

HDR



IMPLEMENTING AN EFW FACILITY

Opportunities, Challenges and Lessons Learned

Bruce Howie, P.E.
Vice President
HDR Corporation (Canada)





Speaker Overview

EfW Project Planning

Durham York Project Overview

Lessons Learned



Bruce Howie, PE, Vice President

Practice Leader for Energy from Waste Services

- 17+ Years of Energy Industry Experience
- Focus in EFW technology assessments & evaluations
- HDR Project Manager and Technical Lead for several recent energy-from-waste facility procurements, including Durham and York



02

EFW Project Planning

KEY PROJECT ELEMENTS TO CONSIDER



Technology



Waste Supply



Residuals Management



Funding



Markets



Site



Education/Outreach

Some Attributes and Uncertainties



Attributes

- Type and Source of waste
- Waste collection practices
 - Public vs. private
 - Source separated

Uncertainties/Risks

- Control of waste stream
- Quantity
- Composition & Quality
- Impacts of current and future diversion programs
- Regulations

Must Have a Reliable Source of Acceptable Waste

Some Attributes and Uncertainties



Attributes

- Waste Stream Dependent
- Best-Fit Technology Class
- Site Requirements
- Performance Guarantees
- Environmental Performance

Uncertainties/Risks

- Costs - Capital & Operating
- Schedule for construction
- Vendor Experience/Capabilities
- Readiness
- Performance

The Technology Must be Technically & Financially Viable

Some Attributes and Uncertainties



Attributes

- Ownership
- Size
- Access for vehicles
- Access to Utilities
- Approvability
- Location

Uncertainties/Risks

- Vendor or Public Site
- Water licensing requirements
- Ability to Permit site
- Pre-existing environmental and subsurface conditions
- Political and Public Acceptance of location

Need to Understand Appropriate Risk Allocation

Some Attributes and Uncertainties



Attributes

- Permits
- Location
- Capacity
- Responsibility for Management
- Host Community

Uncertainties/Risks

- Types & Quantities
- Environmental Characteristics
- Disposal Location & Costs
- Beneficial Reuse Options

There Are Always Residuals

Some Attributes and Uncertainties



Attributes

- Availability/need/price of power
- Other Energy Users (steam, hot water, fuel)
- Other By-Product Users
- Competition

Uncertainties/Risks

- Quality of products
- Quantity of products
- Environmental character
- Availability/Sustainability of markets
- Price

Technology Choice Affects Market Uncertainty

Some Attributes and Uncertainties



Attributes

- Public Funding – reserve fund, grant, loans
- Private Financing – debt, equity
- Possible Revenue Streams – tipping fees, energy revenues, by-product sales, general taxes

Uncertainties/Risks

- Availability of Public or Private Funds/Grants
- Interest Rates
- Repayment of Debt
- Financial capacity of vendors
- Product/By-product pricing



03

Durham York Project Overview

Regional Municipality of Durham



- Borders Toronto to the east
- 2,600 sq. km (1,000 sq. mi.)
- Population - 655,000
- Total annual solid waste – 245,000 MT/yr
 - Recycling – 55,000MT /yr
 - Organics – 74,000MT /yr
 - Re-Use/Other – 6,000MT /yr
 - Residual – 110,000MT /yr
 - 55% Diversion from disposal



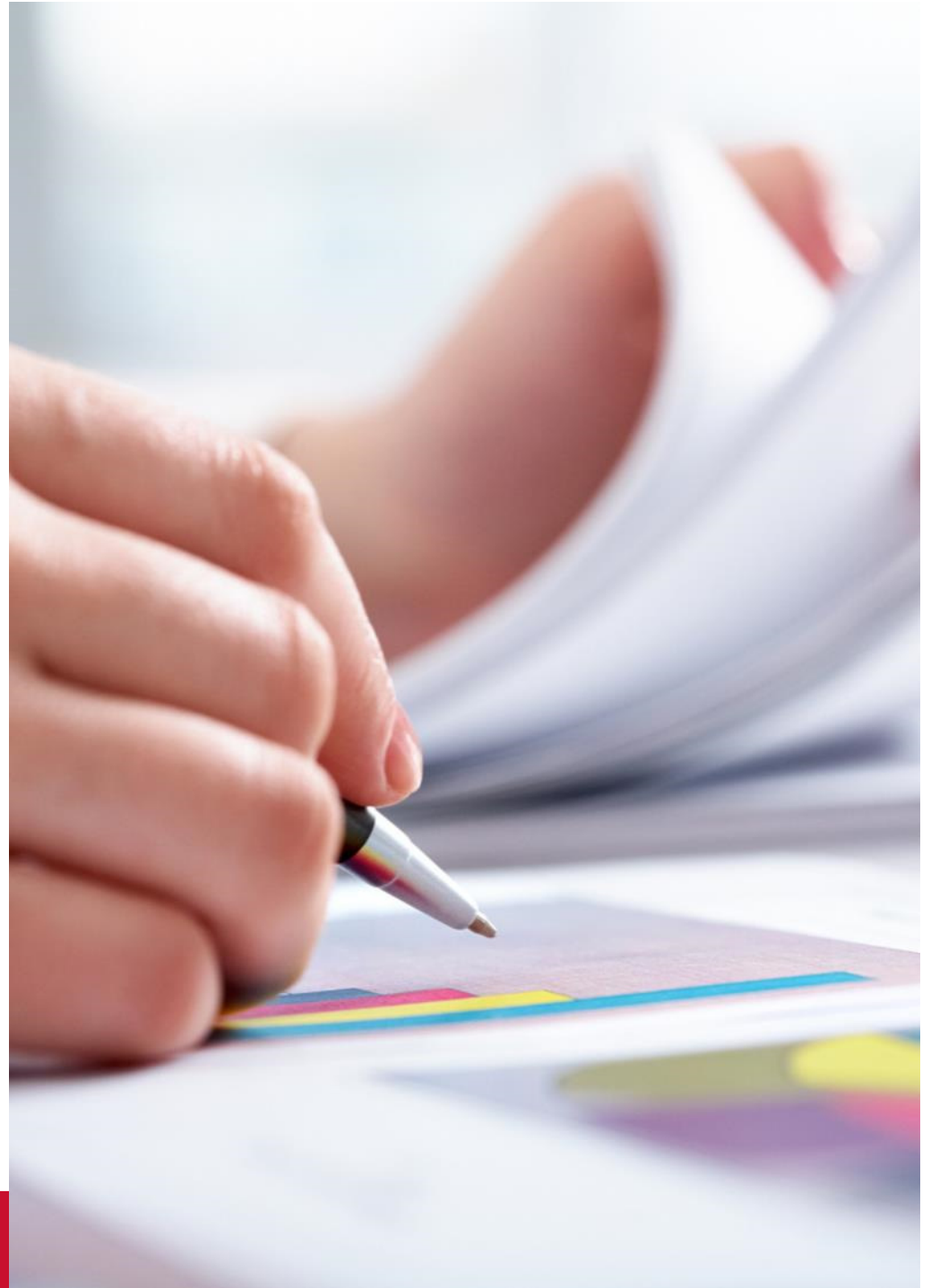
Durham Region's Integrated Waste Management Strategy

- Strong commitment to the 3R's
- Weekly curbside blue box collection – paper, glass, tins, plastics
- Bi-weekly waste collection - limited to four bags per household
- Weekly green bin and seasonal yard waste collection
- Operating three local transfer stations



Municipal Approach and Complexity of Approval

- **Business Case** - Detailed economic and financial analysis undertaken
- The **EA** and the **Procurement Process** -RFQ and RFP documents all needed Council approval
- All other staff reports were approved by Regional Council.
- Council authorized staff to proceed with contract negotiations with Covanta.



Public Education

Complete transparency including extensive public education strategies

Public Education: 2004 to Present

- 100+ Public consultation series and workshops
- 184 News advertisements placed
- 80 Advertisements using other sources



Technology Evaluation

- High-level Technology Screening
- Request for Expressions of Interest (REOI)
- Request for Qualifications (RFQ)
- Reference Facility Tours
- Request for Proposals (RFP)



Selection of Preferred DBO Contractor

Procurement Approach: REOI → RFQ → RFP

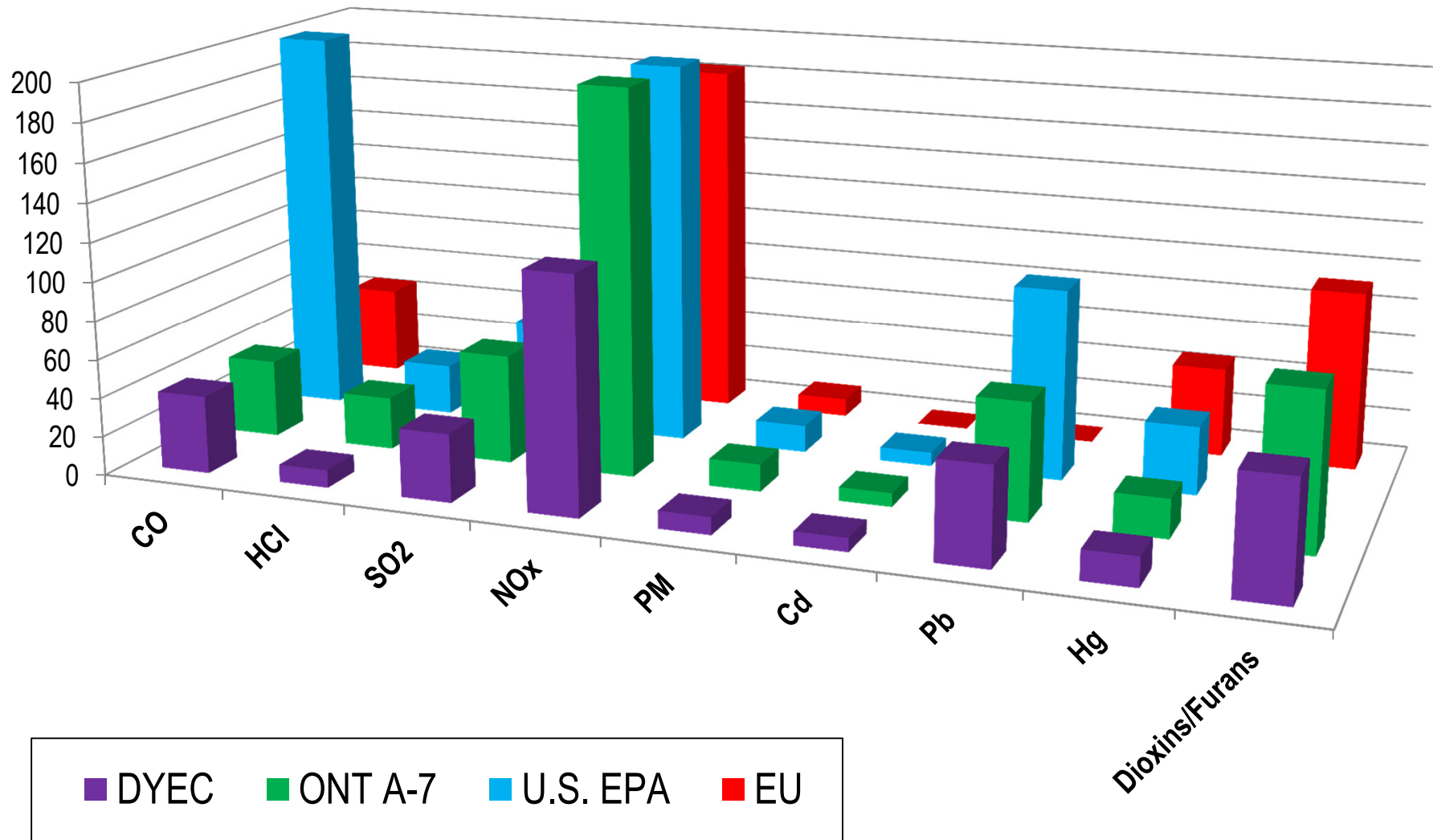
- RFP Proposals evaluated based on:
 - Technical – Highest Score – Covanta
 - Project Delivery – Highest Score – Covanta
 - Cost & Commercial – Highest Score – Covanta
- Regions' evaluation team unanimously recommended Covanta Energy Corporation as the preferred vendor.



DYEC TECHNICAL SUMMARY

Parameter	Performance Specification
Combustors	Two (2) 9.1 Tonne/Hour Martin GmbH stokers at 13 MJ/kg (~5,600 btu/lb)
Boilers	Two (2) Jingding boilers each rated at 33,640 kg/hr steam at 499°C and 91 bar
Electrical Generation	868 kWh/tonne (Gross)/767 kWh/tonne (Net) @ 13 MJ/kg (~5,600 btu/lb)
Boiler Availability	90% (or 7,884 hours per year per unit)
Metals Recovery	Ferrous = 80% Non-Ferrous = 60%
Emissions	Best of EU, USEPA and Ontario A-7
Residue Quantity/Quality	<30% _{wt} Residue at 13 MJ/kg (~5,600 btu/lb) <3% Combustible Matter <25% Moisture Content

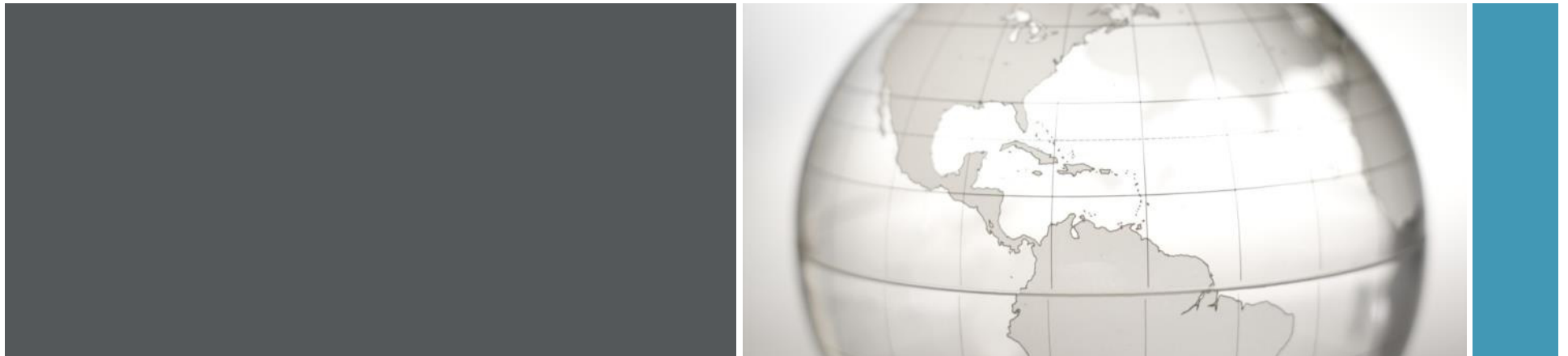
AIR EMISSIONS REQUIREMENTS



Host Community Agreement

For the municipality to become a willing host for EFW, an HCA was agreed to. The Agreement included:

- Covering cost of arterial road construction
- Establish a hazardous waste depot for the residents
- Construct a paved segment for a waterfront trail
- Establish an EFW community liaison group
- Incorporate modern state-of-the-art emission controls
- Monitor ambient air for a three (3) year term
- Incorporate \$9 million of architectural enhancements



CONSTRUCTION OF DYEC

Fall 2011-Fall 2015





Current DYEC Status

- **Acceptance Test (Sep-Nov 2015):**
 - Emissions Testing
 - 30-Day Reliability Test
 - 5-Day Throughput Test
 - Three 8-hr Energy Recovery Tests
- **Commercial Operations began on January 27, 2016**
- **Currently operating both boilers and selling up to 15 MW of electricity to Hydro One grid**





04

Lessons Learned and Next Steps

KEY CHALLENGES TO EXPECT

- Impacts to Human Health
- Air Emissions
- Truck Traffic Impacts
- Impacts to Local Agricultural Operations
- Increased Compliance and Monitoring
- Property Value Concerns
- Competition with Waste Diversion
- Energy Output and Efficiency
- Costs and Economic Viability
- Facility Ownership and Operational Responsibility
- Residue Management

Understanding when, how and to what degree to respond is critical

HOW TO GET IT DONE!!

▪ **Know your Needs**

- Quantity and Characteristics of Your Waste
- Anticipate changes in the System
- Know what your goals are

▪ **Know your Assets**

- Do you have a site?
- How will you fund the capital costs?
- Build a strong team

▪ **Know your Risk Appetite**

- Know your stakeholders

▪ **Engage**

*The clearer you are in
defining your needs,
the better your chance for
success!!*

Slide 27

FD1

I don't think the County has a "goal/desires to go the next step" but I think vendors are telling the County they could be getting paid for their waste stream instead of paying for disposal.. I think this slide covers the critical issues, but need to be aware the initial driver is coming from outside the County potentially

Frye, Debra, 9/8/2014

NEXT STEPS FOR SAEWA

- Complete the Waste Characterisation Study
- Finalize the Business Plan
- Make the final technology decisions and define the Design and Performance Requirements
- Determine the procurement model to select a preferred technology/ contractor



Modified EPC - Lee County Expansion