MRC Pontiac: Energy-From-Waste (EFW) Initial Business Case

February 2024. Final Version.
Private and confidential.

Executive Summary

A major supply risk is emerging with major landfills in the region expected to reach full capacity in the next decade. Pontiac EFW offers an economically viable and carbon neutral solution.

The MRC Pontiac is interested in hosting a new Energy from Waste (EFW) facility with such waste to be sourced from regional municipalities.

MRC Pontiac completed an initial business case comparing the costs of the Pontiac EFW against a base-line landfill option under various facility contractual structures, with and without carbon capture.

Questions Explored

What technologies should be selected for the EFW facility and carbon capture?
For waste treatment, Combustion is recommended as the most robust technology option. For carbon capture, Post Combustion is the only mature option available with proven technology worldwide.

Does an EFW facility provide a more sustainable supply solution versus a comparator landfill option and is it economically viable?
Ontario and the region close to MRC Pontiac are expected to fall short of landfill capacity in the next decade. The Pontiac EFW would offer a sustainable supply solution by producing electricity by accessing 400,000 tonnes per annum of waste expected to be generated by regional municipalities.

What deal and funding structure would allow a Pontiac EFW facility to compete with a comparator landfill option?
Selection of the appropriate EFW Contractual Structure would depend on the funding plan; however, in Canada it is predominantly DBFOM, which accounts for capital contributions from the public and private sector.

Key Considerations

- Regional municipalities such as the City of Ottawa is seeking a long-term solid waste solution – this IBC demonstrates that the Pontiac EFW is a viable solution that should be considered.
- MRC Pontiac should collaborate with key regional stakeholders on a detailed business case to further explore detailed technical and financial feasibility.
- MRC Pontiac and key regional stakeholders should pursue funding to complete the detailed business case.

Purpose and Project Opportunity

Background and Purpose | An Initial Business Case is being developed to assess a new EFW facility in MRC Pontiac

- The Regional Municipality of Pontiac ("**MRC Pontiac**") is interested in hosting a new Energy from Waste ("**EFW**") facility ("**Pontiac EFW**" or the "**Project**") that will process up to 400,000 tonnes of solid waste per year, with such waste to be sourced from local municipalities and other local sources.
- MRC Pontiac is completing an initial business case (the "**IBC**") that is intended to review the costs of the Pontiac EFW against a base-line landfill option (the "**Comparator Landfill Option**"), under the various facility contractual structures (with and without carbon capture), and to recommend a plan that will outline key steps needed to confirm the waste supply, obtain approvals and funding, and to execute the procurement of the Pontiac EFW.
- The Comparator Landfill Option is for illustrative purposes only. As per the draft Solid Waste Master Plan of the City of Ottawa, there is currently no contemplation for a new landfill facility.
- The Deloitte team ("**Deloitte**"), alongside its technical subcontractor ("**Ramboll**"), have been appointed as advisors to complete the IBC.
- This IBC report:
    - Contains information that is at a preliminary level - a higher level of design (e.g., 10 to 20%) will be required to develop the deal, contractual and funding structure as part of the detailed business case.
    - ➢ Is prepared for the use of MRC Pontiac - any distribution of this IBC report would require prior consent from Deloitte and Ramboll.

Problem Statement

We set out to answer four fundamental questions

Each of these questions are addressed in the following sub sections

1 **WHAT TECHNOLOGIES SHOULD BE SELECTED FOR THE ENERGY FROM WASTE FACILITY AND CARBON CAPTURE?**

This section entails a technical and cost analysis of the technology options available and a recommended solution for the EFW Project.

2 **DOES AN ENERGY FROM WASTE FACILITY PROVIDE A MORE SUSTAINABLE SUPPLY SOLUTION VERSUS A COMPARATOR LANDFILL UPTO 2060 AND BEYOND?**

This section provides an assessment of the landfill capacities available in the region and to what extent can the Pontiac EFW facility replace the existing landfill options available.

3 **IS AN ENERGY FROM WASTE FACILITY A CARBON NEUTRAL, ECONOMICALLY VIABLE, AND LONG-TERM SUSTAINABLE WASTE MANAGEMENT SOLUTION VERSUS A COMPARABLE LANDFILL?**

This section compares the EFW breakeven tipping fee and potential cost / savings compared to a Comparator Landfill Option under the various EFW facility contractual structures (with and without carbon capture).

4 **WHAT IS THE DEAL AND FUNDING STRUCTURE THAT WOULD ALLOW THE PROJECT TO COMPETE WITH A COMPARATOR LANDFILL OPTION?**

Level of involvement and funding support required from different levels of government to execute the Project.

Methodology and Approach

Data Collection

- ✓ Prepare an information request of background data required from the Client.
- ✓ Evaluate the background information received from MRC Pontiac.

Assessment of a Comparator Landfill Option

- ✓ Identify the potential sources of long-term waste supply for Pontiac EFW.
- ✓ Understand the capacity utilization projections of existing landfill facilities in Ontario, near the City of Ottawa, and Quebec over the next decade.

Development and Comparison of EFW Technology Option

- ✓ Identify the EFW technology options and comparison against key factors such as reliability, energy efficiency, and environmental impacts of air emission and ash disposal.
- ✓ Recommend of the technology option for the Pontiac EFW.
- ✓ Assess, at a high level, the capital and operating costs.
- ✓ Assess, at a high level, the opportunity for selling power output.

Assessment of EFW Facility Contractual Deal Structure

- ✓ Financially assess using the following contractual options to deliver the Project:
  - ✓ Private concession (Build-Own-Operate-Transfer)
  - ✓ Design-Build-Finance-Operate-Maintain (DBFOM)
  - ✓ Design-Build-Operate-Maintain (DBOM)
- ✓ Prepare a summary of key financial / funding and investment assumptions (public and private) associated with each option

Development of Financial Model

- ✓ Develop of financial model to estimate the breakeven tipping fee under the three deal structure options (with and without carbon capture) and comparison to the Landfill Comparator Option.

Initial Business Case

- ✓ Prepare of the Initial Business Case solving for the four problem statement questions.
- ✓ Summarize the outcomes of each phase, providing a recommendation and guidelines on the next steps and implementation plan.

Question – 1:

What technologies should be selected for the energy from waste facility and carbon capture?

Overview

This section aims to:

1 Lay out the three technology options considered and evaluated by Ramboll for waste treatment and carbon capture;

2 Provide a summary of the outcome of Ramboll's technical analysis for the technology options considered using a set of key metrics and selection parameters; and

3 Recommend the optimal waste treatment and carbon capture technology solution for the EFW Project.

Technology Options Under Consideration | Three technology options, each for waste treatment and carbon capture, were evaluated

The technology options for waste treatment and carbon capture were evaluated separately by Ramboll and the recommended technology option for each was used for estimating the capital and operating costs, and revenue

A EFW Waste Treatment Technologies Considered

1. **Pyrolysis**
2. **Gasification**
3. **Combustion**

Preferred Technology: ?

B Carbon Capture Technologies Considered

1. **Post-Combustion**
2. **Pre-Combustion**
3. **Oxy-Fuel Combustion**

Preferred Technology: ?

Capital and Operating Costs, and Revenue Estimates

EFW Waste Treatment Technology | Three waste treatment technology options were evaluated

A

EFW Waste Treatment Technologies Considered	1 Pyrolysis	2 Gasification	3 Combustion
Description	Feedstock is heated to high temperatures without adding air or steam. This produces a condensable, refinable 'pyrolysis gas' (including tars, methane, hydrogen, CO) that can be treated for energy/fuel production, and a non- condensable gas that can be combusted for heat. Solid carbon and ash are waste products.	Feedstock is heated with the addition of small quantities of oxygen, which react with the carbon to produce additional hydrogen and CO. The oxygen also reacts to breakdown some of the tar, producing a syngas composed primarily of methane, CO, water and hydrogen. Some ash as waste is produced.	Feedstock is heated with excess air supply, causing total combustion. This produces a flue gas composed of CO_2, steam and nitrogen, releasing all energy as heat in the hot flue gas. **Combustion is the only process which can effectively process mixed Municipal Solid Waste (MSW).**
Process Comparison			
Reaction environment	Zero oxygen	Reducing, low oxygen	Oxidizing, excess stoichiometric oxygen
Oxidizing agent	None	Air (also O_2 and/or steam)	Air
Temperature	400-800°C	500-900°C (air) 1,000-1,500°C (other agents)	850-1,200°C
Main outputs	Liquids & solids	Gas	Heat
Produced gases	CO, H_2, CH_4 and other hydrocarbons	CO, H_2, CH_4 CO_2, H_2O	CO_2, H_2O
Pollutants	H_2S, HCl, NH_3, HCN, tar, particulates	H_2S, HCl, NH_3, HCN, tar, particulates	SO_2, NO_x, HCl, PCDD/F, particulates

Source: Ramboll's Technical Report

Selected Thermal Treatment Technology | Combustion waste treatment is recommended as the most robust technology option

A

EFW Waste Treatment Technologies Considered

High — Low

Table 1: Benefit level assessment for each EFW technology

The performance and consumption parameters of three thermal treatment technologies	Pyrolysis	Gasification	Combustion
Resource recovery (material recovery and recycling)	● (green)	● (green)	● (green)
Energy recovery (efficiency, quantity)	● (yellow)	● (yellow)	● (green)
Environmental performance (air, soil, water, GHG)	● (green)	● (green)	● (green)
Land use	● (green)	● (green)	● (green)
Track record and reliability	● (red)	● (red)	● (green)
Cost efficiency	● (red)	● (red)	● (green)
Overall Score	● (orange)	● (orange)	● (green)

** Rating is on a relative basis and not scored individually against a defined baseline*

Selected Waste Treatment Technology (Combustion)

Source: Ramboll's Technical Report

Key rationale:

- ✓ A combustion waste treatment system with an advanced moving grate incinerator is recommended as the most robust technology for the treatment of mixed MSW.
- ✓ Combustion is the most dominant thermal treatment technology, as it can process the widest range of waste types. In the context of MSW treatment, this implies less sorting, selecting and pre-treatment of waste is required.
- ✓ This is also the most proven and widely-used waste system, with numerous long-term commercial operations documented globally. It is a well proven technology with a long and reliable operational record. The CAPEX/OPEX is well known and foreseeable.
- ✓ An advanced moving grate incinerator is recommended as it can accept large waste factions, with minimal pre-sorting of waste.

Carbon Capture Technology Options Considered | Post Combustion is the only option available with proven technology worldwide

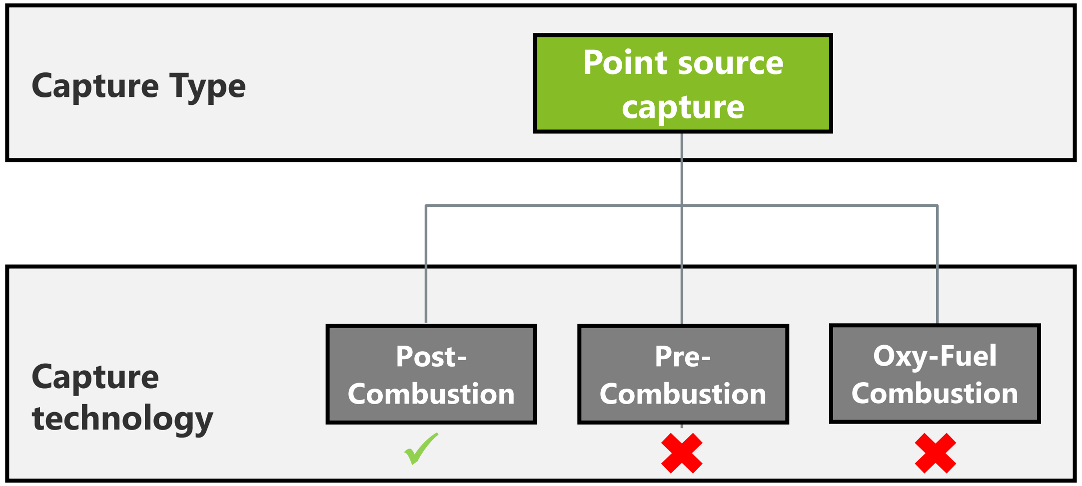
B

Carbon Capture Technologies Considered

Recommended carbon capture technology:

Post-combustion capture
The only mature technology applicable to EFW facilities

Many carbon capture technologies exist, but only a few are mature enough to be implemented in full-scale:



Source: Ramboll's Technical Report

Benefits and drawbacks of post-combustion capture technologies

- ✓ Most mature capture technology with several carbon capture plants operational worldwide
- ✓ Possible to retrofit into existing combined heat and power generation plants (EFW, biomass CHP, pulp and paper mills)
- x A high energy requirement (in the form of steam) for the regeneration of the chemical solvents (i.e., amines) which causes a reduction in plant power/heat output

Understanding mature capture technologies

Point source capture technologies have been developed to remove the carbon at different stages of the process:

- **Post-combustion**, after CO2 has been formed in a traditional combustion process
- **Pre-combustion**, removing the carbon from the fuel before the combustion
- **Oxy-fuel combustion**, which changes the combustion to obtain a flue gas with very high concentration of CO2 directly

Conclusion

The following conclusions were drawn from the Technical Analysis:

- For waste treatment, **Combustion** is recommended as the most robust technology option;
- For carbon capture, **Post Combustion** is the only mature option available with proven technology worldwide; and

The corresponding capital and operating cost estimates using these two sets of technologies (details in Appendices 1 & 2) were used to determine the tipping cost for the Pontiac EFW and incremental cost / savings in comparison to Comparator Landfill Option.

Question – 2:

Does an energy from waste facility provide a more sustainable supply solution versus a Comparator Landfill up to 2060 and beyond?

Overview

This section aims to:

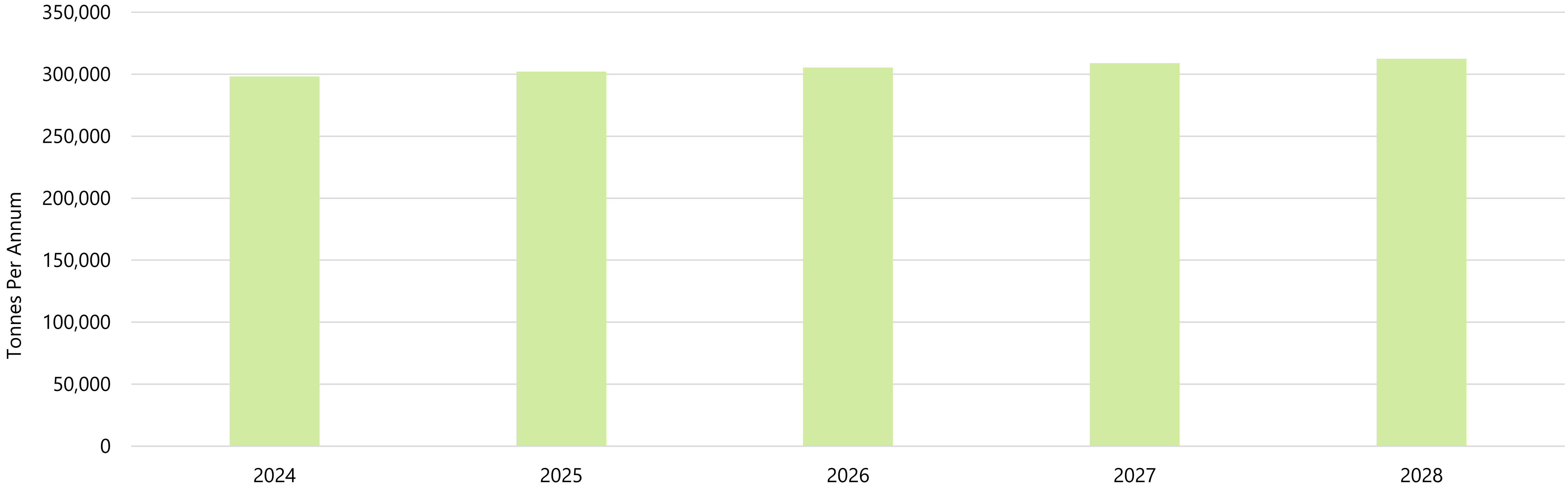
1 Identify the landfill capacities available in the region and their remaining useful life;

2 Establish the landfill supply risk that is emerging over the next decade in the region; and

3 Explain why the Pontiac EFW is a potential solution to this problem.

Growing Supply of Waste to Landfills| Supply of waste to the landfills nearby is shortly expected to surpass the 300k tonnes per annum level

Waste Supply Projections



Source: MRC Pontiac via City of Ottawa

Emerging Landfill Supply Risk | A major supply risk is emerging with major landfills in the region expected to reach full capacity in the next decade

Major Landfills Near Ottawa

Landfill Sites	Owner / Operator
Trail Road Facility	City of Ottawa
Eastern Ontario Waste Handling Facility (Moose Creek)	GFL Environmental Inc. (formerly Lafleche Environmental Inc.)
Navan Road Landfill	Waste Services (CA) Inc.
La Chute Landfill	GFL Environmental Inc.

Major Landfills Used by the City of Ottawa

Landfill Sites	Capacity	Remaining Life
Trail Road Facility	16,998,442 m3	12-15 years
Miller's Road Landfill Site	80,063 m3	20 years
Springhill - Ottawa - Osgoode (Tomlinson)	TBD	TBD
Carp Road Landfill Expansion	400,000 *	TBD

** Ottawa expected to send 60,000 Tonnes of waste per annum to the Carp Road Landfill*

Trail Road Facility

The 153-hectare site is currently in Phase 4, with Phases 1 to 3 already at full capacity. Phase 5 expansion efforts are in progress. The Trail Road Facility is expected to reach full capacity over the next 12-15 years according to the City of Ottawa. To alleviate capacity concerns, the city of Ottawa plans to send 60,000 Tonnes of residential waste annually to two private landfills starting in 2026, extending the Trail Road Landfill's lifespan by at least two years at an annual cost of $8 million.

Location of Major Ontario Landfills

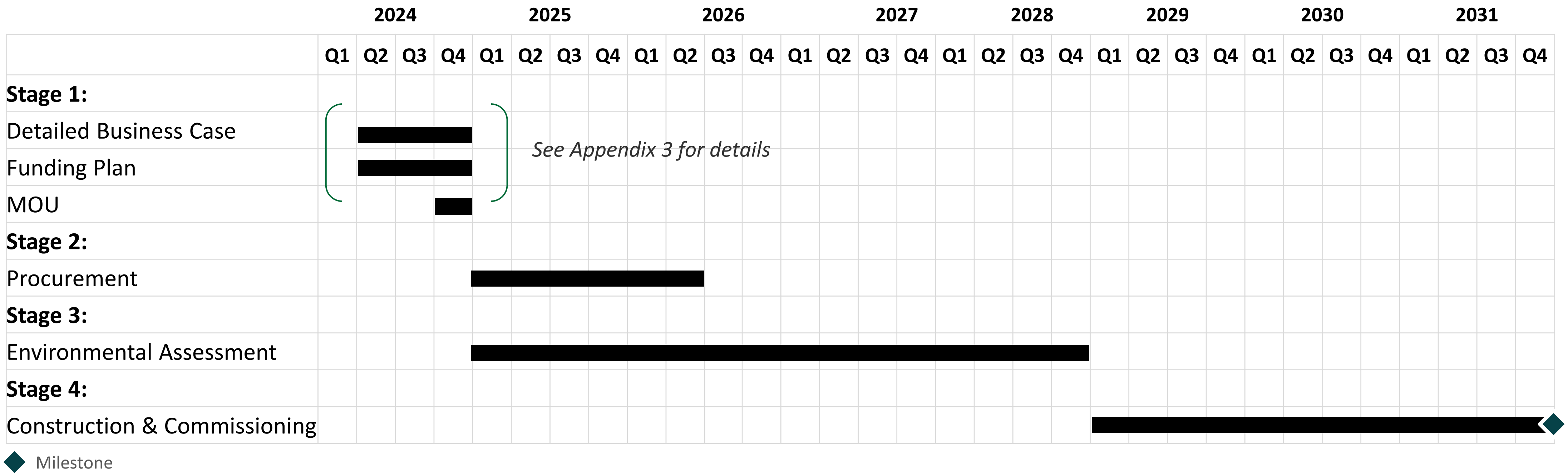
Limited landfill options available near MRC Pontiac

The region is situated at a considerable distance from other major landfill sites in Ontario. The other major landfill currently used by MRC Pontiac (and the Outaouais region) is a WM facility in Lachute, Quebec.

Pontiac EFW Timelines | The following schedule has been developed for the purposes of this analysis

- The schedule below assumes contingencies and largely assumes all activities will be undertaken in a sequential manner (e.g., signed contracts and necessary approvals need to be in place before proceeding with the Environmental Assessment).
- Opportunities for schedule efficiency – for example, 1 to 3 years reduction in overall schedule – exist if activities can be undertaken in parallel.

Project Schedule



Conclusion

The following conclusions were drawn for Sustainable Supply Solution:

- Ontario and the region close to MRC Pontiac are expected to fall short of landfill capacity in the next decade.
- The Pontiac EFW offers a sustainable supply solution by producing electricity using the 400,000 tonnes per annum of waste expected to be generated by the City of Ottawa and other local municipalities; and
- Envisaged Project timelines aligns perfectly with decommissioning timelines of Trail Road Waste Facility.

Question – 3:

Is an energy from waste facility a carbon neutral, economically viable, and long-term sustainable waste management solution versus a comparable landfill?

Introduction

This section aims to:

1. Distinguish the EFW Facility Contractual Structure from the Deal and Funding Structure;

2. Outline and compare the three EFW Facility Contractual Structures considered; and

3. Provide outcome of the financial analysis, which compares the EFW breakeven tipping fee and potential $ savings to the Comparator Landfill Option under the various EFW facility contractual structures (with and without carbon capture).

Considerations

The contractual delivery and the deal / funding structures have been separated and tackled independently supported by the following rationale:

- The costs of construction, operations, maintenance / lifecycle, and electricity output capacity are directly linked to the selection of the technology.
  - There is limited public sector expertise to design, build, operate, and maintain EFW facilities.
  - It is assumed that a bundled design-build-operate-maintain form of contract (the “**EFW Facility Contractual Structure**”) will be used to provide a contractual linkage to the technology selected, with appropriate output performance mechanisms based on tonnage processed.
- It is assumed that the EFW Facility will be publicly owned.
  - A corresponding deal structure covering the extent of involvement and support that would be required from the various levels of the government to execute the Pontiac EFW (“**Deal and Funding Structure**”) has note been assumed for this IBC.

Financing Structures Under Consideration | Three EFW Facility Contractual Structures were developed covering two ends of the spectrum (i.e., 100% public and 100% private sector financing)

	1	2	3
Financing Structure	**Build-Own-Operate-Transfer (BOOT)**	**Design-Build-Finance-Operate-Maintain (DBFOM)**	**Design-Build-Operate-Maintain (DBOM)**
Description	**Public Sector:** Responsible to provide concession and rights to the private sector to design, finance, construct, own and operate the project. **Private Sector:** Design, finance, construct, own, operate and maintain the project.	**Public Sector:** Responsible for planning, covering: • Stakeholder consultations • Environmental assessment • Sets design / construction specifications and operational performance standards. **Private Sector:** • Responsible for Design and Build • Provides construction and long-term financing for the project • Operates and maintains the asset • Ownership of asset reverts to Government at termination	**Public Sector:** Provides construction and long-term financing for the project. **Private Sector:** • Responsible for Design and Build • Operates and maintains the asset • Ownership of asset reverts to Government at termination
Capital Funded	**Public Sector:** 0% **Private Sector:** 100%	**Public Sector:** 75% **Private Sector:** 25%	**Public Sector:** 100% **Private Sector:** 0%

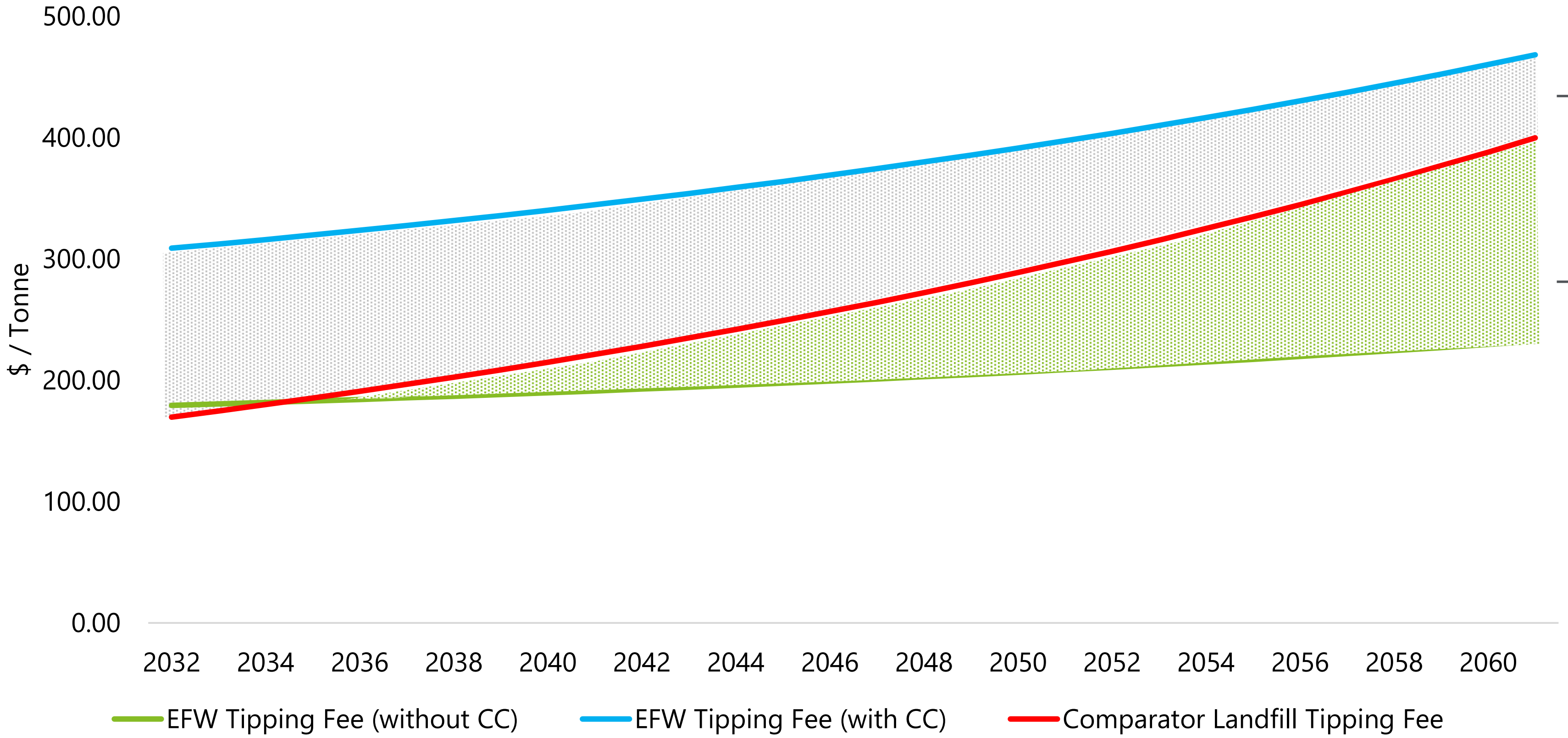
Approach and Methodology | Process overview of the financial analysis of the Pontiac EFW in comparison to Comparator Landfill Option

- Deloitte has a developed a financial model with the objective to:
  - Estimate the tipping fee of the Pontiac EFW under the three EFW Facility Contractual Structures.
  - Calculate the incremental cost / savings of the Pontiac EFW (with and without carbon capture) in comparison of the Comparator Landfill Option. Key assumptions are outlined in Appendix – 1.
  - Complete an “apples-to-apples” comparison of the Pontiac EFW to the Comparator Landfill.
    - Costs for land acquisition taxes, transport costs, procurement, etc. would be applicable under both scenarios and have therefore not been included.
  - Although the Pontiac EFW includes the cost of carbon capture on site, it does not include the cost of long-term storage and therefore any benefits in the form of revenue from sale of carbon credits have not been included.
- Key results of the financial model (with and without carbon capture) are illustrated in the following slides.
- For illustrative purposes, the tipping fee of the Comparator Landfill Option has been assumed to be $130/tonne in the region in 2023 $ terms. An escalation factor of 3% per annum has been applied for the comparative analysis, which maybe skewing results and contributing to the favorableness of the EFW option.
- A simplified approach for DBOM has been used in the analysis, which accounts for an upfront issuance of the municipal debt to fund progress payments during construction period. This results in a higher interest during construction value. The financing structures will be further refined in the detailed business case.

Summary of Key Results – BOOT EFW Facility Contractual Structure

BOOT is expected to be the most expensive option, backed by 100% private financing

Chart 1: Tipping Fee Comparison



Incremental tipping cost in nominal terms: $ 1,304 million

Incremental tipping cost in present value (2023) terms: $ 677 million

Savings in nominal terms: $ 802 million

Savings in present value (2023) terms: $ 251 million

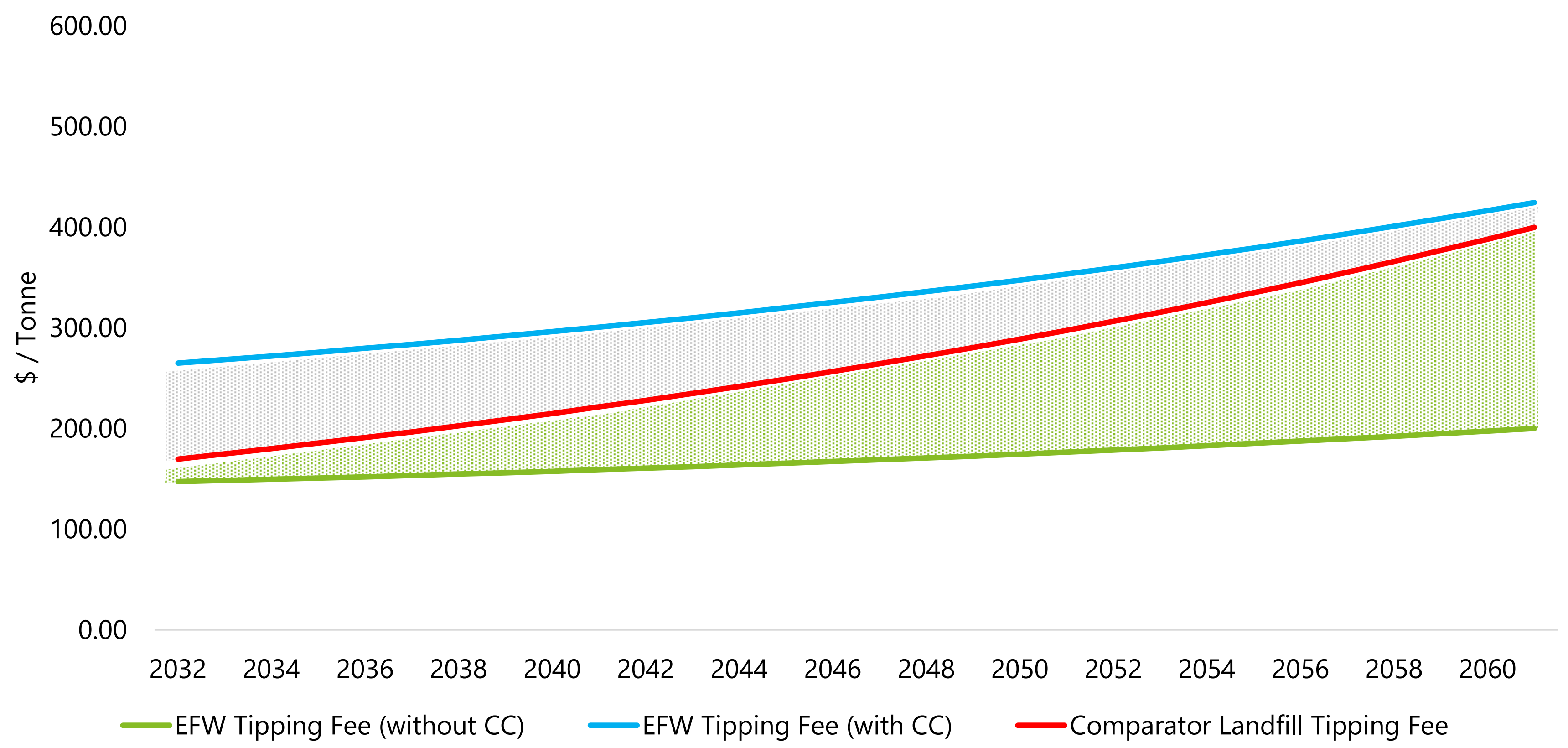
Note: EFW Tipping Fee includes the recovery of financing costs, including from public sector.

CC means Carbon Capture

Summary of Key Results – DBFOM EFW Facility Contractual Structure

DBFOM is expected to be the second most expensive option

Chart 2: Tipping Fee Comparison



Incremental tipping cost in nominal terms: $ 777 million

Incremental tipping cost in present value (2023) terms: $ 472 million

Savings in nominal terms: $ 1,188 million

Savings in present value (2023) terms: $ 522 million

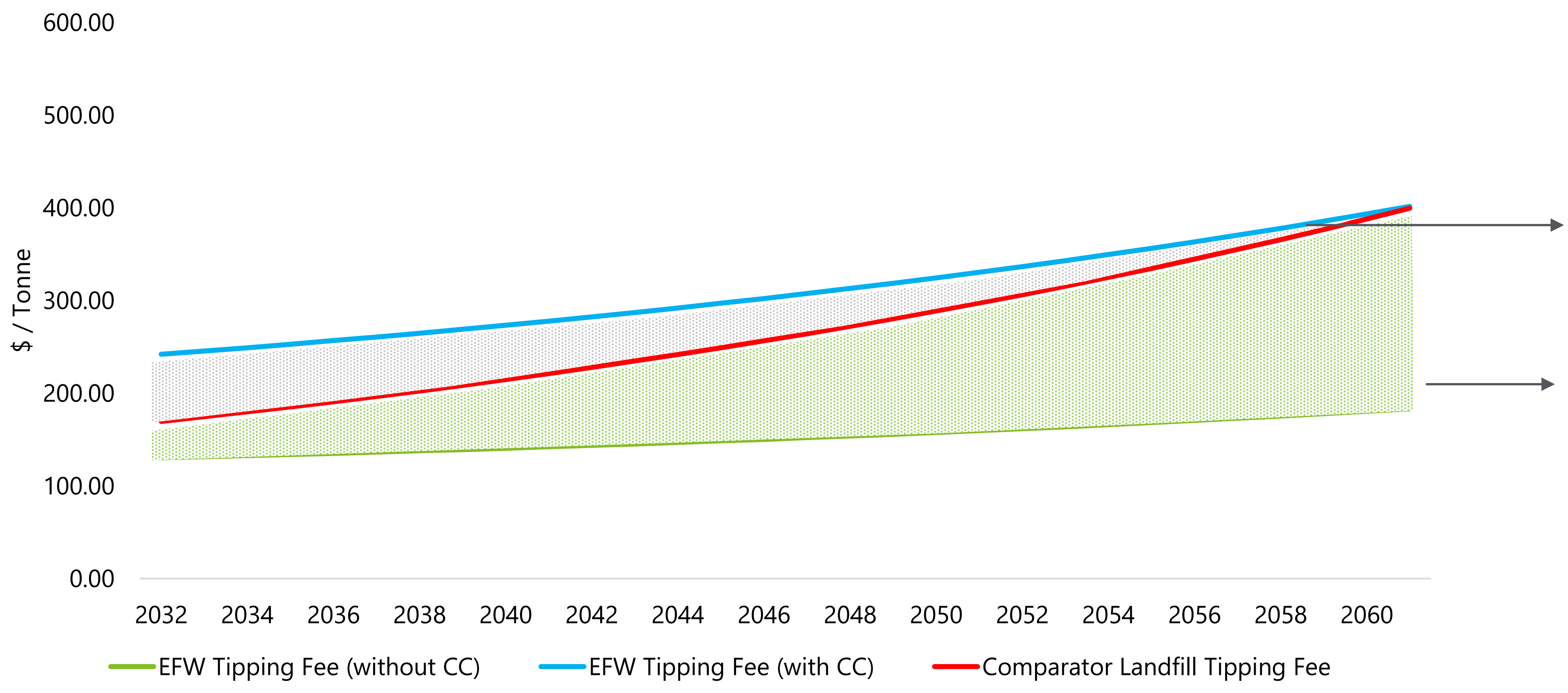
Note: EFW Tipping Fee includes the recovery of financing costs, including from public sector.

CC means Carbon Capture

Summary of Key Results – DBOM EFW Facility Contractual Structure

DBOM is expected to be the cheapest option and competitive to landfill option, supported by 100% public financing

Chart 3: Tipping Fee Comparison



Incremental tipping cost in nominal terms: $ 503 million

Incremental tipping cost in present value (2023) terms: $ 333 million

Savings in nominal terms: $ 1,390 million

Savings in present value (2023) terms: $ 671 million

Note: EFW Tipping Fee includes the recovery of financing costs, including from public sector.

CC means Carbon Capture

Key assumptions and factors to consider

Factors not yet included in our analysis, but would be similar in comparison to the Comparator Landfill Option:

- Land acquisition cost.
- Property taxes and indirect tax (HST/GST).
- Transport costs.
- Procurement costs.
- No difference in the cost of public ownership.
- Site clean-up costs.
- Benefit of carbon capture in the form of potential revenue from selling carbon credits.
- Cost of long-term carbon storage.
- Residual or terminal value at the end of the concession or life of the Project.

Other assumptions:

- Long term municipal bond assumed to be issued based on credit profile of a city with an existing credit history and rating.
- 100% CPI pass through assumed for PPA indexation.
- No waste availability, supply, throughput, and market risks assumed in our analysis.

Conclusion

The following conclusions were drawn for EFW Contractual Structure and Financial Assessment

Capital payments contribute to c. 40 – 70% of the breakeven tipping fee (varying depending on the contractual structure), which does not increase with inflation.

- The annual escalation of the Pontiac EFW tipping fee is lower compared to the 3% per annum escalation assumed for the Comparator Landfill Option.

The incremental tipping cost for the EFW, under DBOM, in 2023$ terms is estimated to be c. $333 million, which cannot be compared to the $400 million[1] cost estimated to setup an equivalent 400k tonnes per annum landfill facility in 2023$ terms as it does not account for the cost to the environment.

- The Government of Canada is in the process of introducing methane emission regulations; therefore, the cost of methane capture and storage cannot be disregarded at this time.

Selection of the appropriate EFW Contractual Structure would depend on the funding plan; however, in Canada it is predominantly DBFOM, which accounts for capital contributions from the public and private sector.

[1] Source: Draft Solid Waste Master Plan (2023), City of Ottawa

Question – 4:

What is the deal and funding structure that would allow the Project to compete with a Comparator Landfill Option?

Introduction

This section aims to:

1 Explain the extent of involvement and support that would be required from the various levels of the government to execute the Project; and

2 Identify next steps and provide guidelines on the way forward.

Funding Opportunities and Limitations (1 of 2)

Potential funding sources include Canada Growth Fund, CIB, and Province of Ontario / Quebec

Funding Source	Details	Key Takeaway
1. Canada Growth Fund	▪ **$15B** Canada Growth Fund ("CGF") created under Canada Development Investment Corporation ("CDEV") in December 2022 ▪ Three areas of focus: ✓ Projects that use less mature technologies and processes, e.g., carbon capture, hydrogen and biofuels. ✓ Technology companies, including small and medium enterprises (SMEs), which are scaling less mature technologies ✓ Companies, including SMEs, and projects across low-carbon or climate tech value chains, including low-carbon natural resource development ✓ $90M invested into an Alberta-based geothermal energy developer (October 2023)	✓ Funding available for large ticket size projects ✓ Carbon capture and related technologies qualify for funding
2. Canada Infrastructure Bank (CIB)	▪ **$2.5B** fund allocated for clean power to support renewable energy generation, storage and transmission ▪ **$500M** allocated for project development and early construction works ▪ Past Investments in Energy from Waste: ✓ $277M invested into Quebec's Varennes Carbon Recycling (March 2023) ✓ Varennes Carbon Recycling converts waste and residual biomass into clean hydrogen	✓ Viable option to consider; however, CIB would bring in private financing, which may increase overall financing cost.

Cont…

Funding Opportunities and Limitations (2 of 2)

Potential funding sources include Canada Growth Fund, CIB, and Province of Ontario / Quebec

Funding Source	Details	Key Takeaway
3. Province of Quebec (PoQ)	▪ Ministère de l'Économie, de l'Innovation et de l'Énergie investment in recycling projects ✓ $284.45mn invested into Varennes Carbon Recycling biorefinery ▪ Natural Resources and Energy Capital Fund (Investissement Québec) - 2030 Plan for a Green Economy ✓ Equity investments in companies that develop, commercialize, and implemented technologies that promote energy transition, innovation, or efficiency or reduce fugitive emissions ▪ Renewable Natural Gas Production Support Program ✓ To reduce Quebec's GHG emissions, increase renewable energy production, create jobs, and attract private investments in the RNG sector	✓ Viable option to consider ✓ PoQ's subsidiaries have a history of supporting sustainable and renewable energy projects
4. Province of Ontario	▪ The Green Investment Fund committing **$325M** for projects that will fight climate change, grow the economy and create jobs ▪ The Low Carbon Innovation Fund to help companies create and commercialize new, globally competitive, low-carbon technologies that will help Ontario meet its GHG emissions reductions targets	✓ Viable option to consider; however, commitment may face challenges due to Pontiac's location in Quebec
5. Hydro Quebec	▪ Investor in Energy Transition, focusing on driving efficient decarbonization of Québec province ▪ Hydro-Québec has various other funding programs, offering grants lower than **$1M**	✓ Viable for small scale projects, focusing on new clean energy technologies ✓ Need to consider complexities around T&Cs under the PPA and indexation provisions.
6. Electrification and Climate Change Fund (FECC)	▪ The FECC has a particular focus on clean energy technology, including recovery from waste. Funding sources include contributions from the carbon credit market and the federal government from the Low Carbon Economy Fund.	✓Viable option as the fund focuses particularly on investments in energy from waste technology.

Note: preliminary research pending additional review.

Recommendation and Next Steps

1

Viable Solution for Regional Stakeholders

The City of Ottawa is seeking a long-term solid waste solution - this IBC demonstrates that the Pontiac EFW is a viable solution that should be considered.

2

MRC Pontiac Collaboration with Key Stakeholders

MRC Pontiac should collaborate with key stakeholders on a detailed business case to:

- Complete a preliminary level of design (10% to 20%) to ensure constructability, develop a detailed project schedule, outline an approvals plan, and prepare a cost estimate that is suitable for funding purposes;
- A detailed analysis of the financing structuring, including a recommendation on the EFW Contractual Structure and the Deal and Funding Structure;
- Confirm sources of waste supply;
- Details on the Deal Structure, including ownership, governance, cost share and document the results in a Memorandum of Understanding;
- Define the economic, social and environmental benefits of the as compared to a Landfill Comparator; and
- Engage upper levels of government for funding, including Hydro Quebec.

3

MRC Pontiac and Key Stakeholders: Pursue Funding

MRC Pontiac and key stakeholders should pursue funding to complete this detailed business case.

Conclusion

The following conclusions were drawn from the deal structure and funding analysis:

- The Pontiac EFW is an economically viable and carbon neutral as compared to the Comparator Landfill Option.
- MRC Pontiac and its key stakeholders should engage in detailed discussion to build a detailed business case, involving different levels of the government; and
- Pontiac EFW should be funded in partnership with the municipal, federal, and provincial governments.

Appendix – 1: Financial Model Assumptions

Key Financial Model Assumptions

Id	Key Inputs	Source	BOOT	DBFOM	DBOM
1	**Timelines**				
1.1	EFW Construction		36 months (January 2029 – December 2031)		
1.2	EFW Project Life	Deloitte	30 years (commencing January 2032)		
2	**General**				
2.1	Capital cost escalation p.a.	Deloitte	4.00%		
2.2	Operating cost escalation p.a.	Deloitte	3.00%		
3	**Financing Cost**				
3.1	Private Lender Percentage Share	Deloitte	100%	25%	0%
3.2	Public Funds Percentage Share	Deloitte	0%	75%	100%
3.3	Government of Canada Long-Term Rate	GoC	3.11% (i.e., GoC LT Benchmark Bond Yield (as of Dec 6, 2023))		
3.4	Private Lending Spread	Deloitte	2.50%	2.50%	0.00%
3.5	Public Debt Spread	Deloitte	0.00%	1.00%	1.00%
3.6	All-in Cost of Long-Term Debt	Deloitte	5.61%	4.49%	4.11%
3.7	Short-Term Debt Spread	Deloitte	0.00%	1.00%	1.00%
3.8	Debt-to-Equity	Deloitte	50:50	90:10	100:0
3.4	Equity IRR	Deloitte	15.0%	11.0%	11.0%
3.5	Substantial Completion Payment	Deloitte	0%	50%	0%
4	**Capital Cost**				
4.1	EPC Cost (without Carbon Capture)	Ramboll	$ 550 million (in 2023$ terms; refer to slide 32 for escalated cost)		
4.2	EPC Cost (with Carbon Capture)	Ramboll	$ 750 million (in 2023$ terms; refer to slide 32 for escalated cost)		
4.3	Project Development Cost, Miscellaneous Expenses, and Contingencies	Ramboll	10% of total EPC Cost		

Key Financial Model Assumptions Cont'd

Id	Key Inputs	Source	BOOT	DBFOM	DBOM
5	**Financing Fees**				
5.1	Upfront fees (Long Term Debt)	Deloitte		1.5%	
5.2	Upfront fees (Short Term Debt)	Deloitte		1.0%	
5.3	Commitment fees	Deloitte		0.5%	
6	**Operating Expenses**				
6.1	Staff cost p.a.	Ramboll		$ 8.0 million	
6.2	Average maintenance cost p.a.			2.5% of capital cost	
6.3	Consumables			$ 6.0 million	
6.4	Landfill of Incineration Bottom Ash			$ 4.5 million	
6.5	Landfill cost of flue gas residuals			$ 2.4 million	
6.6	Revenue from flue gas residuals			$ 2.1 million	
6.7	Insurance cost p.a.			$ 2.0 million	
6.8	Permitting and regulatory costs p.a.			$ 0.7 million	
6.9	Carbon capture operating expenses p.a.			$ 10.8 million	
6.10	Other operating expenses p.a.			10.0% of total operating expenses	
7	**Energy Output and Revenue**				
7.1	Total Energy Output (SNCR + Power Generation)			0.89 MWh / tonne	
7.2	Waste tonnage	Pontiac		400,000	
7.3	Power price	Ramboll		$ 0.8 / Kwh	
7.4	Carbon Capture Energy Consumption			0.19 MWh / tonne	

Capital Costs | Capital cost, with and without carbon capture technology, estimated to be $605mn and $825mn, respectively

Table 1: Capital Expenditure (without carbon capture)

Item	%	CAD Mn
Furnace/ Boiler System	25%	137.50
Turbine/ Generator/ ACC	7%	38.50
Flue Gas Treatment System	11%	60.50
Control Monitoring System (CMS)	2%	11.00
Electrical Key Installations	5%	27.50
Common Systems (Cranes, CCTV, etc.)	5%	27.50
Plant for Treatment of Combustion Ashes	3%	16.50
Balance of Plant	8%	44.00
Wear & Spare Parts	2%	11.00
Design, Procurement, Project Management, Documentation, Commissioning (within scope of EPC Contract)	5%	27.50
Civil Works and Buildings	24%	132.00
Transmission Power Connection	3%	16.50
Sub-Total EPC Contract Price		**550.00**
Carbon Capture Plant, EPC price		0.00
Sub-Total with Carbon Capture Plant		**550.00**
Project Development Cost & Miscellaneous Costs	10%	55.00
Total Project Costs		**605.00**

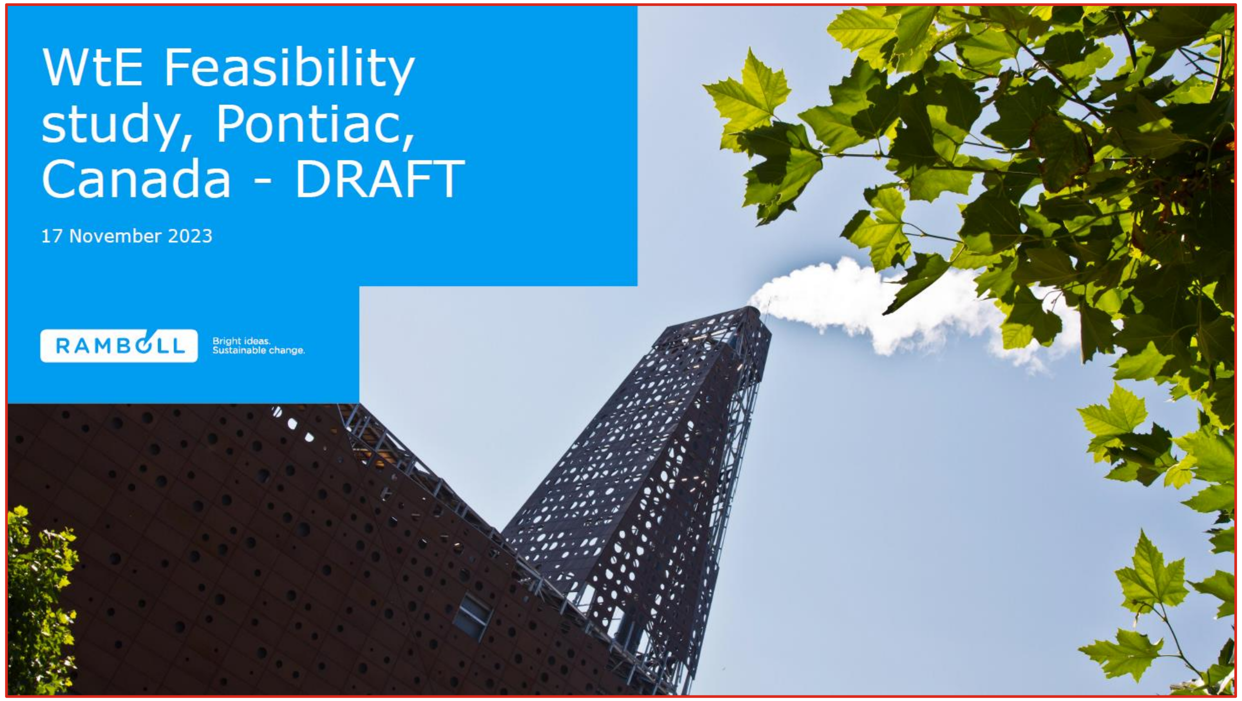
Table 2: Capital Expenditure (carbon capture)

Item	%	CAD Mn
Furnace/ Boiler System	25%	137.50
Turbine/ Generator/ ACC	7%	38.50
Flue Gas Treatment System	11%	60.50
Control Monitoring System (CMS)	2%	11.00
Electrical Key Installations	5%	27.50
Common Systems (Cranes, CCTV, etc.)	5%	27.50
Plant for Treatment of Combustion Ashes	3%	16.50
Balance of Plant	8%	44.00
Wear & Spare Parts	2%	11.00
Design, Procurement, Project Management, Documentation, Commissioning (within scope of EPC Contract)	5%	27.50
Civil Works and Buildings	24%	132.00
Transmission Power Connection	3%	16.50
Sub-Total EPC Contract Price		**550.00**
Carbon Capture Plant, EPC price		200.00
Sub-Total with Carbon Capture Plant		**750.00**
Project Development Cost & Miscellaneous Costs	10%	75.00
Total Project Costs		**825.00**

Appendix – 2: Technical Report

Appendix – 2: Technical Report

Shared separately via email.



Appendix – 3: Work Plan

Stage 1: Indicative Work Plan | Detailed work plan to be established at the onset of the engagement

	1.0 **DETAILED TECHNICAL ANALYSIS**	2.0 **DETAILED FINANCIAL AND COMMERCIAL OPTIONS ASSESSMENT**	3.0 **STRATEGIC PLAN, STAKEHOLDER ENGAGEMENT, AND BUSINESS CASE**
Objective	Define technical requirements	Refine financial and commercial feasibility	Drive program buy-in
Timelines	**~ 4 – 6 MONTHS**	**~ 2 - 4 MONTHS**	**~ 1 – 2 MONTHS**
Note: timelines are largely sequential however there may be opportunities to undertake activities in parallel (particularly no. 2 and no. 3) to shorten the overall duration			
Activities	• Technical studies and development of the conceptual design • Study on consumables • Study on energy off-takers and prices • Studies of CC and downstream handing of captured CO_2 • Initial discussion with environmental authorities to verify expected time and details of the EIA • Elaborated CAPEX / OPEX estimates • 3D visualization of the plant	• Updated commercial options and associated assessment • Integration of elaborated cost estimates into Financial Model • Analysis of cost sharing approaches and funding / financing options • Scenario and sensitivity analysis	• Strategic plan and stakeholder engagement process • Development of Business Case
Outcomes	A. Detailed Technical Analysis incl. Conceptual Design and Elaborated Costs Estimates	B. Financial and Commercial Feasibility Assessment incl. Detailed Financial Model	C. Business Case
Fee estimate	$250K to $350K (depending on the details and complexity of the carbon capture)	$200K to $300K	