manage waste locally**
  - Stop shipments to Michigan
  - Establish control for mandated responsibilities

- **Plant to be 140,000 tonnes, with expansion potential**
  - Clarington site is willing host
  - No importation of waste
  - District energy potential with industrial neighbours

- **Success to date resulting from strong political leadership**
  - Opposition loud but limited
  - No advocacy permitted by proponents

- **Final stages**
  - Preferred vendor (Covanta Energy) selected in April 2009
  - Business case complete by June 2009
  - Approval to proceed in summer 2009
Case Study: Dufferin

- **Dufferin EcoEnergy Park (DEEP)**
  - Gasification process
    - Will treat 27,500 tons per year (75 tonnes per day)
    - Will take MSW, ICI, and tires
    - Will generate 3 megawatts
  - Approval in May 2009 to negotiate with AlterNRG
    - Westinghouse Plasma technology
    - County to undertake due diligence
  - Small project with big implications
    - Rejected huge landfill opportunity
    - EFW possible even for small communities
    - If approved, no reason to deny large cities
Case Study: Edmonton

- **Currently constructing a new integrated processing and transfer facility ($85M)**
  - Landfill to close in July 2009
  - Will only run the transfer station until EFW facility operational

- **Gasification/biofuels facility ($70M) received approval from Alberta Environment in April 2009**
  - 100,000 tonnes per year of processed RDF residues
  - Capacity to co-produce methanol/ethanol and residual syngas
  - Screened over 150 gasification technologies

- **Joint venture**
  - Partner to build/operate gasification and fuel production facilities for 25 years
  - Operational sometime in 2011

- **City of Edmonton and Alberta Energy Research Institute (AERI) also building separate R&D facility**
  - 300 kg/hr pilot gasification facility this year ($9M)
  - Operational by year-end
  - On-going research and development, including different feedstocks and the potential to produce higher value products, such as DME and alcohols
Integrated In Edmonton
Lessons Learned
An Integrated System

- EFW is critical part of an integrated waste and energy system

- And integration matters because...
  ...engages robust selection of options
  ...it leverages proven technologies
  ...emerging solutions are allowed to fail
  ...progressive solutions will thrive
  ...zero-waste a generation or more away
  ...diversification mitigates risk
  ...it forces us closer to the truth
  ...it’s the right thing to do
  ...we’ve seen what’s possible in time
Perception Matters

• Energy-from-Waste/Waste-to-Energy
  – “Volatile” and “Controversial” evoke unfair imagery
  – “Proven” and “Reliable” present accurate portrayal

• Name-calling
  – EFW
    • Employs maximum achievable control technology (MACT)
    • Utilize high temperature to extract energy from trash
  – Incinerators
    • Only attempt to reduce volume of garbage
    • Usually install rudimentary pollution control equipment
An Old Stereotype
A Model Facility
Latest Technology
Best Practices

• **Need a political champion**
  – Because there’s always opposition
  – Even the converted can only move in small, incremental steps

• **Decision-makers playing to different audiences**
  – Municipal staff – Council – Ratepayers – Media
  – Provincial staff – Executive – Finance – Cabinet – Premier

• **Must meet zero-wasters head-on**
  – Many generations away
  – No policy will get us there in realistic timeframe

• **Need to recognize different forms of communications**
  – New media – social networking, internet
  – Polling, focus groups
  – Give equal weighting to public meetings

• **Industry leading way and public well ahead of policy**

• **Senior levels of government “get it”**
  – Understand the technology and simplicity
  – See EFW as part of public health infrastructure
  – But live in a complex political world

• **Organized association critical for credibility**
Arguments That Resonate
The Basics

- EFW emissions are safely controlled, with continuous compliance beyond all environmental standards.
- EFW _does not compete with recycling_, rather it processes trash that can't be recycled.
- EFW is _economically viable_ and competitive with any other form of solid waste management when properly sited with electricity, heat, or steam customers.
- EFW plants _generate thousands of megawatt hours_ of power, providing needed clean energy and conserving natural resources.
Energy Value of Trash

1 metric tonne trash

\[ \sim \]

750 net kilowatt-hours

1 tonne of trash = 1 barrel of oil = \( \frac{1}{4} \) tonne of coal

- A typical 2,000 tonne per day EFW facility generates about 75 net megawatts of electricity, which is enough energy to power about 75,000 homes.
- The residual waste generated from a single household going to an EFW facility will produce enough electricity to run that household's energy efficient lights.
## Recovery Inventory

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSW</strong> BioCycle Data</td>
<td>266</td>
<td>2,729,160</td>
<td>3.90%</td>
</tr>
<tr>
<td>Franklin Data</td>
<td>137</td>
<td>1,405,620</td>
<td>2.01%</td>
</tr>
<tr>
<td><strong>Biomass, Ag Residue</strong></td>
<td>100</td>
<td>1,000,000</td>
<td>1.43%</td>
</tr>
<tr>
<td><strong>Biomass, Animal Manure/Gaseous Fuels</strong></td>
<td>35</td>
<td>420,000</td>
<td>0.60%</td>
</tr>
<tr>
<td><strong>C&amp;D, Land Clearing Debris</strong></td>
<td>27</td>
<td>394,200</td>
<td>0.56%</td>
</tr>
<tr>
<td><strong>C&amp;D, Wood Building Materials</strong></td>
<td>19.6</td>
<td>353,000</td>
<td>0.50%</td>
</tr>
<tr>
<td><strong>Landfill Methane Gas</strong></td>
<td>N/A</td>
<td>144,000</td>
<td>0.21%</td>
</tr>
<tr>
<td><strong>Coal Combustion Products, Fly Ash</strong></td>
<td>20</td>
<td>80,000</td>
<td>0.11%</td>
</tr>
<tr>
<td><strong>Biomass, Pulp and Paper Residues</strong></td>
<td>3</td>
<td>30,000</td>
<td>0.043%</td>
</tr>
</tbody>
</table>

What’s Working?

- Emission control systems meet or exceed all regulatory requirements
  - Eighty-nine US EFW plants prevent the release of 40 million metric tons of greenhouse gases in the form of carbon dioxide equivalents

- Test results demonstrate that dioxin emissions are well below government regulations
  - Found at levels barely detectable by the most sophisticated instrumentation
  - EPA estimates that all US EFW facilities annually emit less than 12 grams of dioxin in total
  - Swedish EPA estimates 0.7 grams of dioxin emission annually
  - Backyard burning of trash and other natural and manmade sources produce much more dioxin than EFW
### Green House Gases

**Assuming a Recycling Rate of 50%**

<table>
<thead>
<tr>
<th>Material Available (millions of tons/year)</th>
<th>Energy Content (billions of BTU/year)</th>
<th>Electrical Power (billion kilowatt-hours)</th>
<th>Equivalent Number of Homes Powered</th>
<th>Lifecycle GHG Savings (million tons CO2E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BioCycle Franklin</td>
<td>178 95</td>
<td>1,826,300 974,700</td>
<td>91 49</td>
<td>8,300,000 4,500,000</td>
</tr>
</tbody>
</table>

Compatibility

- US communities with EFW plants recycle about 33% of their waste, whereas the national average is 28%
  - Canadian diversion rate is nearly ten points lower than the US

- European studies show that countries with high EFW implementation have a correspondingly higher level of recycling (while also generating less waste and producing more clean electricity than Canadians)
There’s More?

- **EFW plants** continuously track, record, and store up to 1,200 data points to ensure plant inputs/outputs stay within operating parameters established by government regulators
  - Valued-added jobs, requiring post-secondary degree/diploma, professional certification

- **EFW reduces waste volumes** by 90%
  - With metals removed, ash passes rigorous testing to ensure it is non-hazardous and safe for disposal and reuse
  - Field tests show that metal levels in ash leachate are below drinking water standards and far lower than government toxicity criteria
  - Ash residue can be re-used as landfill roadbed material, daily and final landfill cover, road aggregate, asphalt-mixture, construction of artificial reefs and cement blocks
A Sustainable Solution

- Solid public support for proven technologies
- Municipalities can manage waste and generate energy locally, in their own backyard
- Potential for distributed generation, district heating/cooling
- Regional operations offer economies-of-scale consistent with Smart Growth planning policies
- Tough emissions standards with transparent reporting, including on-line and on-site disclosure
- Stringent regulations assure accountability and responsible operations
- Performance measures to guide improvements and investments
Addressing the Opposition
Anti-EFW Viewpoint

- Incineration is disposal
  - It is “wasting”
  - Worse than landfill
- EFW produces a “toxic soup” of air emissions that could poison the world
- Significantly restricts the more beneficial option of increased recycling and composting
  - “Feed the beast” syndrome
  - Ruins the potential for a “zero waste” national policy
- Adversely impacts GHG reduction efforts
  - Directly releases massive amounts of CO2 and NOx
  - Reduces future carbon emission reductions from increased recycling
- Adverse environmental justice impacts
  - No jobs are created for local communities - just pollution
  - Big cost, no gain.
- Why is it even being considered? Ban it!

Heard This Before?

- “Not a single study anywhere concludes that EFW is safe.”
  - More than 800 worldwide – one for each facility
  - Plus hundreds of independent reviews from SWANA, ASME, etc.

- “A modern EFW plant costs approximately $1B.”
  - A modern EFW plant generates approximately $1B in economic activity, including value-added, high-paying jobs
  - Cost for a Canadian-sized plant (150-200,000 tpy) ranges from $200-$400 million

- “This is a 20\textsuperscript{th} century solution for a 21\textsuperscript{st} century problem.”
  - Completely backwards
  - Problem is age old
  - Technology is state-of-the-art
Nonsense that makes sense if you ignore the facts….

- What’s your recovery rate?
  - Canada’s recovery rate stands at 22%
  - Metro Vancouver diverts 55%
  - Durham Region is at 51%

- But…
  - These aren’t 78/45/49 away from 100
  - Nor are they 48/15/19 away from 70

...they’re a million miles away
Zero: Great in Theory

Triple bottom-line challenges

- **Economic**
  - High cost - law of diminishing returns
    > Who sorts and for how much?
  - Commoditization of marginal goods
    > Fabric at the price of gold
  - 5% and 5 percentage points aren’t the same
    > 22% + 5 percentage points = 27%
    > 22% + 5% = 23.1%

- **Environmental**
  - Ignoring a net positive GHG technology
  - Turning away from elevated recycling rates
  - Opting out of international best practices

- **Social**
  - Even more public education and engagement
    > Is this possible given current level of awareness?
  - Vast majority of people choose to pay
    > A lifestyle choice; the consequences of growth
Progressive Public Attitudes
Public Opinion

- Research shows 83% of Canadians support EFW technologies, up from 67% only four years ago.
- Canadians understand that EFW can help preserve natural resources and reflects a preferred disposal option.
- Among those who approve of facilities being built, more than half (58%) would also approve construction of such a facility in their immediate community.
Support is Growing

National ‘Waste to Energy Facility’ Approval +2 points (85%) ...+8 in Alberta (87%), +4 in Ontario (85%) and +9 in Atlantic (83%)... Disapprove/DK 15%...

<table>
<thead>
<tr>
<th>Year</th>
<th>Strongly approve</th>
<th>Somewhat approve</th>
<th>Somewhat disapprove</th>
<th>Strongly disapprove</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>24%</td>
<td>43%</td>
<td>18%</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>40%</td>
<td>38%</td>
<td>11%</td>
<td>9%</td>
<td>2%</td>
</tr>
<tr>
<td>2008</td>
<td>44%</td>
<td>39%</td>
<td>8%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>2009</td>
<td>45%</td>
<td>40%</td>
<td>8%</td>
<td>5%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Thinking about this and the other options available, do you approve or disapprove of waste to energy facilities being used for garbage disposal and management in your province? Is that strongly or somewhat? Base: 2004 All respondents N=1806, 2006 N=2750, 2008 N=1652, 2009 N=1650

Source: Waste Management Inc. (Research by IPSOS Reid)
Approval up across the board since 2004...+20% in British Columbia since 2004...+18% in Alberta...+17% in Ontario+23% in Quebec...+19% in Atlantic

<table>
<thead>
<tr>
<th></th>
<th>British Columbia</th>
<th>Alberta</th>
<th>Saskatchewan</th>
<th>Ontario</th>
<th>Quebec</th>
<th>Atlantic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>80%</td>
<td>87%</td>
<td>78%</td>
<td>85%</td>
<td>91%</td>
<td>83%</td>
</tr>
<tr>
<td>2008</td>
<td>83%</td>
<td>79%</td>
<td>84%</td>
<td>81%</td>
<td>91%</td>
<td>74%</td>
</tr>
<tr>
<td>2006</td>
<td>73%</td>
<td>75%</td>
<td>73%</td>
<td>81%</td>
<td>80%</td>
<td>69%</td>
</tr>
<tr>
<td>2004</td>
<td>60%</td>
<td>69%</td>
<td>67%</td>
<td>68%</td>
<td>69%</td>
<td>64%</td>
</tr>
</tbody>
</table>

NOTE: In the 2008 wave, ‘waste to energy facility’ replaced ‘incinerator’ in questionnaire.

Source: Waste Management Inc. (Research by IPSOS Reid)
Energy Versus Waste

Most Effective Message to Move to More Likely to Approve Facility is “Burning Waste Produces Energy for Heat and Power, Saving Natural Resources” (51%)…Opposition/DK Dissipates from 15% to 8%…

- Burning waste produces energy for heat and power, saving natural resources
  - 2008: 15% Much more likely to approve, 31% Somewhat more likely to approve, 15% No impact
  - 2009: 15% Much more likely to approve, 26% Somewhat more likely to approve, 15% No impact

- A modern waste to energy facility is less hazardous to its neighbours, in terms of cancer risk, than a modern landfill
  - 2008: 16% Much more likely to approve, 21% Somewhat more likely to approve, 18% No impact
  - 2009: 16% Much more likely to approve, 21% Somewhat more likely to approve, 18% No impact

- Burning waste means less goes to landfill
  - 2008: 13% Much more likely to approve, 25% Somewhat more likely to approve, 28% No impact
  - 2009: 13% Much more likely to approve, 25% Somewhat more likely to approve, 28% No impact

- Burning waste helps to reduce pollutant emissions and preserve resources
  - 2008: 11% Much more likely to approve, 32% Somewhat more likely to approve, 21% No impact
  - 2009: 11% Much more likely to approve, 32% Somewhat more likely to approve, 21% No impact

- 85-90% of waste can be burned
  - 2008: 13% Much more likely to approve, 19% Somewhat more likely to approve, 31% No impact
  - 2009: 13% Much more likely to approve, 19% Somewhat more likely to approve, 31% No impact

I am now going to read you some things that may be said about waste to energy facilities. Please tell me whether after hearing each statement you are more or less likely to approve of waste to energy facilities being used for garbage disposal and management, or whether the statement has no impact on your opinion? Base: Do not approve/don’t know of incinerators being used for garbage disposal 2008 N=278, 2009 N=239

Source: Waste Management Inc. (Research by IPSOS Reid)
A Good Neighbour

Among those who Approve of Waste to Energy Facilities (85%), 6 in 10 (61%, +2) Would also Accept the Construction of such a Facility in their Immediate Community: 52% of Population...15% Strongly...

How would you feel about a waste to energy facility being built in your immediate community? Would you strongly approve, somewhat approve, somewhat disapprove, or strongly disapprove? Base: All respondents that said ‘Strongly Approve’ or ‘Somewhat Approve’ at Q15 2008 N=1375, 2009 N=1411

Source: Waste Management Inc. (Research by IPSOS Reid)
Two Years From Today
Operational Priorities

• **Advocating for progressive electricity pricing that reflects EFW’s net positive impact re: climate change and spurring responsible waste management**
  - Power purchase agreements will assure project financing and long-term, stable tip fees for EFW users
  - Tipping fees can be used as an incentive for 3Rs
  - Proper pricing model will allow operators to shift load during peak demand periods

• **Advocating for a designation for EFW as renewable base load power (thereby recognizing the solid waste management hierarchy)**
  - Standard offer program will drive project development of clean, renewable projects

• **Advocating for the establishment of acceptable air emission standards for EFW**

• **Support projects coming on-line**

• **Educating key stakeholders, particularly on health and safety issues**

• **Serving as a primary and credible source for EFW information**
So, By 2011...

- Four or five new projects approved
  - Moving towards construction and/or operation
  - In Ontario, Alberta, and British Columbia
- Preferred price for EFW
  - Accelerated price for EFW operations that meet recycling and environmental goals
- Clearly articulated air emissions standards
- Recognition by policy-makers, politicians, and the public, that EFW is...
  - Safe
  - Proven
  - Cost-effective
  - Compatible with recycling
  - Environmentally sustainable
  - Trusted by residents and ratepayers
  - Increasingly utilized worldwide
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Executive Director

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