Durham York Energy Centre

Regional Municipality of Durham Council
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Presentation Outline

1. Waste Management and Durham York Energy Centre (DYEC) History (brief)
2. Environmental Assessment and Environmental Compliance Approval
3. Emissions
   - Dioxins and Furans
   - AMESA
4. Process for Amendment of Capacity
5. Terms of Reference for future Environmental Assessment
6. Conclusions

Durham York Energy Centre History

- **No new landfill** in Durham Region – resolution of Regional Council
- Long-Term Plan conclusion to **consider energy from waste** as waste disposal option
- Provincial directive to **cease disposal contracts with Michigan** (December 31, 2010)

There was no willing host for our garbage.

There is no willing host for our garbage today.

2005	• Environmental Study (EA) initiated
2009	• RFP process • Council Approval of Preferred Vendor (April 22) • Council Approval of EA Submission (June 24)
2010	• EA Approval (Nov 3)
2011	• Submission of Environmental Approval to the MOECC (Feb) • Certificate of Approval Issued (June) • Notice to Proceed (August)
2011 to 2013	• Engineering and Procurement
2012 to 2016	• Construction
2015	• Facility Commissioning • First Delivery of Waste (Feb 9) • First Fire of Waste (Feb 13) • Connection to Electricity Grid (Sept) • Acceptance Test (Sept/Oct) • First Source Test (Oct) • MOECC Approval (Dec)
2016	• Commercial Operations (Jan)

Environmental Assessment (EA) Process and Communications

EA included assessments for the 140,000, the 250,000 and the 400,000 tonnes per year scenarios

- 100+ public consultation series and workshops
- 513 print advertisements placed
- 271 advertisements other sources
- 95 public engagements / presentations

> "I have also concluded that there was **sufficient time and opportunities** for interested members of the public, the government agencies and Aboriginal communities to comment during the EA process." – **Minister of the Environment**

Significant Peer Review

- Three levels of Peer Review – internal, external and agency.
- Funding provided to the Municipality of Clarington to retain peer review services ($500,000).
- Peer Reviews completed on all major technical studies (both internal and external), and findings made public.
- Comments received addressed in EA prior to submission to the Ministry of the Environment, Conservation and Parks (MECP).
- Each entity identified their own experts to review documentation and analysis.
- **All subject matter experts' concerns addressed and EA amended accordingly**

Site-Specific and Vendor-Specific Studies and Assessments for both 140,000 and 400,000 tonnes per year

- Air Quality Assessment;
- Surface Water and Groundwater Assessment;
- Facility Energy and Life Cycle Assessment;
- Geotechnical Investigation;
- Acoustic Assessment;
- Visual Assessment;
- Natural Environment Assessment;
- Social/Cultural Assessment;
- Stage 2 Archaeological Assessment and Built Heritage Assessment;
- Traffic Assessment;
- Economic Assessment; and,
- Site-Specific Human Health and Ecological Risk Assessment.

More than 20 different companies and over 100 professionals were involved in completing and reviewing these reports.

Environmental Assessment Summary of Findings

- Project will not compete with waste diversion
- Air emissions below standards
- Minimal truck traffic impacts
- Net energy output to grid
- Project economically viable
- Stringent compliance and monitoring standards included
- No impacts to local agricultural operations
- Minimal cumulative effects
- Minimal impacts from ash management
- No impacts to property values

"I am satisfied that these concerns have been adequately addressed during the preparation of the EA and that any concerns that remain outstanding will be addressed through conditions of approval and other applicable ministry legislation and regulations."

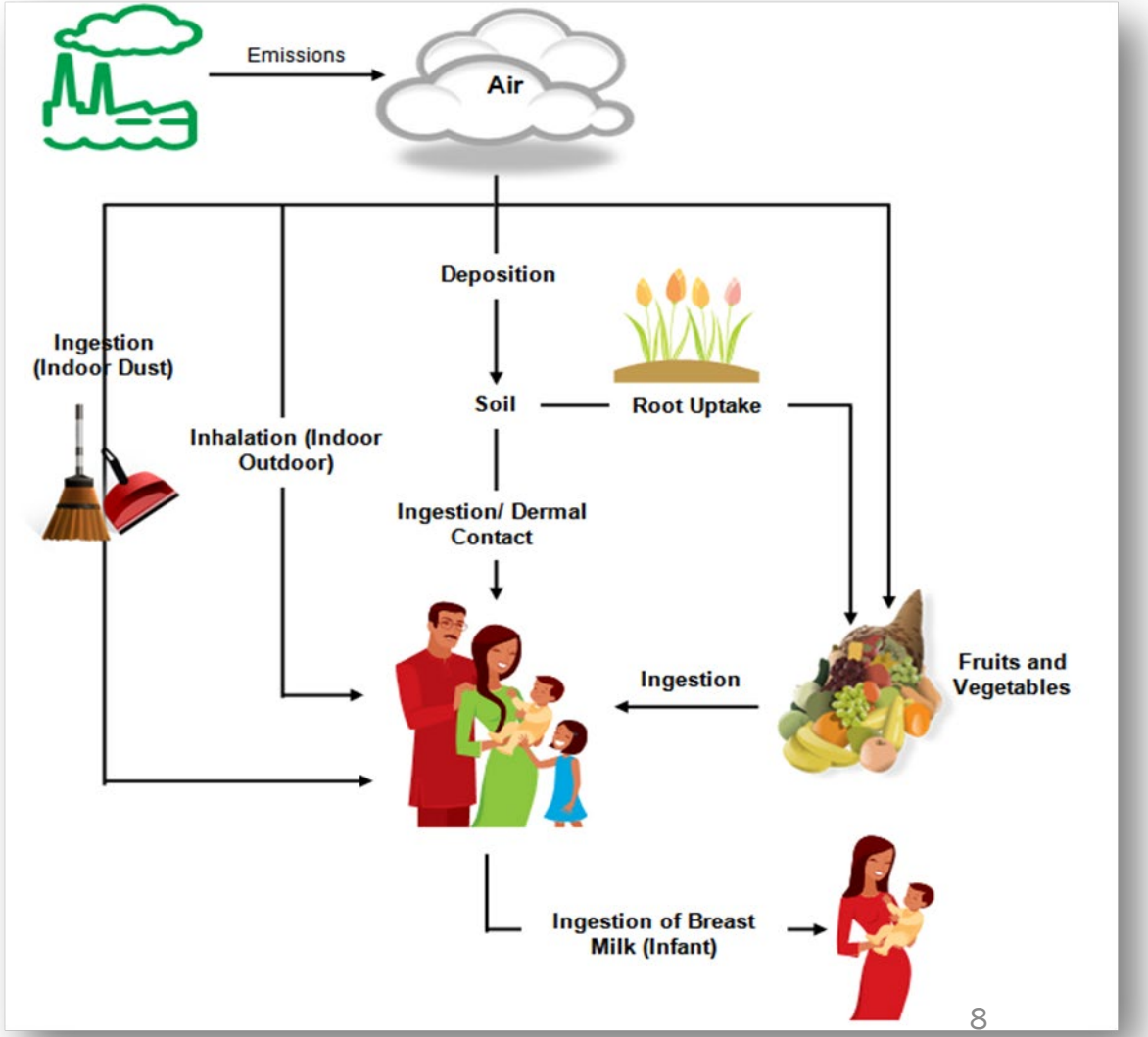
- Minister of the Environment

Human Health and Ecological Risk Assessment Evaluation

- The risks to human receptors were evaluated in two ways:

1. **Inhalation Assessment:** The risks associated with inhaling energy-from-waste air emissions
   - 309 receptor locations were evaluated

2. **Multi-Pathway Assessment:** The risks associated with exposure to energy-from-waste emissions through dermal contact or ingestion of exposed media
   - Dermal contact with soil, dust
   - Ingestion of produce, agricultural products, fish and wild game as well as incidental ingestion of surface water while swimming
   - 132 receptor locations were evaluated



Human Health and Ecological Risk Assessment Conclusions

- Overall, the results of the human health risk assessment indicate that chemical emissions from the energy-from-waste facility would not lead to any adverse health risks to local residents, farmers or other receptors in the Local Risk Assessment Study Area under either the initial operating design capacity of 140,000 tonnes per year or the maximum design capacity of 400,000 tonnes per year
- Peer Reviewers:
  - Dr. Lesbia F. Smith, MD;
  - Ross Wilson, MSc, DABT;
  - Dr. Ray Copes, Chief, Environmental and Occupational Health, Public Health Ontario; and,
  - Others.

Environmental Assessment Conditions of Approval

- Notice of Approval to Proceed with the Undertaking (energy from waste) was granted by the Minister of the Environment on November 19, 2010.
- **Provided sufficient mitigation and monitoring measures** to ensure that the potential negative environmental effects will be appropriately managed and minimized.
- Any concerns that remain outstanding will be addressed through conditions of approval and other applicable ministry legislation and regulations.

Environmental Compliance Approval - June 28, 2011

- An Environmental Compliance Approval (ECA) is a legal document issued by the Ministry of the Environment, Conservation, and Parks (MECP) that is essentially a license to construct, install and operate equipment or a plant that discharges into the environment.
- **To obtain an ECA, one must demonstrate that the plant will not cause adverse impacts to the general population or the environment.**
- The ECA applies to the Regional Municipalities of Durham and York (Owner) and Covanta (Operator).

Environmental Compliance Approval Mandated Monitoring Program (both continuous and discrete frequency)

- Ambient Air Monitoring (off-site): two stations
- Noise Monitoring (off-site)
- Odour Management and Mitigation Monitoring (on-site and off-site)
- Groundwater and Surface Water Monitoring (on-site and off-site)
- Soils Monitoring (off-site)
- Air Emissions Monitoring (at Stack)

Emissions Monitoring

- Continuous Emissions Monitoring (Stack)
  - Opacity, NOx, SO_2, HCl, HF, NH_3, CO and Organic Matter
  - Oxygen, Moisture and Temperature (one second resident time at greater than 1000 degrees Celcius)
- Continuous integrated Dioxins and Furans sampling: AMESA (Adsorption Method for Sampling Dixons Sampling)
- Emissions Stack testing as prescribed in the Environmental Compliance Approval (ECA)
  - Appendix 1 of A-7 contaminants (i.e. greater than 150 contaminants) will be sampled for, including $PM_{2.5}$ with condensables

Environmental Compliance Approval Emissions Limits at the Stack

Results of the Durham York Energy Centre's performance limits identify:

- more stringent results for seven of the 11 contaminants, with four of the 11 meeting the limits

Item	Contaminant	Units	RFP	Old A7 limits	EU limits	New A7 limits	EA Conditions and CofA limits
1	Filterable Particulate Matter	mg/Rm3	9	17	9	14	**9**
2	Cadmium	ug/Rm3	7	14	n/a	7	**7**
3	Lead	ug/Rm3	50	142	n/a	60	**50**
4	Mercury	ug/Rm3	15	20	46	20	**15**
5	Dioxins & Furans	pg/Rm3	60	80	92	80	**60**
6	Hydrogen Chloride	mg/Rm3	9	27	9	27	**9**
7	Sulphur Dioxide	mg/Rm3	35	56	46	56	**35**
8	Nitrogen Oxide	mg/Rm3	180	207	183	198	**121**
9	Organic Matter	mg/Rm3	49	66	n/a	33	**33**
10	Carbon Monoxide	mg/Rm3	45	n/a	46	40	**40**
11	Opacity	%	TBD	n/a	n/a	5% 10%	**5% (2 hr avg)** **10% (6 min. avg)**

Source Test Results: 2015 to Present

Parameter	Year	Fall 2015		Spring 2016		Fall 2016		Spring 2017		Fall 2017		Spring 2018		Fall 2018	
	Emissions Limit	Boiler 1	Boiler 2	Boiler 1	Boiler 2	Boiler 1	Boiler 2	Boiler 1	Boiler 2	Boiler 1	Boiler 2	Boiler 1	Boiler 2	Boiler 1	Boiler 2
Dioxins and Furans	60 pg/Rm3	27.00	22.20	818.00	12.10	9.44	6.40	5.32	7.67	5.90	10.10	10.40	10.50	5.05	3.22
Mercury	15 ug/Rm3	1.16	0.72	0.44	0.27	0.05	0.03	0.16	0.10	0.22	0.18	0.22	0.77	0.30	0.13
Total Suspended Particulate Matter	9 mg/Rm3	0.53	0.41	0.62	0.48	0.95	1.04	1.03	1.17	1.40	0.66	1.11	0.96	0.34	0.32
Sulphur Dioxide (SO2)	35 mg/Rm3	6.70	1.80	0.20	0.00	0.80	0.90	0.00	0.00	2.40	1.70	0.02	0.00	0.00	0.10
Nitrogen Oxides (NOx)	121 mg/Rm3	115.00	115.00	111.00	111.00	112.00	113.00	110.00	112.00	112.00	111.00	109.00	109.00	109.00	111.00
Cadmium	7 ug/Rm3	0.12	0.15	0.04	0.04	0.07	0.12	0.12	0.07	0.05	0.03	0.14	0.12	0.14	0.04
Lead	50 ug/Rm3	0.57	0.51	0.27	0.22	0.39	0.28	0.28	0.28	0.34	0.48	0.45	0.29	0.18	0.22
Organic Matter	50 ppmdv	0.00	4.90	0.80	0.90	4.60	4.00	1.00	0.80	0.30	0.03	0.80	1.20	0.70	1.00
Hydrochloric Acid (HCl)	9mg/Rm3	3.70	4.10	5.60	5.30	1.20	1.20	2.10	3.10	2.00	5.10	2.00	3.80	2.90	4.10
Carbon Monoxide (CO)	40 mg/Rm3	24.40	27.00	22.40	37.50	11.40	15.70	12.90	15.80	11.50	12.20	19.70	13.00	13.00	13.40

Potential Causes of Dioxins and Furans' Emissions

Dioxins and Furans' emissions from energy-from-waste facilities can be in a solid (particulate) form or in a gaseous phase, and can be 'typically' traced to one of four main factors:

1. Incomplete destruction of Dioxins and Furans in the furnace;
2. Reformation of Dioxins and Furans (also know as "De Novo Synthesis"), which can occur as the flue gases cool from 400 degrees Celsius to 250 degrees Celsius;
3. Inadequate adsorption of the chlorinated compounds, including Dixons and Furans on Powdered Activated Carbon (PAC), in the Air-Pollution Control (APC) System; and,
4. Breakthrough of Dioxins and Furans laden particulate through the baghouse.

Abatement Plan

- Part of the Ministry of the Environment, Conservation and Parks' (MECP) Compliance Policy: **Applying Abatement and Enforcement Tools**

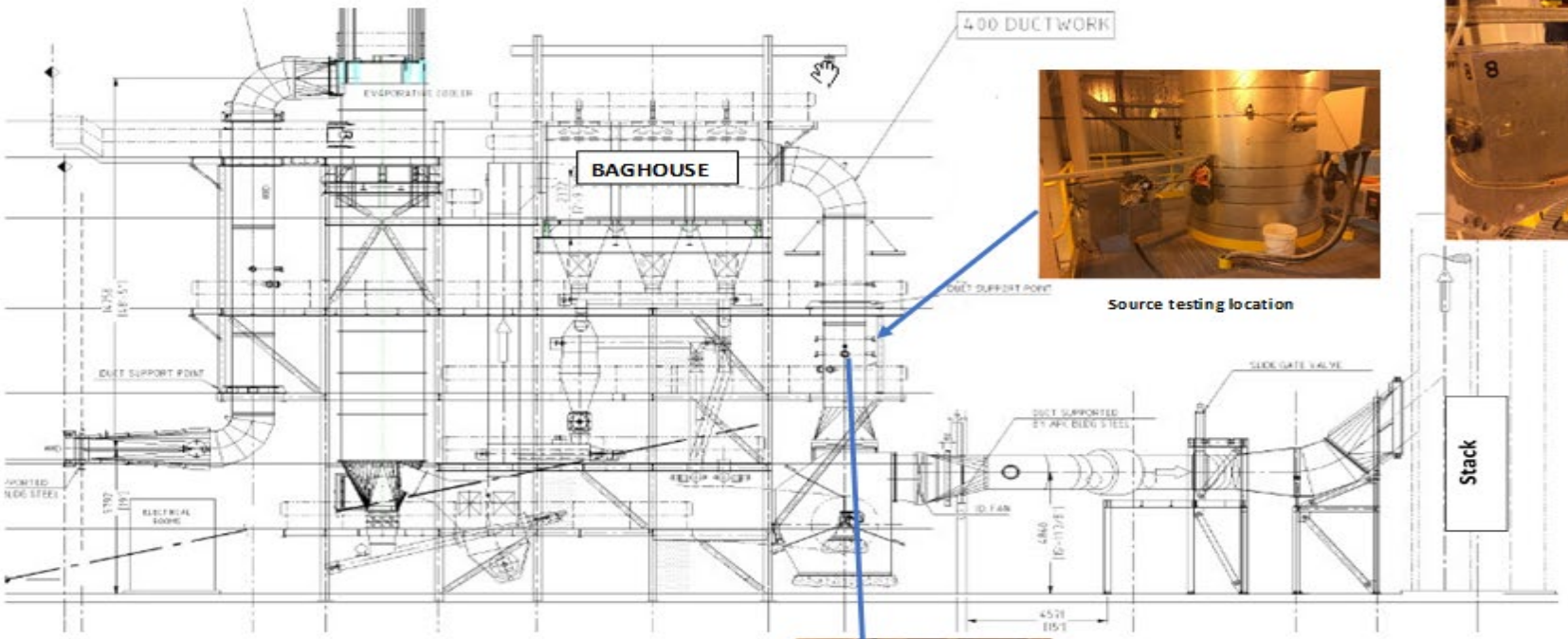
  "At all times, staff will seek to work cooperatively and in a professional manner with the responsible person(s) to help address the impacts of a violation and to prevent its recurrence."

- Abatement Plan requested by the MECP

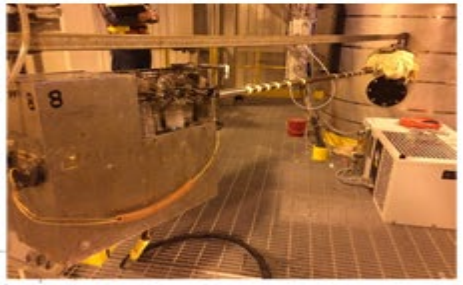
AMESA (Adsorption Method for Sampling Dioxins and Furans)

- Long-Term Sampling System (LTSS): new cartridge every 28 days
- In conformance with Environmental Compliance Approval Condition 7.(3)(a)
  - Owner shall develop, install, maintain and update as necessary
  - Performance will be evaluated during the annual Stack testing
  - Owner shall evaluate the performance of the LTSS in determining Dioxins and Furans emission trends and/or fluctuations, as well as demonstrating the ongoing performance of the Air-Pollution Control (APC) Equipment associated with the Boilers.

AMESA (Adsorption Method for Sampling Dioxins and Furans) Location in the Durham York Energy Centre



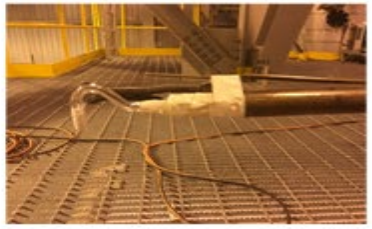
Source testing location



Source testing rail with impinger units

AMESA trap (contains XAD resin and spike)

Cartridge Case



Goose neck nozzle

AMESA (Adsorption Method for Sampling Dioxins and Furans) Relative Accuracy Validation Data

- Reported in the Annual Environmental Compliance Approval (ECA) Report
- Accuracy must be within 10 per cent (ECA) or 100 per cent (British)

RUN #	DATE	Unit 1 AMESA Dioxin Concentration	Unit 1 Reference Method	Unit 2 AMESA Dioxin Concentration	Unit 2 Reference Method
1	28 Oct 2015	843	25.9	559	19.5
2	29 Oct 2015	273	29.6	258	23.8
3	29 Oct 2015	121	25.5	182	23.2
4	9 May 2016	430	1169	12.4	14
5	10 May 2016	61.3	678	7.5	9.0
6	11 May 2016	24.3	606	8.9	12
7	27 Oct 2016	26.2	7.6	34.1	6.8
8	28 Oct 2016	15.7	5.9	31.3	6.5
9	31 Oct 2016	12.7	14.8	19.9	6.0
10	10 May 2017	6.14	5.70	7.59	12.5
11	14 Sep 2018	16.9	5.1	5.04	3.2

AMESA (Adsorption Method for Sampling Dioxins and Furans) Workplan: Next Steps 2019

- Procure additional sample assemblies, to be used as spare sampling assemblies, to permit alternating laboratory cleaning
- Stack Test evaluation with AMESA in September 2019
- Evaluation of comparison between AMESA results and Stack Test results
- Reporting of Stack Test results

Ambient Air

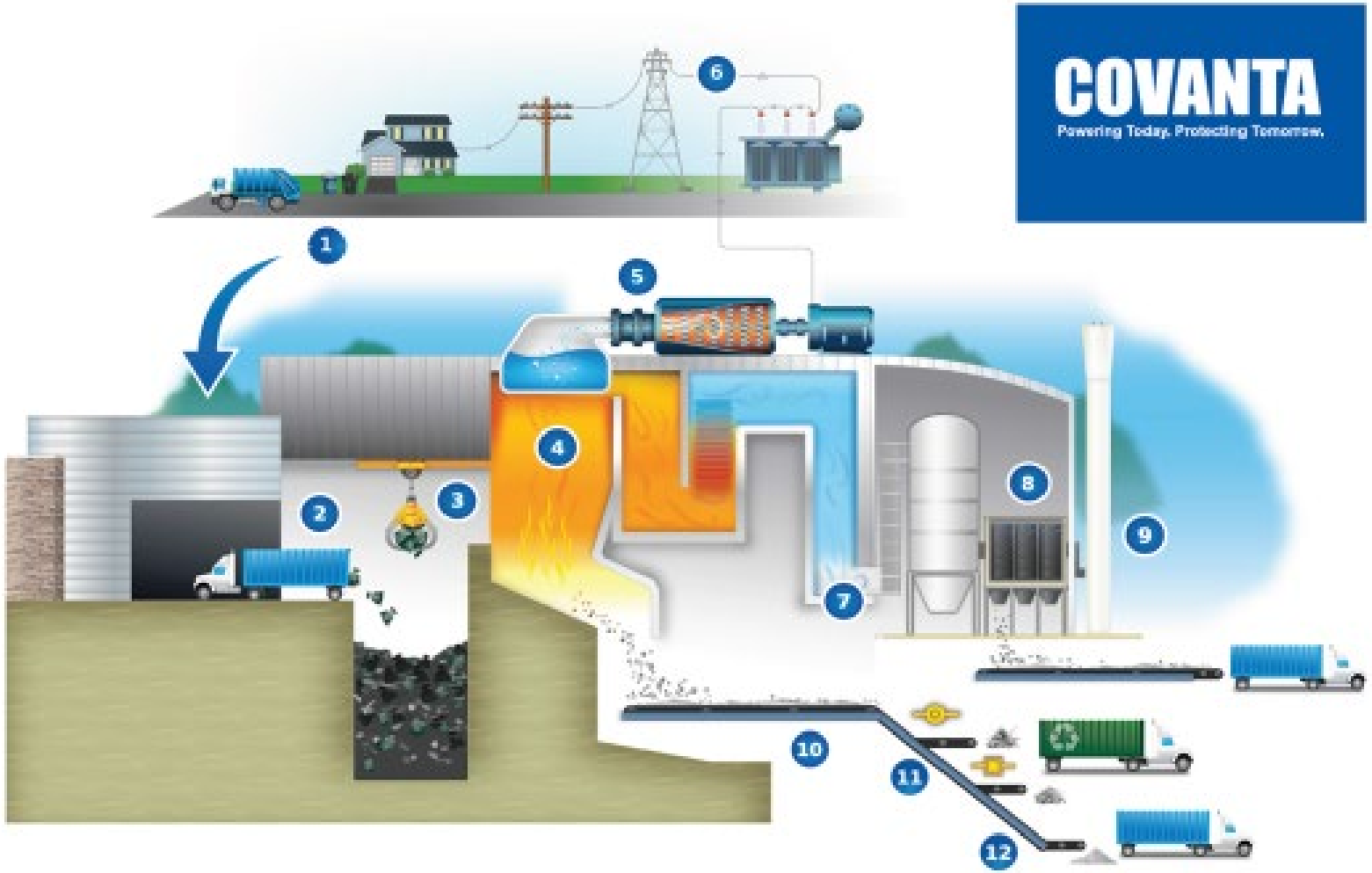
- Two monitoring stations
- Continuous monitoring of $PM_{2.5}$; NOx; SO_2
- Metals (every six days); Polycyclic Aromatic Hydrocarbons (PAHs) (every 12 days); Dioxins and Furans (every 24 days)

Durham-York Energy Centre Ambient Air Quality Testing Total Toxic Equivalency pg		Courtice WPCP (Upwind)			Rundle Road (Downwind)		
	MOE Criteria	Max	Min	No. of Exceedances	Max	Min	No. of Exceedances
2013 Second Quarter (May-June 2013)	1[a]	0.036	0.019	0	0.021	0.016	0
2013 Third Quarter (July - September 2013)	1[b]	0.035	0.019	0	0.026	0.017	0
2013 Fourth Quarter (October- December 2013)	1[a]	0.026	0.019	0	0.029	0.019	0
2014 First Quarter (January March 2014)	1[b]	0.038	0.021	0	0.065	0.021	0
2014 Second Quarter (April - June 2014)	1[a]	0.027	0.019	0	0.024	0.019	0
2014 Third Quarter (July - September 2014)	1[b]	0.034	-	0	0.027	-	0
2016 First Quarter	1[a]	0.044	0.011	0	0.026	0.011	0
2016 Second Quarter	1[b]	0.016	0.012	0	0.015	0.014	0
2016 Third Quarter	0.1[a] 1[c]	0.0163	0.0137	0	0.018	0.015	0
2016 Fourth Quarter	0.1[a] 1[c]	0.02	0.01	0	0.03	0.01	0
2017 First Quarter	0.1[b] 1[c]	0.0205	0.0146	0	0.0227	0.0158	0
2017 Second Quarter	0.1[a] 1[c]	0.0211	0.0141	0	0.0321	0.0151	0
2017 Third Quarter	0.1[a] 1[c]	0.051	0.0141	0	0.0647	0.0128	0
2017 Fourth Quarter	0.1[a] 1[c]	0.019	0.016	0	0.0198	0.0192	0
2018 First Quarter	0.1[a] 1[c]	0.0236	0.0169	0	0.0407	0.0191	0
2018 Second Quarter	0.1[a] 1[c]	0.109	0.014	1	0.091	0.017	0
2018 Third Quarter	0.1[a] 1[c]	0.021	0.006	0	0.024	0.002	0
2018 Fourth Quarter	0.1[b] 1[c]	0.005	0.002	0	0.006	0.001	0

National Pollution Release Index (NPRI)

	Reporting Limit	DYEC, Clarington (29003)		Gerdau, Whitby (3824)		GMCL Oshawa (3893)		St. Mary's Cement Bowmanville		OPG Darlington (3163)	
Pollutant		onsite release	offsite disposal or recycling	onsite release	offsite disposal or recycling	onsite release	offsite disposal or recycling	onsite release	offsite disposal or recycling	onsite release	offsite disposal or recycling
Arsenic and its compounds, kg	50	0.050	1,415	4.4	7						
Cadmium and its compounds, kg	5	0.080	2,109	23.000	73.0			5			
Lead and its compounds, kg	50	0.350	27,349	393.0	1,922			186			
Ammonia, tonnes	10	12						133			
Copper and its compounds, tonnes	10		66		0.540						
Dioxins and furans - total, g TEQ	32 pg TEQ/m3 LoQ	0.008		0.613	0.011			0.300			
Hexachlorobenzene, g	6 ng TEQ/m3 LoQ	-		121				-			
Mercury, kg	5	0.120	31	167	0.355			13			
Phosphorous, tonnes	10		-		0.131						
Zinc and its compounds, tonnes	10	-	171	7.8	35.000	0.048	10				
Manganese and its compounds, tonn	10	-	29		4.200						
Criteria Air Contaminants, tonnes											
TPM (total particulate matter)	20			79		10		337			
PM10 (particulate matter <10 micron	0.5	1		45		10		195			
PM2.5 (particulate matter <2.5 micro	0.3	0.376		37		6.4		78			
NO2	20	160		133		119		3,071		38	
CO	20			205		59		1,077			
SO2	20			134				3,779			
VOCs	10					218		73			

Durham York Energy Centre Waste Processing



Capacity Amendment to 160,000 tonnes per year

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Durham York Energy Centre (DYEC) 140,000 to 160,000 tonnes per year

- DYEC already built to handle 160,000 tonnes of waste per year
- Current operations at 90 per cent availability and approximately 90 per cent processing capacity (Maximum Continuous Rating (MCR))
- Modelled operations at 95 per cent availability and up to 110 per cent MCR
- Environmental Assessment: Screening Process
- Environmental Compliance Approval (ECA) Amendment

Impact on Emissions

- Original methodology as the Emissions Summary Dispersion Model used for the 140,000 assessment for hourly, 24-hour and annual concentrations.
- Emission rates for the 160,000 and 140,000 scenario were the same but the flow rate was adjusted according to recent Stack testing data.
- **The results indicate that the change in predicted concentrations between the two scenarios is minor.** The majority of contaminants show the same values or a decrease in predicted concentration at the Point of Impingement (POI), with and without background levels included.
- Durham York Energy Centre would **still be able to demonstrate compliance** with Ministry of the Environment, Conservation and Parks' limits listed in Ontario Regulation 419/05 and cumulative concentrations of all contaminants would be below the relevant Ambient Air Quality Criteria (AAQC).

Environmental Screening Process (140,000 to 160,000)

The Environmental Assessment (Screening Process) is a proponent driven, self-assessment process available to waste management projects that requires:

- Completion of a detailed Screening Criteria Checklist that verifies potential environmental effects;
- A written report that details if any potential environmental effects will need to be mitigated; and
- Notification to the public of the commencement of the Screening, consultation on issues or concerns, consultation on mitigation measures and public Notice of Completion.

Durham Region's Share of Operating Costs

Savings to Durham Region in 2020: $1.3 million

- Cost Avoidance of Landfill fees
- Lower Disposal Cost
- Increased revenues from electricity production and metals recovery

	2019	2020	2021	2022	2023
Covanta Operating Fee	**13.2**	**13.5**	**13.7**	**14.0**	**14.2**
Property Taxes	0.5	0.5	0.6	0.6	0.6
Non-Covanta Operating Costs (gross costs)	0.9	0.9	0.9	1.0	1.0
Non-Covanta costs	**1.4**	**1.4**	**1.5**	**1.6**	**1.6**
Total Gross Costs	**14.6**	**14.9**	**15.2**	**15.6**	**15.8**
Revenues					
Electricity Revenues (IESO)	(7.0)	(7.1)	(7.1)	(7.2)	(7.2)
Materials Recovery Revenues	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)
sub-total Revenues	**(7.5)**	**(7.6)**	**(7.6)**	**(7.7)**	**(7.7)**
Net Durham DYEC Cost	**7.1**	**7.3**	**7.6**	**7.9**	**8.1**
Covanta landfill disposal (beyond DYEC capacity)	**0.9**	**0.9**	**1.2**	**1.6**	**2.0**
Status Quo Cost of Disposal	**8.0**	**8.2**	**8.8**	**9.5**	**10.1**
With DYEC ECA Administrative Amendment:					
Reduced Covanta Operations Fee > 140,000 tonnes	0.0	(0.4)	(0.6)	(0.9)	(1.3)
Additional Revenues (IESO and material recovery)	0.0	(0.9)	(1.1)	(1.3)	(1.3)
Covanta landfill disposal (beyond 125,720 tonnes)	0.0	0.0	0.0	0.1	0.5
Sub-total Amendment Savings	**0.0**	**(1.3)**	**(1.7)**	**(2.1)**	**(2.1)**
Total Cost of Disposal	**8.0**	**6.9**	**7.1**	**7.4**	**8.0**

Terms of Reference

Future Environmental Assessment for 250,000 tonnes per year

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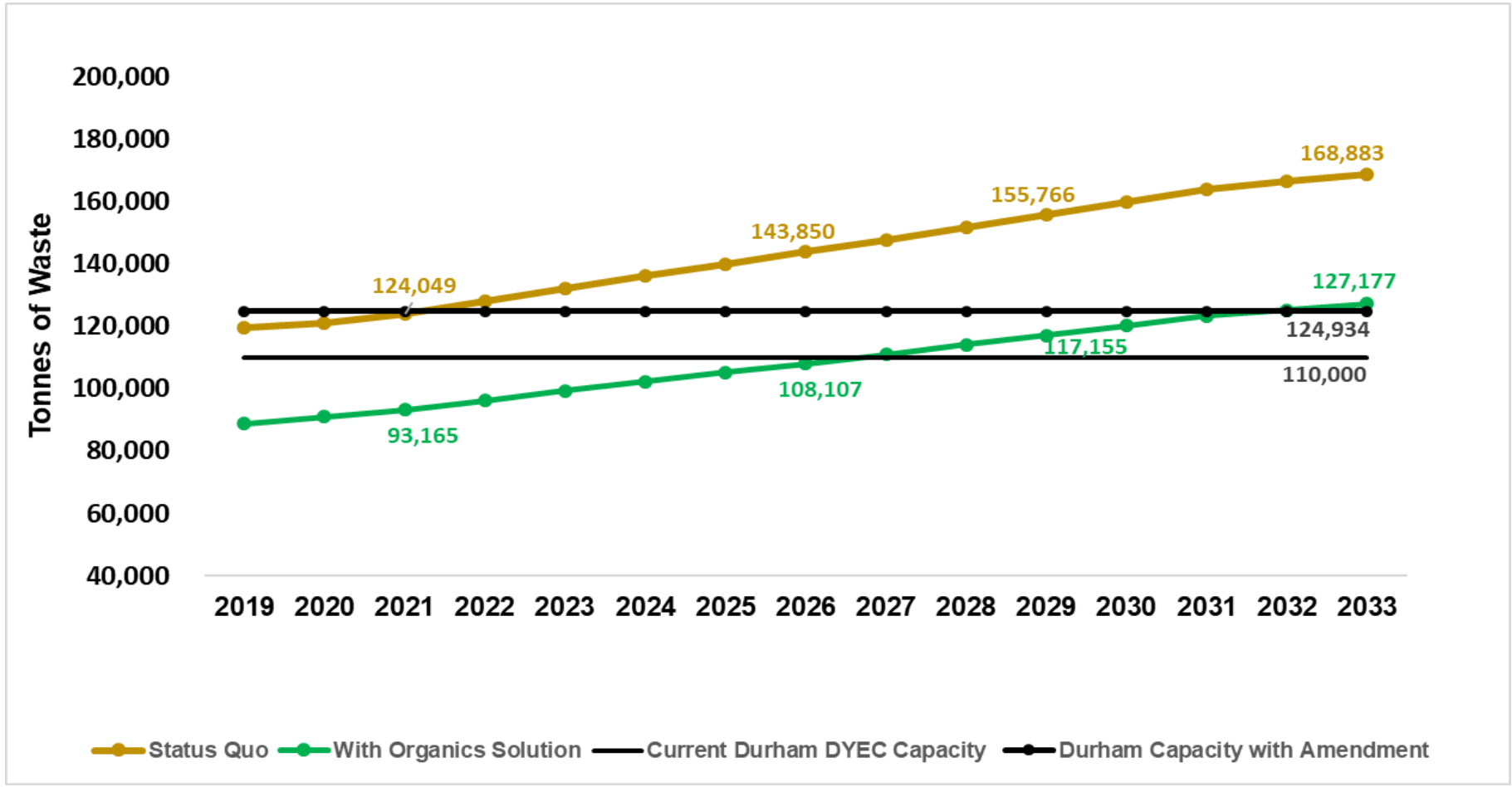
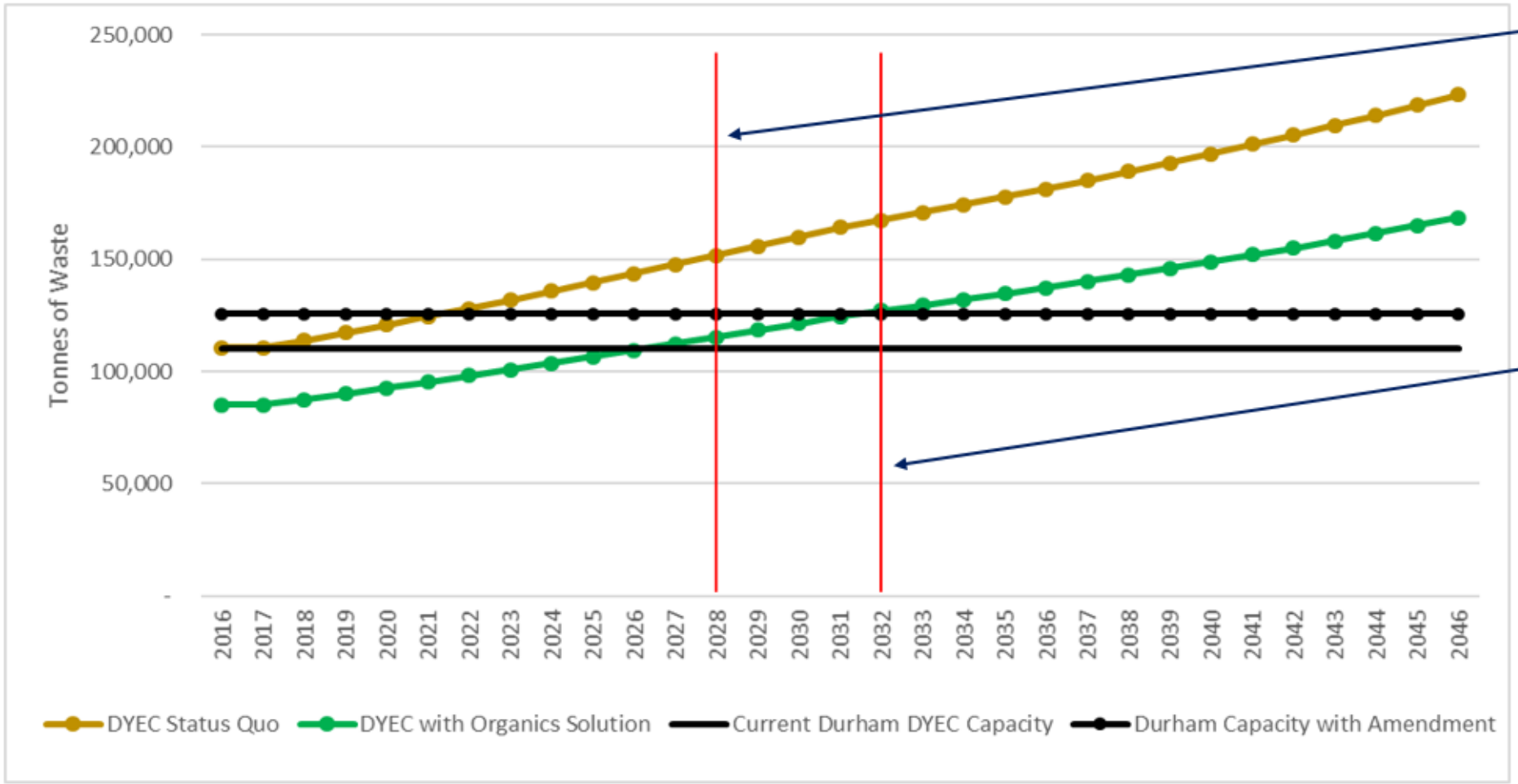
Durham Region Disposal Needs (2019 Solid Waste Servicing and Financing Study)



Durham Region Disposal Needs
(Updated to include Durham Region's 2018 Garbage Composition Study Results)



Existing Ontario landfill capacity is reached with no waste exported to US

Existing Ontario landfill capacity is reached with 30 per cent of Ontario waste exported to US

Environmental Assessment Terms of Reference

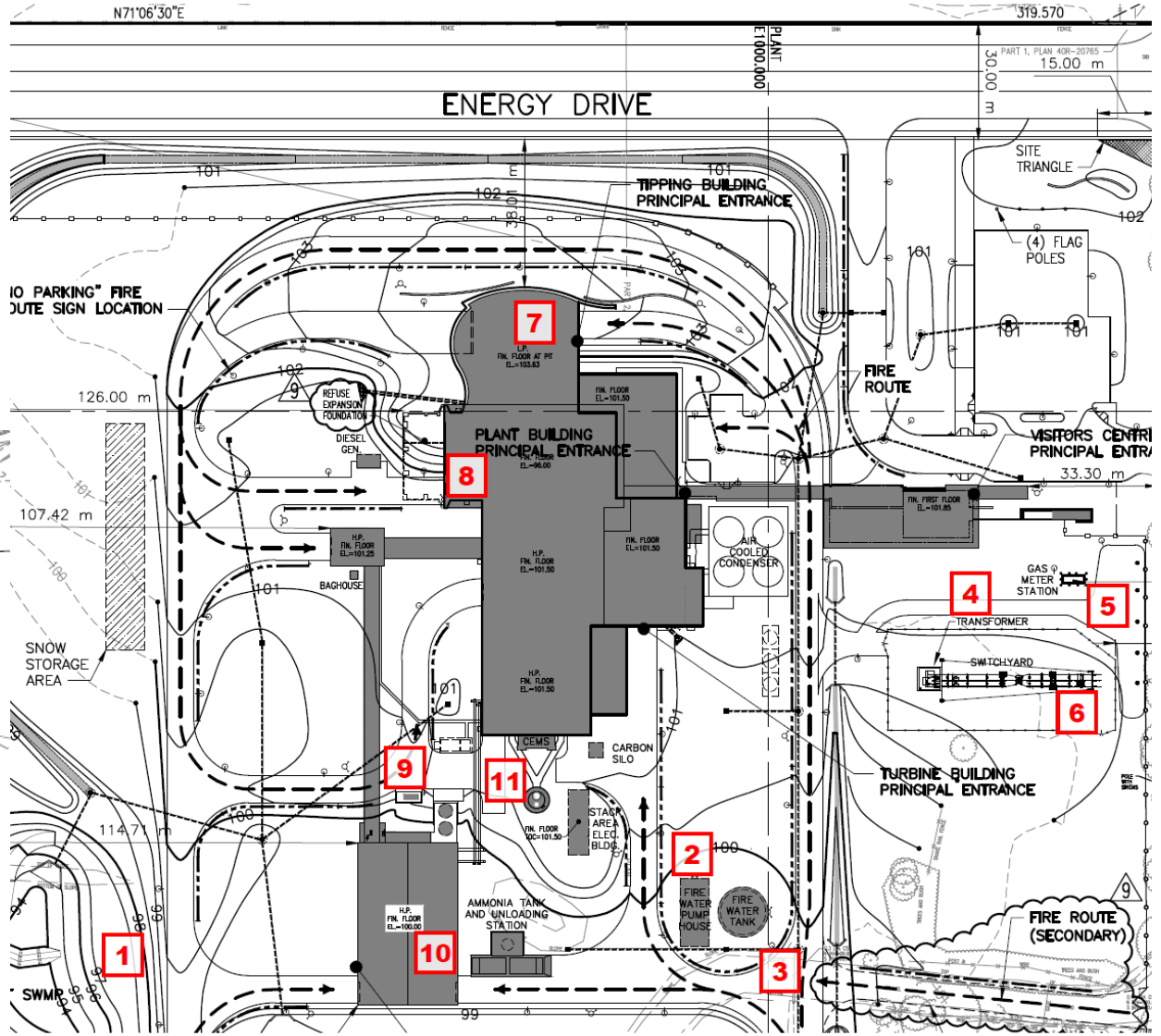
- Identification of the Proponent
- Indication of How the Environmental Assessment Is to Be Prepared
- Purpose of the Study or Undertaking
- Description of and Rationale for the Undertaking
- Description of and Rationale for Alternatives
- Description of the Environment and Potential Effects
- Assessment and Evaluation
- Commitments and Monitoring
- Consultation Plan for the Environmental Assessment
- Providing Flexibility to Accommodate New Circumstances

Durham York Energy Centre (DYEC) Oversized Components for 250,000 tonnes per year

Value of DYEC oversized components approximately $30 million

	Item	Facility Sizing (Tonnes per year)
1	Site Work	250,000
2	Fire Protection	250,000
3	Water Supply Piping	400,000
4	Sewer System Piping	400,000
5	Natural Gas Pipeline	400,000
6	Electrical and Switchyard	250,000

	Item	Facility Sizing (Tonnes per year)
7	Tipping Floor and Waste Storage Pit	250,000
8	Waste Handling Crane	250,000
9	Larger Ash Processing Equipment	250,000
10	Larger Ash Building	250,000
11	Stack	250,000



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Conclusions

- Durham York Energy Centre (DYEC) Environmental Assessment (EA) and Human Health and Ecological Risk Assessment (HHERA) approved by the Ministry of the Environment, Conservation and Parks (MECP) (several layers of Peer Review)
- DYEC operating in accordance with Environmental Compliance Approval (ECA) permit (last five Stack Tests good)
- Ambient Air issues (unlikely from DYEC)
- Durham Region has a current and future waste disposal capacity need
- The interim solution for a permit amendment from 140,000 to 160,000 tonnes per year: good financial and environmental outcome
- Mixed waste pre-sort and transfer with Anaerobic Digestion needed for organics management and disposal capacity requirements
- Terms of Reference for future (2030+) Environmental Assessment