The State of WTE in North America

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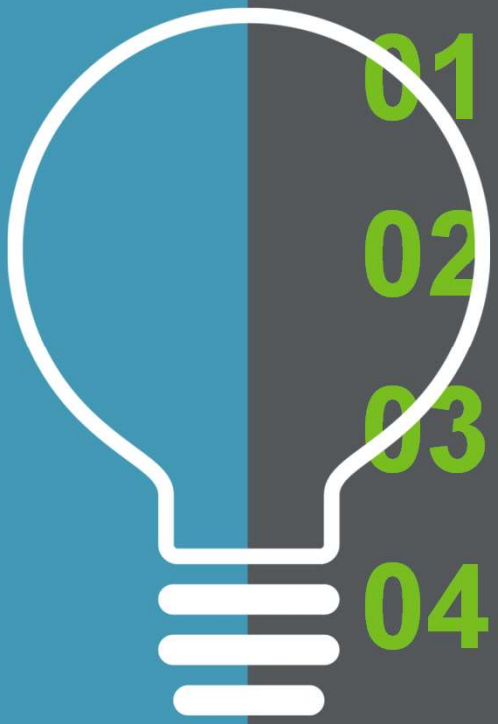
Agenda



01 A Brief History of Energy Recovery from Waste in North America

02 Current State of Industry

03 Recent Projects

04 What's Next?

A Brief History

Energy Recovery From Waste: Then & Now

1950's – 1960's

Construction of early WTE facilities in Europe and incinerators in U.S.

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The "Hay Days" of WTE in North America

Energy Recovery From Waste: Then & Now

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Existing Facility Expansions & new facility construction in Europe & Asia

Energy Recovery From Waste: Then & Now

1980's

The "Hay Days" of WTE in North America

The "Dark Ages": Stricter Emission standards in U.S. – retrofits & some facility closures

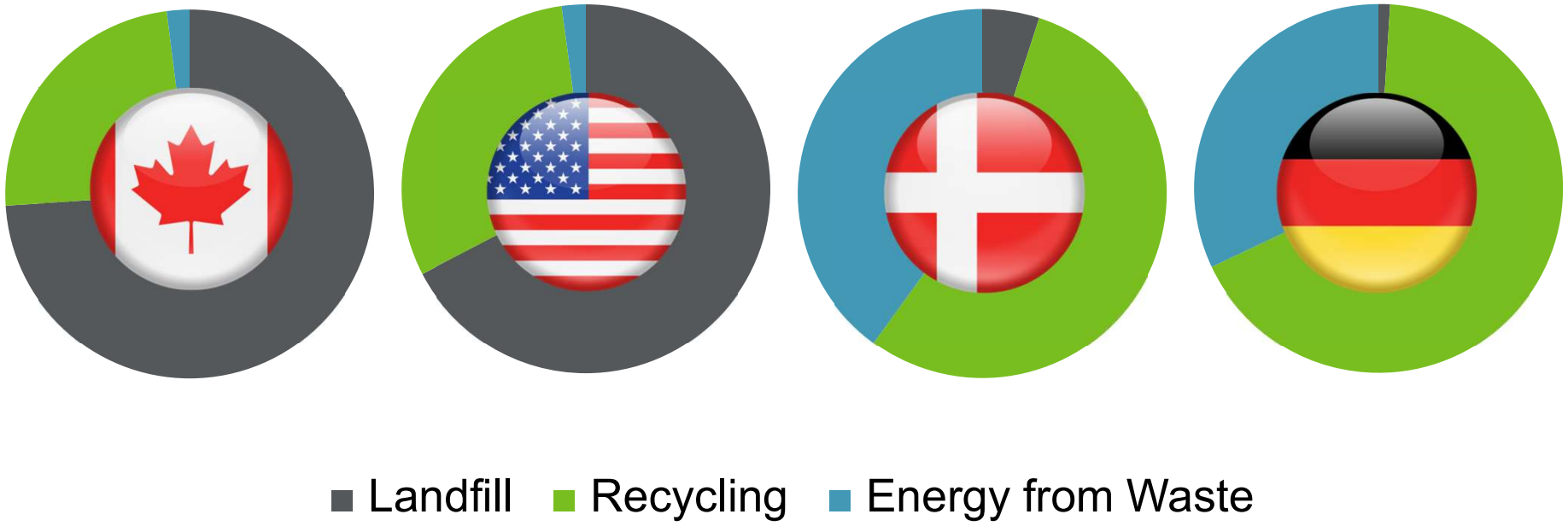
1990's

2000's

Existing Facility Expansions & new facility construction in Europe & Asia

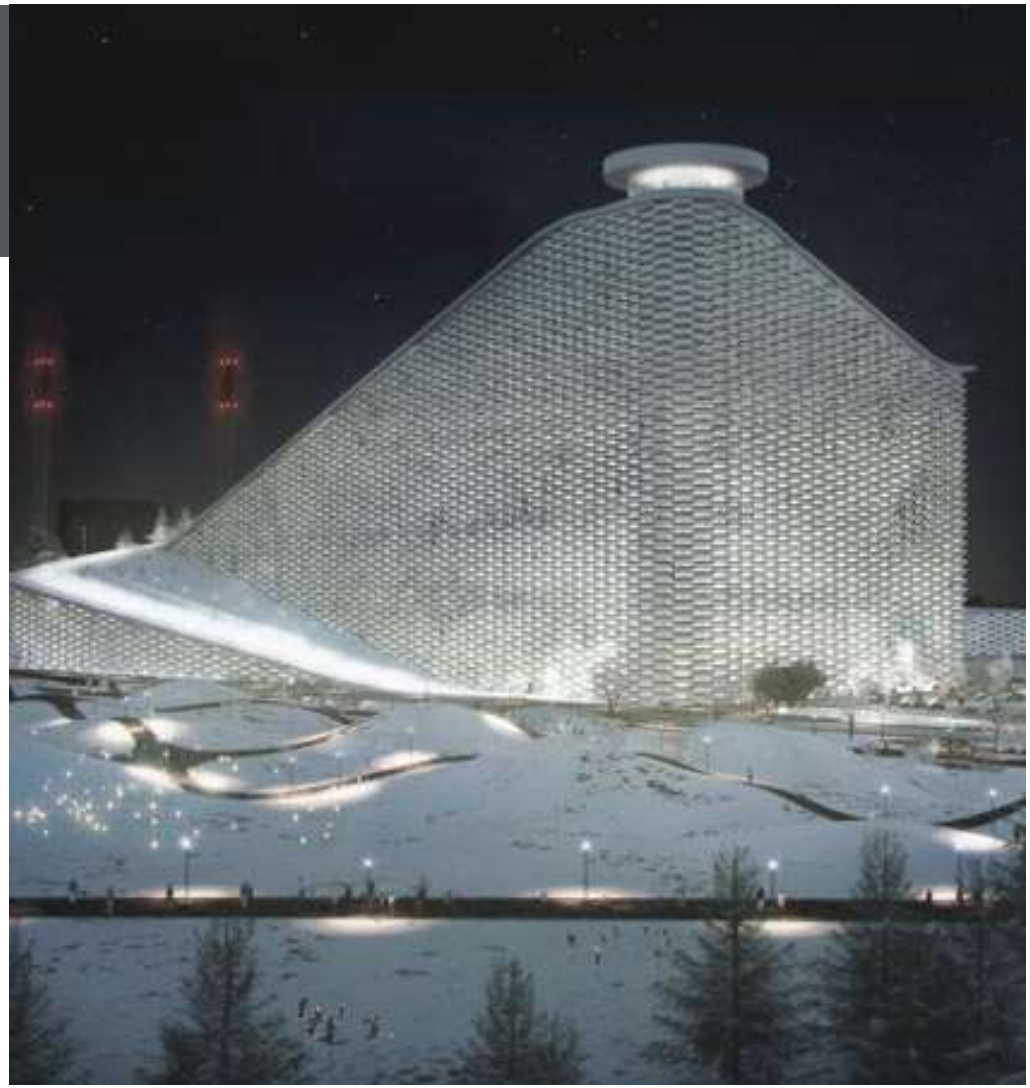
Current State of the Industry

North America: A Wasteful Legacy

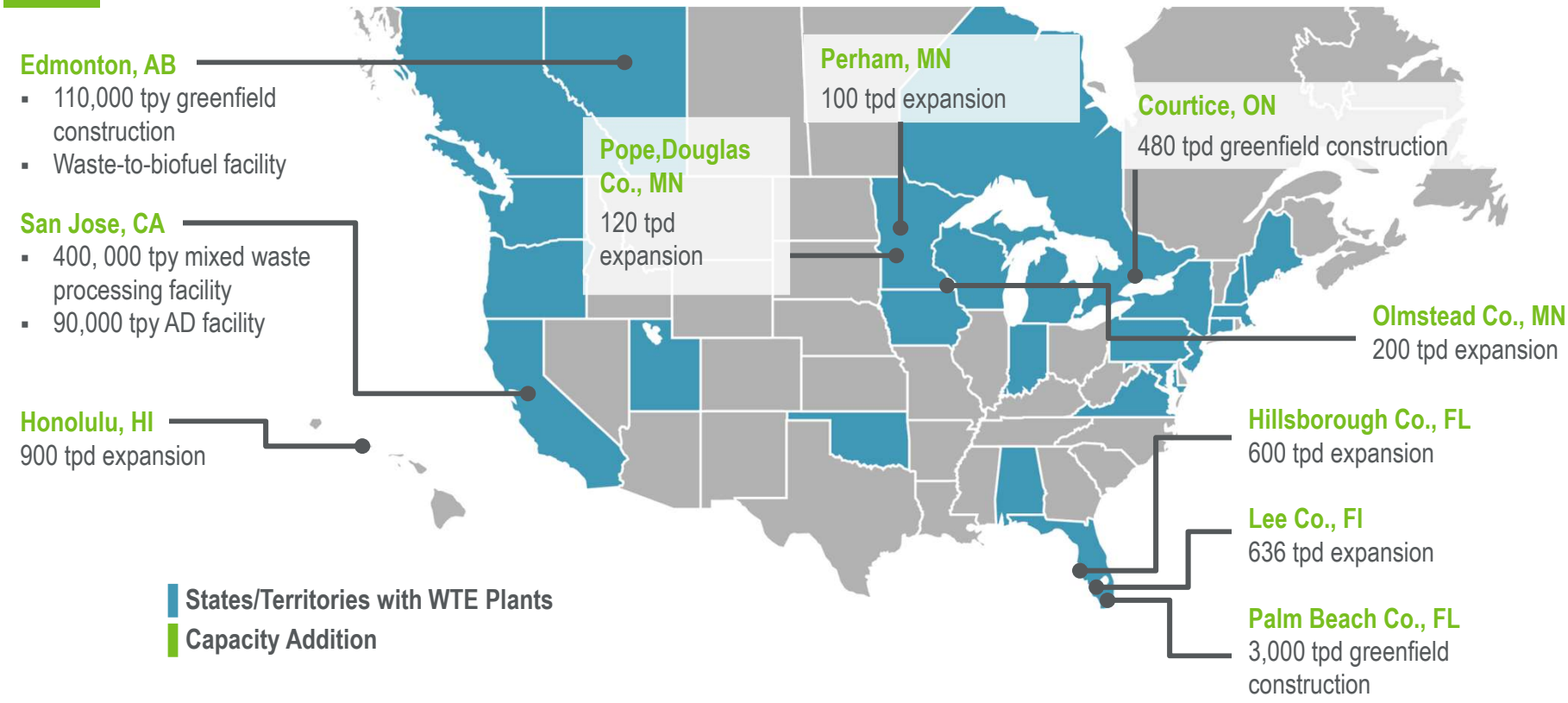


Key Drivers

- Push for greater diversion from landfill
- Enhancement of 3Rs programs & expansion of organics collection programs
- Waste is a Resource…the "4th R"
- Interest in alternatives to traditional waste to energy technologies; mixed waste processing and anaerobic digestion



Energy Recovery in North America TODAY



Key Inhibitors

- Cheap landfill & lots of it!!!
- Relatively cheap energy prices & low cost of fuel (at least in the U.S.)
- Pressure on Commodity Markets for many recyclables
- Opposition Groups: "NIMBY"'s, "BANANA"'s and other activist groups…OH MY!!!
- Regulatory Factors: Greenhouse Gas legislation & carbon taxes

Challenges to Change in U.S.

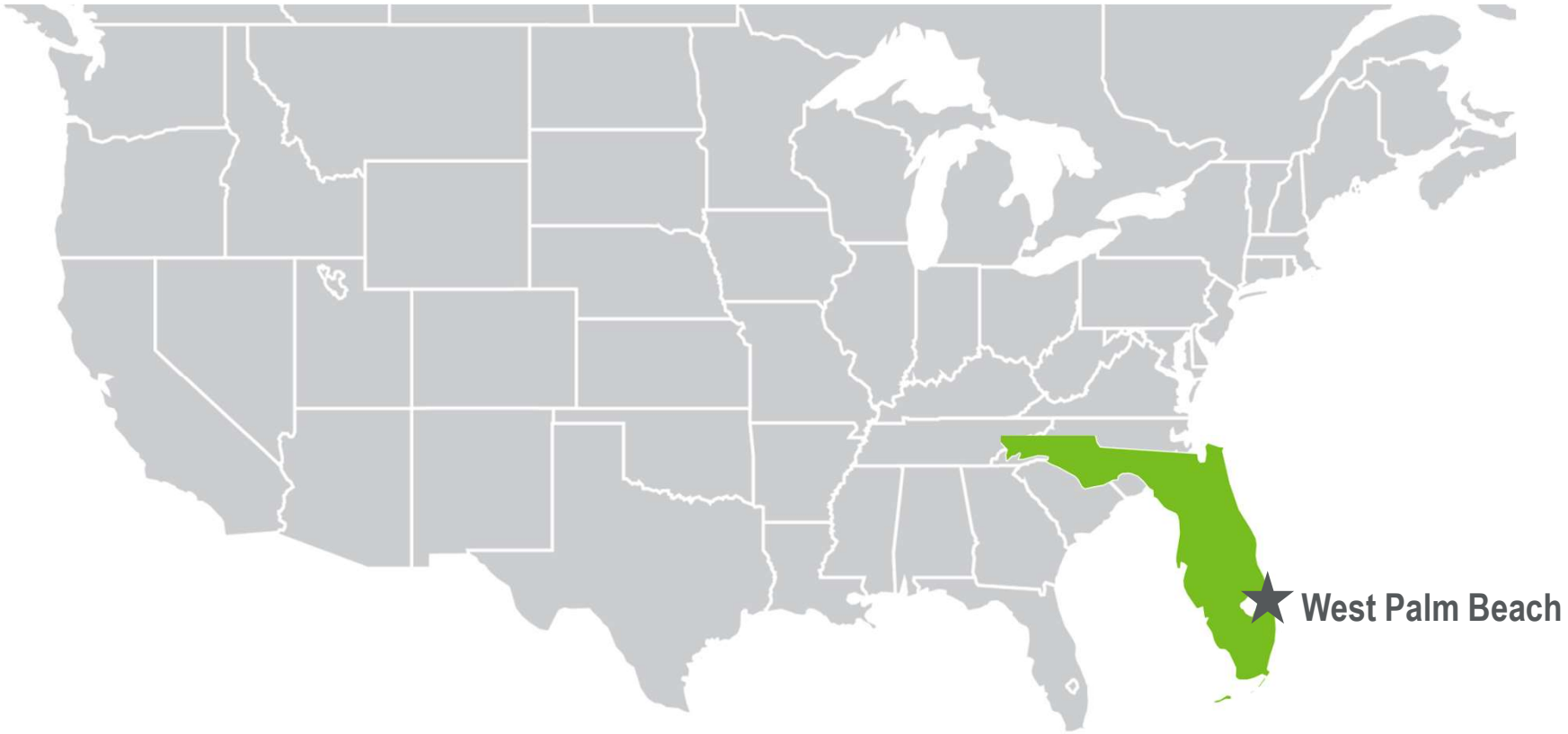
- **No regulatory or policy framework** currently in place to incentivize programs
- **Limited to No Funding** or support to look beyond traditional linear business model
- **No compromise** between parties and stakeholders on either side of aisle

Facility Closures

- Broward County, Florida
- Harford County, Maryland
- Biddeford, Maine
- Charleston County, South Carolina
- Claremont, New Hampshire

Recent Projects

Recent Projects in North America



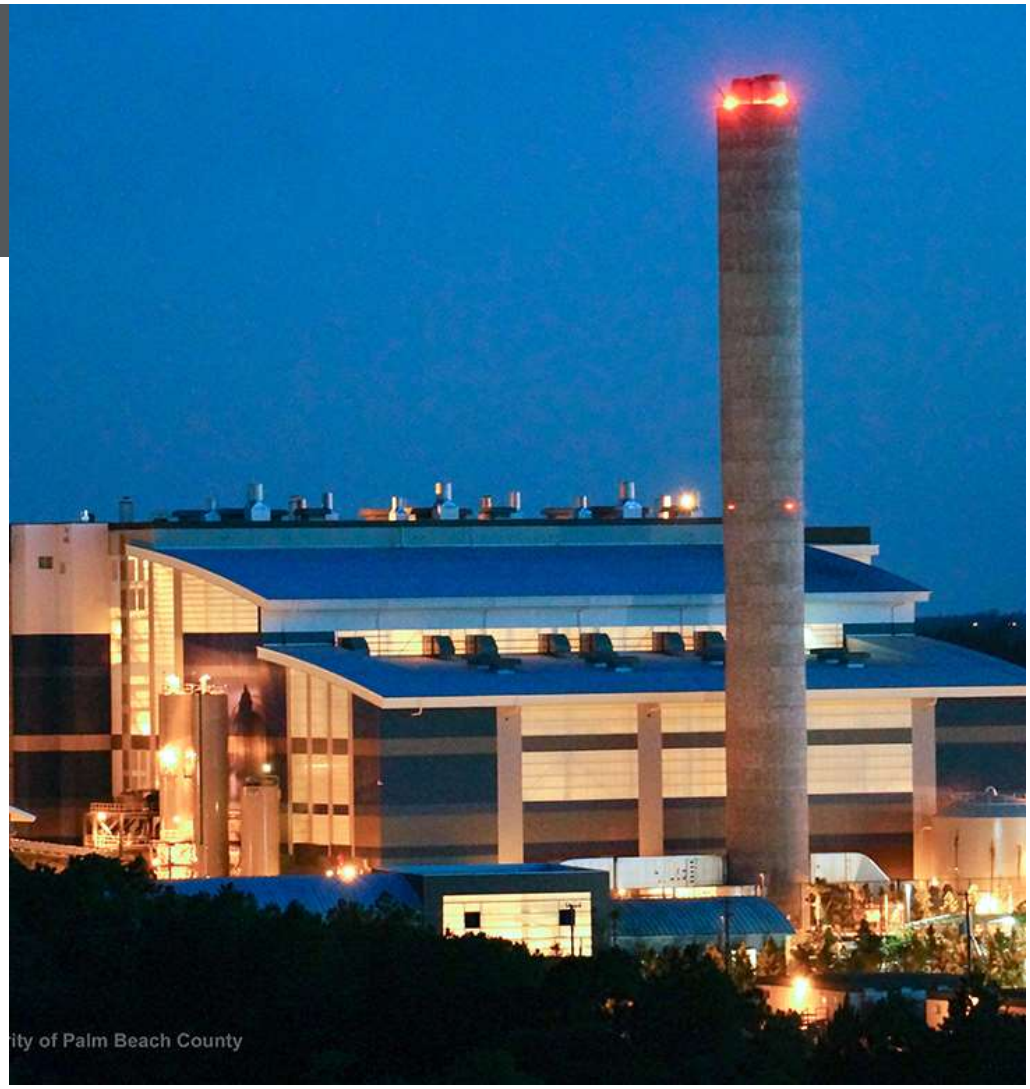
West Palm Beach Renewable Energy Facility

West Palm Beach, Florida, USA

Project Drivers

West Palm Beach Renewable Energy Facility

- Meet Florida State mandate of 75% diversion from landfill
- Existing RDF Combustion Facility was over 30 years old and at capacity
- Increasing population within region and lack of available landfill capacity



Project Features

West Palm Beach Renewable Energy Facility

- Mass Burn technology capable of processing up over 900k tonnes per annum
- Features state-of-the-art air pollution control design capable of meeting lowest emission standards in North America
- Generates up to 100 MW of electricity
- Features a 9 million liter rooftop rainwater collection system
- Capital Cost: $672m USD
  Operating Cost: $20m USD


San Jose
Clarington,
Ontario

Durham- York Energy Centre

Clarington, Ontario, Canada

Project Drivers

Durham-York Energy Centre

- Growing population and urbanization of Durham Region
- Local landfill closures and heavy reliance on long-haul disposal (Michigan and NY)
- Goal to divert at least 50% of residential waste from landfill by 2007
- Consider an "energy-from-waste" facility for the disposal of residual waste

Innovative Features

Durham-York Energy Centre

- 1st true “Greenfield” energy from waste facilities in North America
- Mass burn technology capable of processing up to 140,000 tonnes per annum
- Features latest boiler design & air pollution control design capable of meeting lowest emission standards in North America & EU
- Generates up to 17 MW of electricity to grid & potential to generate up to 7 MW thermal
- Capital Cost: $255m CDN
  Operating Cost: $15m CDN annually


Edmonton,
Alberta
Clarington,
Ontario

Enerkem Alberta Biofuels

Edmonton, Alberta, Canada

Project Drivers

Enerkem Alberta Biofuels

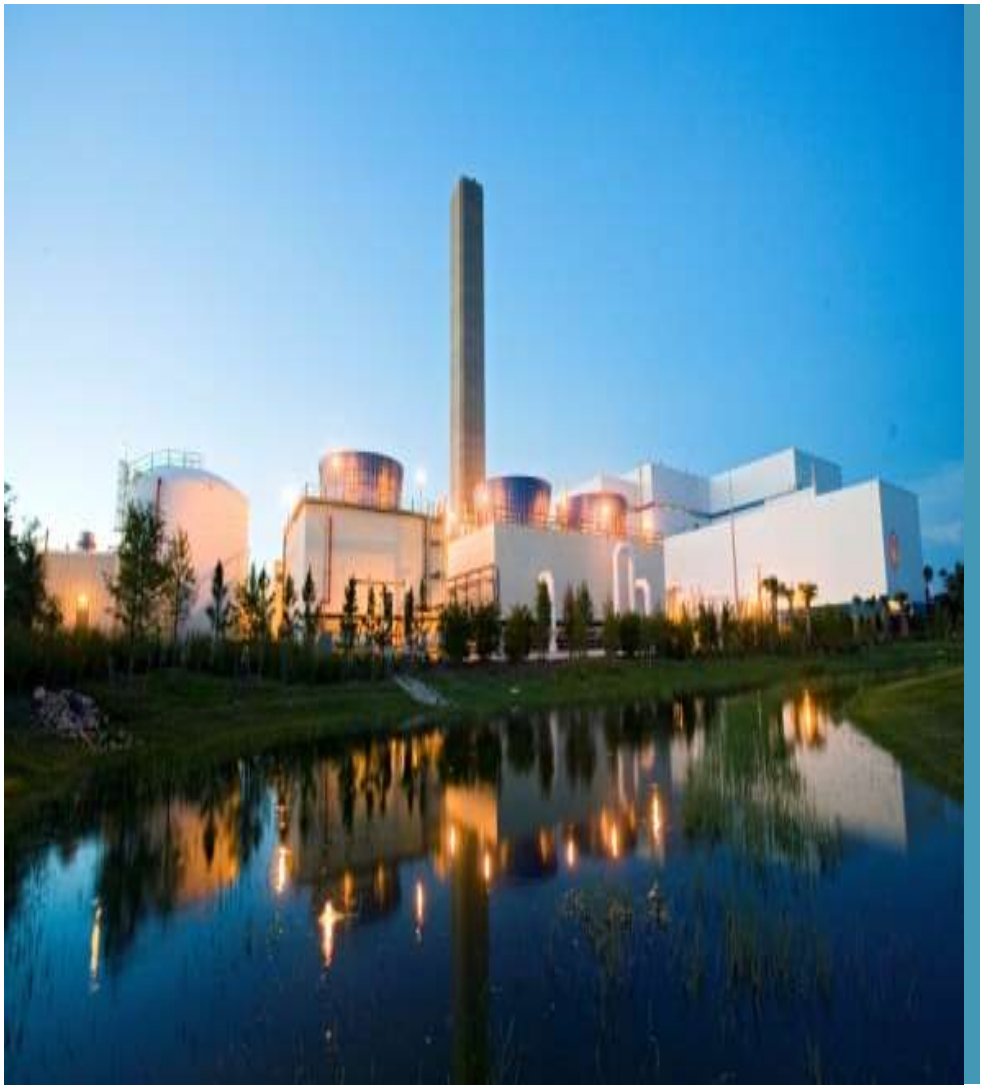
- City of Edmonton's search for increased diversion from landfill and alternative technologies to incineration
- Funding from Alberta Innovates – Energy and Environment Solutions
- Renewable Fuel Standards (RFS) program in the U.S. authorized under the Energy Policy Act of 2005 & Energy Independence and Security Act of 2007

Innovative Features

Enerkem Alberta Biofuels

- **Edmonton Waste Management Centre**:
  - 70,000 TPY MRF w/manual pick stations, magnets, etc
  - Mechanical systems to produce up to RDF feedstock for Enerkem's Waste-to-Biofuels Facility
  - Organic waste Composting Facility
  - C&D Recycling Facility
  - E-Waste Recycling Facility

- **Enerkem Biofuels Facility**:
  - Designed to process up to 140,000 TPY RDF
  - Intended to produce up 38 million litres per year of biofuel (methanol and/or ethanol)
  - Currently in final phases of commissioning – intended commercial operation in 2017



What's Next for the North American Industry?

What does the Future in North America Hold?

An Eye on Tomorrow

What could the future hold for WTE?

- WTE economics will continue to be challenging which will push the search for non-traditional energy markets
- Push for finding other revenue sources (enhanced metal recovery and ash reuse)
- Regulatory uncertainty will remain for some time
- The role of new and emerging technologies will evolve – there will be successes & some failures
- A need to identify WTE's important role in diversion from landfill and the circular economy