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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Zero Waste Committee

From: Sarah Wellman, Senior Engineer, Solid Waste Services

Date: June 20, 2025 Meeting Date: July 3, 2025

Subject: **Waste-to-Energy Facility Environmental Monitoring and Reporting 2024 Update**

RECOMMENDATION
That the Zero Waste Committee receive for information the report dated June 20, 2025, titled "Waste-to-Energy Facility Environmental Monitoring and Reporting 2024 Update".

EXECUTIVE SUMMARY
This report provides the Waste-to-Energy Facility environmental performance update for 2024.

All air emission related parameters monitored during 2024 were similar to 2023, and well below regulatory limits specified in the Waste-to-Energy Facility Provincial Operational Certificate. The Waste-to-Energy Facility's contributions of nitrogen dioxide, fine particulates, and anthropogenic (human caused) greenhouse gases are less than 1% of regional emissions. Emission data is reported to various regulatory agencies and posted on the Metro Vancouver website.

Calculated total greenhouse gas emissions from the facility declined by 9% in 2024 compared to 2023, likely due to variability in waste composition. The facility also generated greenhouse gas emissions offsets of approximately 2,000 tonnes CO2eq by using renewable natural gas and the recycling of metals.

PURPOSE
The purpose of this report is to provide the Zero Waste Committee with an annual overview of the Waste-to-Energy Facility's environmental monitoring program and implementation of Provincial Operational Certificate requirements.

BACKGROUND
Metro Vancouver continuously monitors the environmental performance of the Metro Vancouver Waste-to-Energy Facility and, since 2010, annual environmental performance summaries have been provided to the Zero Waste Committee.

This report provides updates on the facility's 2024 environmental performance. Annual reporting on the environmental performance of the Waste-to-Energy Facility is included in the Zero Waste Committee work plan.

ENVIRONMENTAL MONITORING AND REPORTING UPDATE

Since the Waste-to-Energy Facility opened in 1988, Metro Vancouver has continually reduced emissions through assessment, operational and plant infrastructure improvements, and environmental controls. All air emission related parameters monitored during 2024 were in compliance with the requirements of Operational Certificate 107051.

To assess regulatory compliance, measurements from the environmental monitoring program are compared to the regulatory limits specified in the Waste-to-Energy Facility Operational Certificate 107051 issued by the BC Ministry of Environment and Climate Change Strategy. Results are reported in the following ways:

- Monthly compliance reports, which provide a summary of all air emissions monitoring results for each month, are provided to the BC Ministry of Environment and Parks, City of Burnaby, and Fraser Health Authority.
- Results of manual stack testing, conducted four times per year by an independent company, are provided to the BC Ministry of Environment and Parks, City of Burnaby, and Fraser Health Authority.
- Results from annual stack testing for semi-volatile organic compounds are provided to the BC Ministry of Environment and Parks, City of Burnaby, and Fraser Health Authority.
- Annual reporting of greenhouse gas emissions is provided to the BC Ministry of Environment and Parks and Environment and Climate Change Canada.
- Annual reporting of substances emitted into the air and contained in bottom ash and fly ash is provided to Environment and Climate Change Canada for the National Pollutant Release Inventory.

Environmental Monitoring Program

The 2024 Waste-to-Energy Facility environmental monitoring program consisted of the following:

- Air Emissions Monitoring – Continuous Emission Monitoring System:
    - The Waste-to-Energy Facility is equipped with a real-time flue gas continuous emission monitoring system that measures and records emission parameters at the exit of the air pollution control plant 24 hours per day, seven days a week, using a United States Environmental Protection Agency certified and auditable tracking system.
    - The following parameters are measured: sulphur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, hydrogen chloride, total hydrocarbons, and opacity.
    - The following key operational parameters are also monitored: furnace temperature, total flue gas flow, flue gas moisture, and flue gas oxygen.
- Air Emissions Monitoring – Periodic Manual Stack Testing:
    - Triplicate tests are conducted four times per year on each of the three plant lines to measure particulate matter, trace metals, and hydrogen fluoride.
    - A single test is conducted annually on one boiler (rotating between boilers each year) in triplicate to monitor for semi-volatile organic compounds, including dioxins and furans, chlorobenzenes, chlorophenols, polychlorinated biphenyls, and polycyclic aromatic hydrocarbons.
    - Quarterly sampling in triplicate to determine the biogenic fraction of the waste stream.

- Fly and Bottom Ash Monitoring:
  - Each fly ash load is tested prior to transport and disposal.
  - Bottom ash samples are collected from each truck loaded with bottom ash for transport and disposal. Samples are combined to form a weekly composite sample for analysis.

Continuous emission monitoring data, grab sample data, and fly ash and bottom ash analytical data are all posted on the Metro Vancouver website along with an annual report for the facility.

Comparison with Regulatory Limits

Table 1 shows comparisons for various emission parameters with regulatory limits. Overall, the Metro Vancouver Waste-to-Energy Facility operates well within environmental standards.

Parameter (Average Values)	Units	Current Regulatory Levels	2024 Emissions Data	Percentage of Limit
Manual Stack Tests				
Particulate Matter	mg/dscm	9	0.9	10%
Hydrogen Fluoride (HF)	mg/dscm	1	0.04	4%
Sum of Lead, Arsenic, and Chromium	ug/dscm	64.0	4.9	8%
Cadmium (Cd)	ug/dscm	7.0	0.2	2.6%
Mercury (Hg)	ug/dscm	20.0	0.07	0.4%
Trace Organics Tests				
Dioxins/Furans (PCDD/PCDF)	ng/dscm	0.08	0.0042	5%
Chlorophenols	ug/dscm	1	0.0088	0.9%
Chlorobenzenes	ug/dscm	1	0.31	31%
Polycyclic Aromatic Hydrocarbons (PAHs)	ug/dscm	5	0.08	1.6%
Polychlorinated Biphenyls (PCBs)	ug/dscm	1	0.02	2.4%
Continuous Emissions Monitoring System:				
Nitrogen Oxides (NOx)	mg/dscm	190	132	69%
Carbon Monoxide (CO)	mg/dscm	50	28	56%
Sulphur Dioxide (SO_2)	mg/dscm	200	68	34%

The continuous emissions monitoring system at the Waste-to-Energy Facility was upgraded in 2016 and has been in operation since August 1, 2017. As noted in the presentation included in Attachment 1, continuously monitored carbon monoxide levels show a step increase that aligns with the timing of the installation of the upgraded continuous monitoring system. Given the same step increase was observed in other parameters measured with the with the continuous monitoring system, the observed increase appears to be a result of the change in equipment rather than an actual increase in emission levels. Upgrades and operational improvements have been added to help ensure continuous monitoring data reflects actual parameter concentrations.

Greenhouse Gas Emissions Reporting

Greenhouse gas emissions from the Waste-to-Energy Facility are comprised mainly of carbon dioxide with trace amounts of methane and nitrous oxides. Non-biogenic (anthropogenic) emissions from the facility were 127,345 tonnes carbon dioxide equivalents, a 2% increase from 2023. This increase is primarily due to annual fluctuations in waste composition. Over the past five years, the anthropogenic portion of greenhouse gas emissions has ranged from 40% to 50%. More frequent monitoring of the portions of anthropogenic and biogenic carbon dioxide has been implemented. This is expected to reduce the annual variability of the data.

Overall greenhouse gas emissions from the facility in 2024, including both anthropogenic and biogenic, were 255,152 tonnes carbon dioxide equivalents, a decrease of approximately 9% compared to 2023. Waste processed at the facility increased in 2024, by 6,891 tonnes, but due to the variability of the waste composition the GHG emissions were lower. As in past reporting years, the Waste-to-Energy Facility accounted for less than 1% of all anthropogenic greenhouse gas emissions in the region.

Greenhouse gas emissions from the use of natural gas at the Waste-to-Energy Facility in 2024 were 4,214 tonnes carbon dioxide equivalent. Natural gas is used to ensure complete combustion of the waste, and to maintain boiler temperatures during startup and shutdown periods. The facility uses a portion renewable natural gas, which is claimed as an offset in corporate reporting. Recycling of metals from the Waste-to-Energy Facility generated an additional 930 tonnes in offsets in 2024.

National Pollutant Release Inventory Reporting

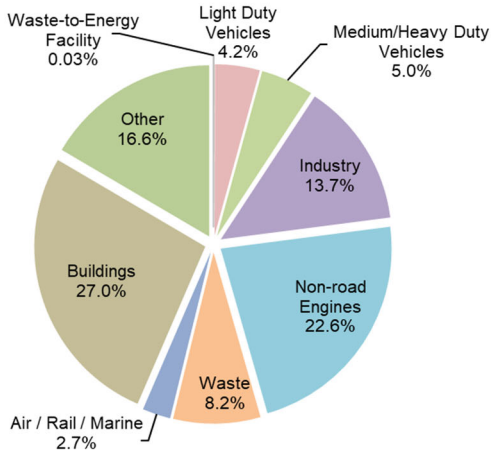
The National Pollutant Release Inventory is Canada's legislated, publicly accessible inventory of pollutant releases to air, water, and land, as well as from disposal and transfer for recycling. The National Pollutant Release Inventory is managed by Environment and Climate Change Canada and currently tracks over 300 substances and groups of substances. Metro Vancouver is required to report air emissions (e.g., particulate matter, metals, organic compounds, and acid gases) and substances transported for off-site disposal, including fly ash and bottom ash for the preceding calendar year, to the National Pollutant Release Inventory. Table 2 summarizes the information which has been reported to the National Pollutant Release Inventory for 2024.

	Reported Quantity (tonnes)	
Substance	**Stack Emissions**	**Ash Disposal**
Nitrogen Oxides	211	N/A
Carbon Monoxide	44.5	N/A
Sulphur Dioxide	110	N/A
Hydrogen Chloride/Hydrochloric Acid	125	N/A
Aluminum (dust)	0.017	N/A
Arsenic	0.00067	1.3
Cadmium	0.00021	1.2
Cobalt	0.00017	2.3
Copper	0.0011	72.4
Lead	0.0035	18.5
Manganese	0.0015	25.8
Mercury	0.00009	0.06
Phosphorus	0.0030	438.7
Zinc	0.023	182.5
Particulate Matter ≤ 10µm	1.48	N/A
Particulate Matter ≤ 2.5µm	1.19	N/A
Dioxins and Furans	N/A	N/A
Hexachlorobenzene	N/A	N/A

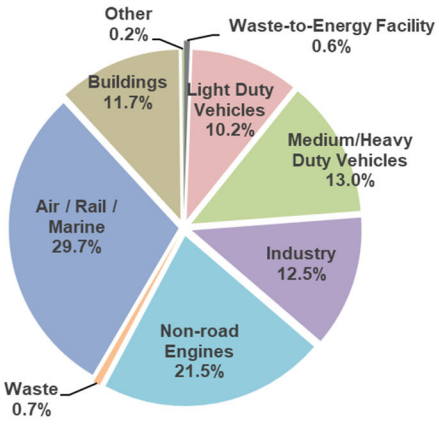
Waste-to-Energy Facility in a Regional Context

Figure 1 compares Waste-to-Energy Facility emissions to total emissions from all regional sources for two key air contaminants in the Lower Fraser Valley – fine particulate matter and nitrogen oxides (a key smog forming pollutant). In 2024, the Waste-to-Energy Facility accounted for 0.03% of regional fine particulate matter emissions and 0.6% of regional nitrogen oxide emissions. The Nitrogen Oxide Reduction Project, completed in October 2014, reduced nitrogen oxide emissions from 0.9% of the regional total in 2013 to 0.6% in 2024.

Figure 1: 2024 Regional Emissions Distribution



2024 Lower Fraser Valley Fine Particulate Matter Emission Sources



2024 Lower Fraser Valley Nitrogen Oxide Emission Sources

ALTERNATIVES
This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS
Activities related to emissions monitoring and reporting are included in the approved Solid Waste Services operational budget.

CONCLUSION
The Waste-to-Energy Facility operates well within environmental standards and regulatory limits. All air emission related parameters monitored during 2024 were in compliance with Operational Certificate 107051. Continuous emissions monitoring data and all compliance reports are available on the Metro Vancouver website.

ATTACHMENTS
1. Presentation re: Waste-to-Energy Facility Environmental Monitoring and Reporting 2024 Update.

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Photo: Waste-to-Energy Facility

Waste-to-Energy Facility Environmental Monitoring and Reporting – 2024 Update

Sarah Wellman, P.Eng.
Senior Engineer, Solid Waste Services

Zero Waste Committee Meeting - July 3, 2025

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CONTINUOUS EMISSIONS MONITORING SYSTEM

Stack Sampling Ports

Continuous Emission Monitoring Analyzers

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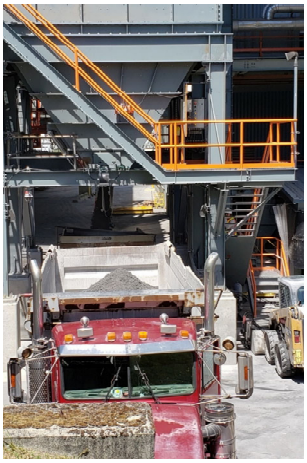
QUARTERLY MANUAL STACK TESTING

3

FLY ASH AND BOTTOM ASH MONITORING

Loaded Fly Ash Trailers

Fly Ash Composite Samples



Bottom Ash Loading

Bottom Ash Weekly Composite Samples

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OPERATIONAL CERTIFICATE

All environmental reporting submitted to the Province is posted to the website:

- Monthly compliance reports
- Annual compliance reports
- Quarterly stack test results
- Semi-volatile organic compound stack test results
- Bottom ash weekly composite data
- Quarterly fly ash summary

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GREENHOUSE GAS EMISSIONS REPORTING

2024 Greenhouse Gas Emissions:

- Anthropogenic 127,345 tonnes (~50%)
- Biogenic 127,807 tonnes (~50%)
- Annual reports to provincial and federal databases

Air sample for biogenic testing

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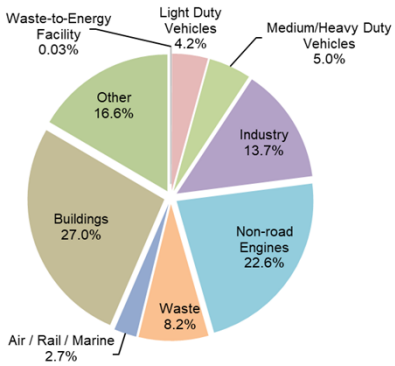
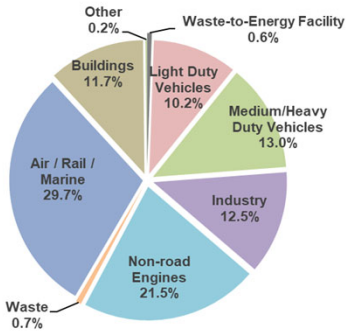
WASTE-TO-ENERGY IN A REGIONAL CONTEXT

2024 Lower Fraser Valley Fine Particle Matter (PM2.5) Emissions Sources



2024 Lower Fraser Valley Nitrogen Oxides (NOx) Emissions Sources



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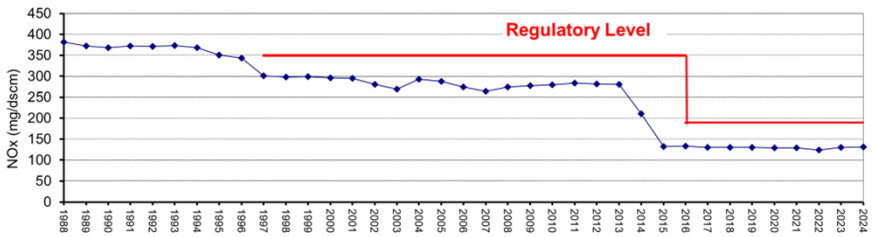
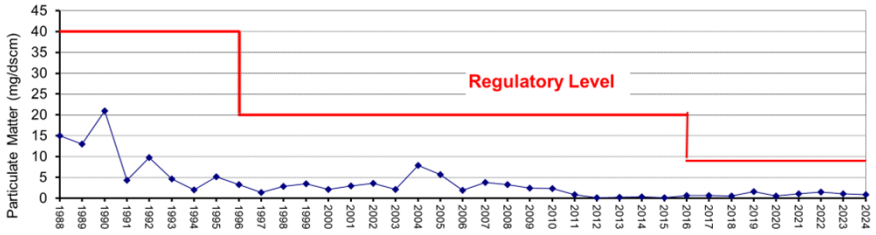
HISTORICAL TRENDS

Nitrogen Oxides



Particulate Matter



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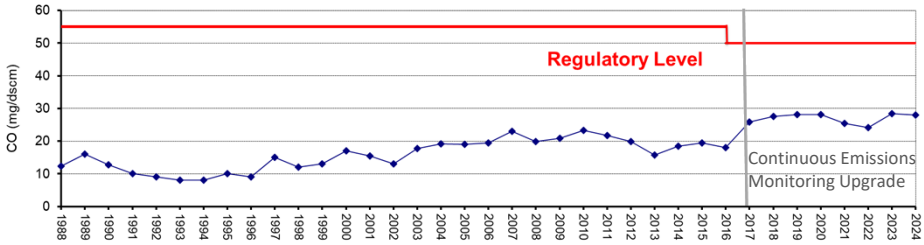
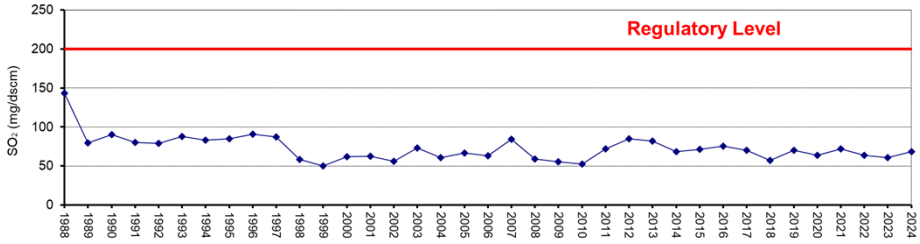
HISTORICAL TRENDS

Carbon Monoxide



Sulfur Dioxide



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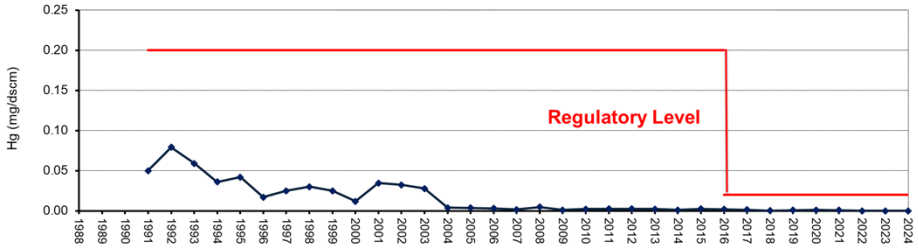
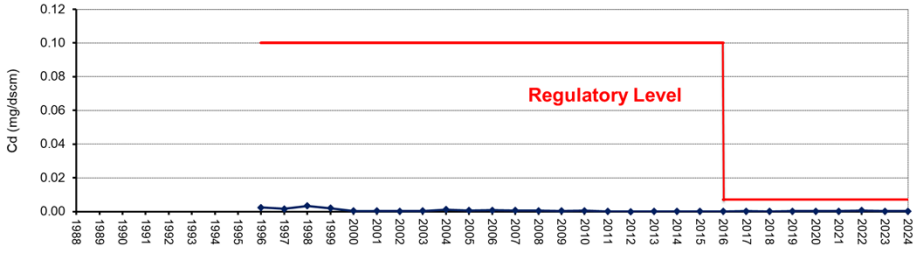
HISTORICAL TRENDS

Mercury



Cadmium



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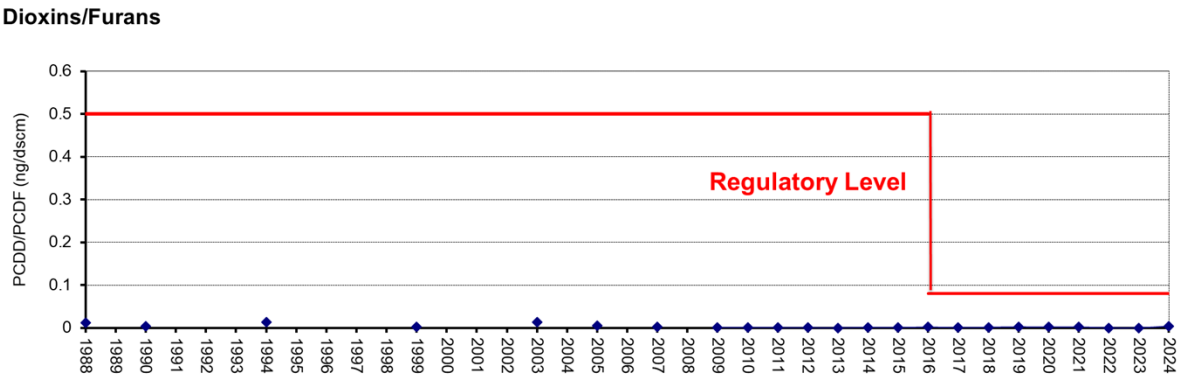
HISTORICAL TRENDS



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Metro Vancouver skyline

Questions?

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