Appendix "B"

HAMILTON

RENEWABLE POWER INC.

Draft Strategic Plan

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INTRODUCTION

The Hamilton Renewable Power Inc. is fully owned by City of Hamilton and was incorporated in 2005 (HRPI Corporate By-Law No. 1) with an objective of exploring and developing renewable energy generation projects within the City of Hamilton. This Strategic Plan 2024 aims to identify opportunities to increase/optimize biogas production and its beneficial uses as per current market conditions at its existing sites. It focuses on generating non-levy revenue, increasing environmental benefits, and supporting Hamilton's Net Zero emissions goal by 2050. The plan evaluates three strategies: 100% Renewable Natural Gas (RNG), 100% Combined Heat and Power (CHP), and a combination of both.

It includes market analysis, strategic objectives, financial planning, and implementation steps to enhance operational efficiency and expand renewable energy capacity, benefiting the Hamilton community environmentally and economically in addition to support City meet its GHG and Net Zero goals by 2050.

1. EXECUTIVE SUMMARY

The Hamilton Renewable Power Inc. (HRP Inc.), fully owned by the City of Hamilton, was established in 2005 with a mission to explore and develop renewable energy projects within the city. As a leader in converting waste-derived biogas into clean energy, HRPI operates two key facilities: the Woodward Wastewater Treatment Plant and the Glanbrook Landfill. These facilities not only contribute to the city's ambitious environmental goals but also generate non-levy revenue, supporting Hamilton's broader objective of achieving Greenhouse Gas (GHG) Emissions reduction and Net Zero targets by 2050.

The 2024 Business Strategic plan outlines a clear path forward, focusing on optimizing and expanding existing renewable natural gas (RNG) production and exploring additional energy generation including like solar and sewer thermal energy recovery within the city. With a combined strategy of RNG and Combined Heat and Power (CHP), HRP Inc. aims to maximize both environmental and economic benefits and minimize market and technical risk in these projects. This strategy includes a phased approach ranging from short term (1-3 year) to long term (7-10 years) focusing on maintaining current operations/maintenance, transitioning to high-value RNG, and eventually supplying RNG directly to the City to leverage carbon credits and enhance sustainability.

To achieve these goals, HRP Inc. will adopt a procurement strategy that aligns with municipal policy, allowing for more effective and timely project execution compared to the existing process. Additionally, the company plans to apply and secure grant/loan funding through a mix of federal and provincial programs, investment tax credits, long-term borrowing, and equity contributions from the City. This financial plan is designed to ensure a positive net present value (NPV) and a reasonable payback period, making the business strategy both financially viable and strategically sound.

By continuing to innovate and strategically align with market opportunities and right local partners, HRP Inc. is well-positioned to lead Hamilton's transition to a more sustainable energy future, benefiting both the environment and the community it serves.

2. COMPANY OVERVIEW

2.1 Governance Structure

- **Company summary:** Hamilton Renewable Power Inc. (HRP Inc.) is a renewable energy company wholly owned by the City of Hamilton. Established in 2005, HRP Inc. focuses on optimizing the use of biogas and landfill gas to generate clean, renewable energy. The company operates two primary facilities: the Woodward Wastewater Treatment Plant and the Glanbrook Landfill, where it transforms wastewater biogas/ methane into low carbon fuel namely electricity and renewable natural gas (RNG). Through continuous improvement and strategic partnerships, HRP Inc. aims to lead development of additional renewable energy generation projects leveraging City's existing assets by providing value to the community, generating financial return, and fostering a greener future.

  The board meetings are held every quarter.

- **Mission Statement:** To optimize the beneficial use of biogas in a manner that balances the desire to generate a non-levy revenue stream, increase the environmental and social benefits of managing the streams and creates value for the single shareholder, the City of Hamilton.

- **Operational Structure:**

  - Board of Directors: Responsible for managing the overall business and affairs of HRPI, the Board ensures that the company operates with integrity and in accordance with corporate governance standards. The Board also makes key decisions regarding financial statements, budgets, and major business developments.

  - **Executive Officers**:

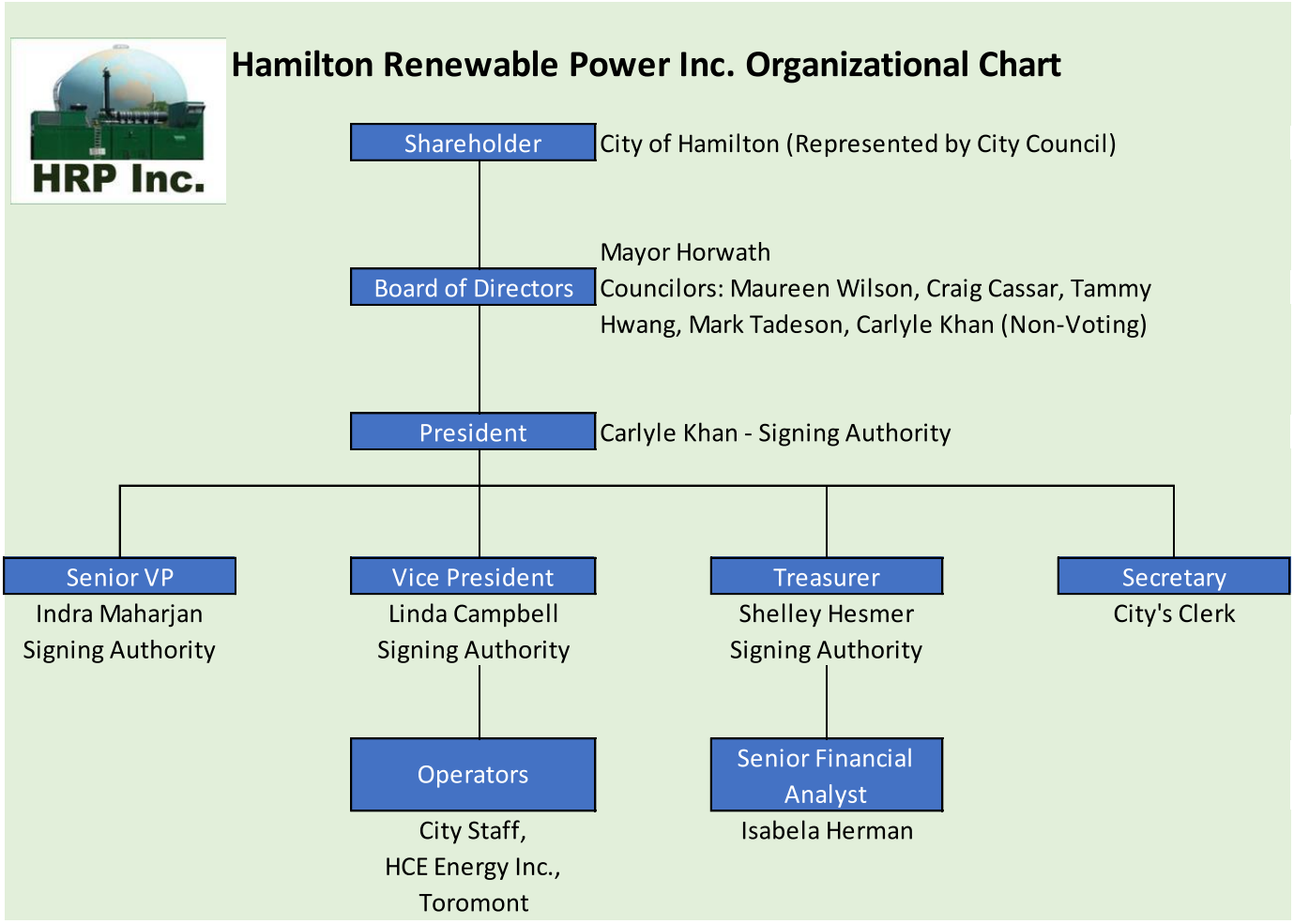
  - President: The Chief Executive Officer, overseeing all business operations and reporting to the Board.

  - Vice-President: Assists the President and may take on specific duties as assigned by the Board or CEO.

  - Secretary: Manages corporate documentation, meeting records, and compliance with by-laws.

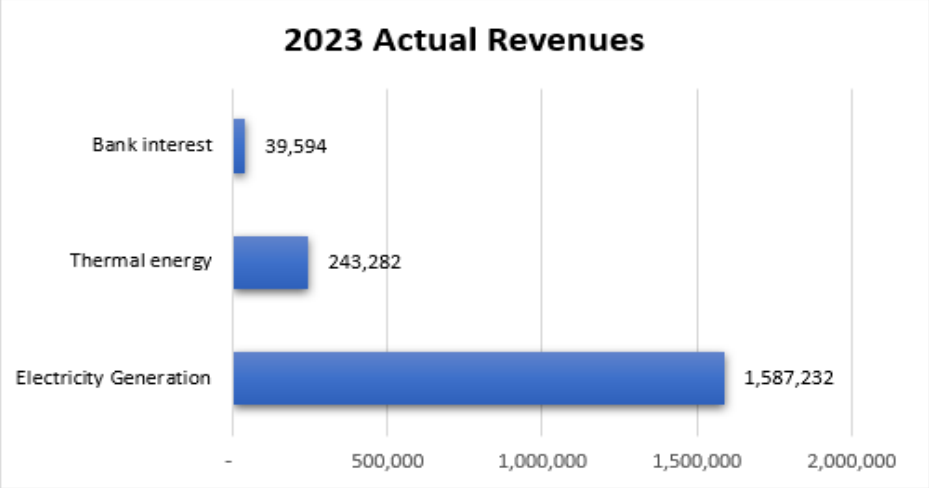
  - Treasurer: Handles financial records, fund management, and financial reporting to the Board.

- Shareholder: The City of Hamilton is the sole shareholder, and significant corporate decisions, particularly those impacting the ownership or strategic direction of HRP Inc, require shareholder approval.

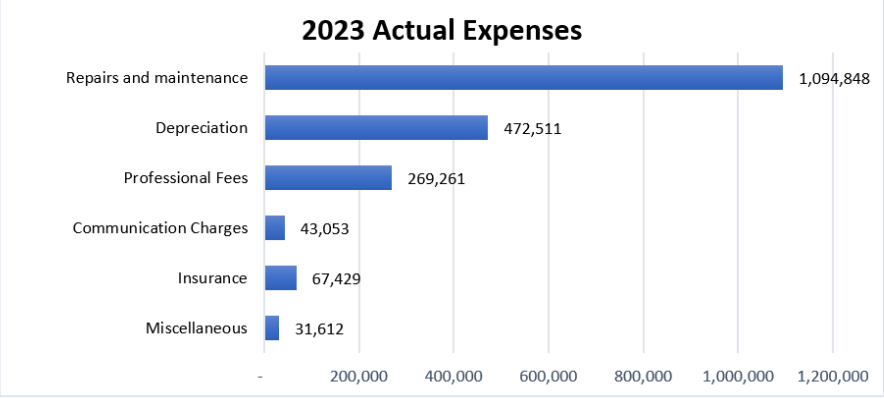


2.2 Financial Summary

The charts below provide a summary of HRP Inc.'s financial performance as presented in the June board meeting. HRP Inc. generated revenue to Hamilton Water and Waste Management division with City as asset owners of WW treatment plant and landfill site through purchase of biogas.

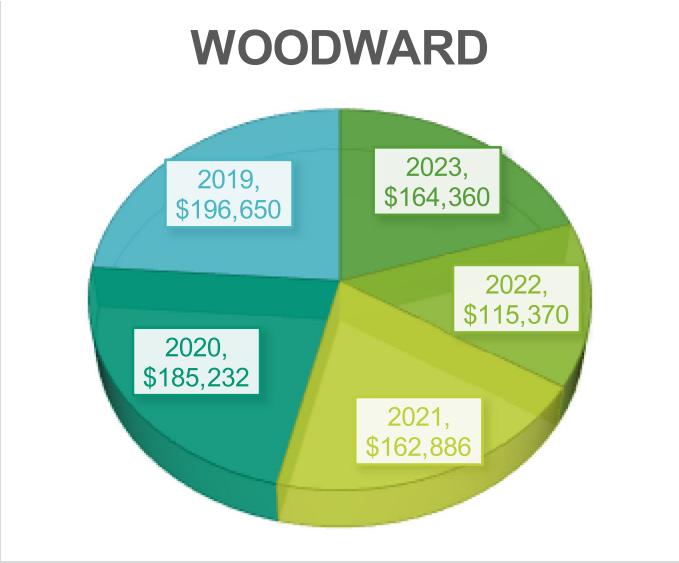


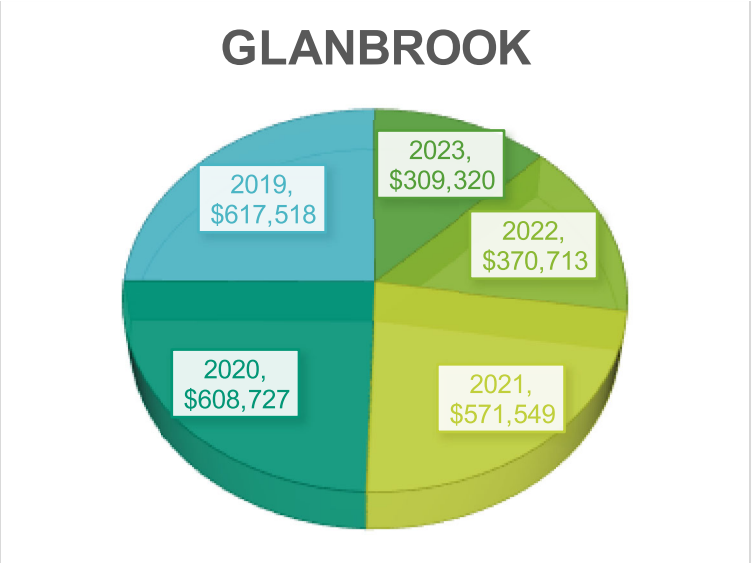
2023 Actual Revenues =$1,870,108



2023 Actual Expenses = $1,978,714

- Following charts shows City revenues from selling biogas/methane gas to HRP Inc.





- **RNG Revenue at Woodward**

Staff Recovery by City

3. EXISTING RENEWABLE ENERGY SITES

HRP Inc. owns and operates two existing renewable energy generating sites that have feed in tariff (FIT) agreement for electricity with Independent Electricity System Operator (IESO). A brief description about the generation sites is presented below.

Woodward Wastewater Treatment Plant:

Commodity	Parties	Contract/Agreement Description
Digester Gas	City, HRPI	▪ The agreement between the City and HRPI defines the terms for the City to provide HRPI with digester gas to fuel the Cogeneration Facility ▪ The 1.6 MW Cogeneration Facility can consume upwards of 15,000 m^3 of digester gas per day
Electricity	HRPI, Independent Electricity System Operator (IESO)	▪ The Cogeneration Facility is connected to the Woodward Avenue WWTP through a behind-the-meter installation (metered at the CHP unit) ▪ HRPI currently holds a 20-year power purchase agreement contract with the IESO, to sell electrical energy produced by the Cogeneration Facility to the IESO ▪ This contract is coming to an end and roll-over of the existing contract is not likely
Thermal Energy	HRPI, City	▪ Thermal energy produced by the Cogeneration Facility is sold by HRPI to the City to heat the Woodward Avenue WWTP digesters ▪ On average, HRPI sells 23,200 GJ (22,000 mmBTU) of thermal energy to the City annually
RNG	City, Third Party, Enbridge	▪ The City sells RNG generated in the BPU to a third party, who also receives the associated carbon credits ▪ The City has an agreement (M13) with Enbridge to manage the distribution of the RNG to the third party

The IESO FIT contract expires on July 9, 2026.

Glanbrook Landfill:

Commodity	Parties	Contract/Agreement Description
2 Gas Digesters	City, HRPI	3.7 MW Capacity
Electricity	HRPI, Independent Electricity System Operator (IESO)	• HRPI currently holds a 20-year power purchase agreement contract with IESO, to sell electrical energy produced by the Cogeneration Facility to the IESO • Contract is expiring on November 18, 2028

The IESO FIT contract expires on November 18, 2028.

Both existing renewable energies generating sites will be assessed using following approach with a successful consultant and a fulsome report will be brought back to board in future date

Options		Short-term (1-3)	Mid/Long -term (4-10)
0	Status Quo - Continue existing operations without significant changes rather regular operations and maintenance	• Maintain current operational standards. • Conduct periodic maintenance on existing CHP and RNG systems	• Plan for gradual system upgrades to improve efficiency • Explore minor enhancements to existing infrastructure
1.1	100% RNG to Gas Line - Inject all Renewable Natural Gas (RNG) by injecting it into the gas line	• Upgrade Woodward's RNG equipment to reduce flaring and increase production • Apply for permits and begin planning for a new RNG facility at Glanbrook	• Complete RNG infrastructure at Glanbrook for gas line injection • Optimize RNG production and injection at both facilities
1.2	RNG to City - Renewable Natural Gas (RNG) directly consumed by City	• Coordinate RNG consumption plans with the city • Secure funding and permits for RNG expansion at Glanbrook	• Scale RNG distribution for city-wide use from both Woodward and Glanbrook • Develop infrastructure to support broader RNG consumption

2	100% CHP - Sell all generated energy through Combined Heat and Power (CHP)	• Maintain existing CHP operations at Woodward and electricity production at Glanbrook. • Evaluate potential for increasing efficiency at both facilities.	• Expand CHP operations at Woodward and electricity generation at Glanbrook. • Explore integrating additional renewable sources at both sites.
3	Hybrid: Maintain CHP and RNG at same site	• Upgrade RNG at Woodward and plan new RNG infrastructure at Glanbrook. • Secure funding and permits for dual operations.	• Complete infrastructure for both CHP/RNG at Woodward and RNG/electricity at Glanbrook. • Develop long-term hybrid operation strategy for both sites.

3.1 Woodward Wastewater Treatment Plant (WWTP)

At the Woodward Avenue WWTP, thickened raw sludge (TRS) and thickened waste activated sludge (TWAS) are stabilized in three (3) primary anaerobic digesters, producing digester gas as a byproduct. The plant currently uses the digester gas in either the on-site BPU or as fuel to the HRPI CHP unit, and any excess gas is flared. Thermal energy is used to heat the Woodward Avenue WWTP digestion process. The facility is operated and maintained by Toromont Power Systems (Toromont) and Hamilton Community Energy (HCE) under contract with HRPI, with the contract term ending on December 31, 2025.

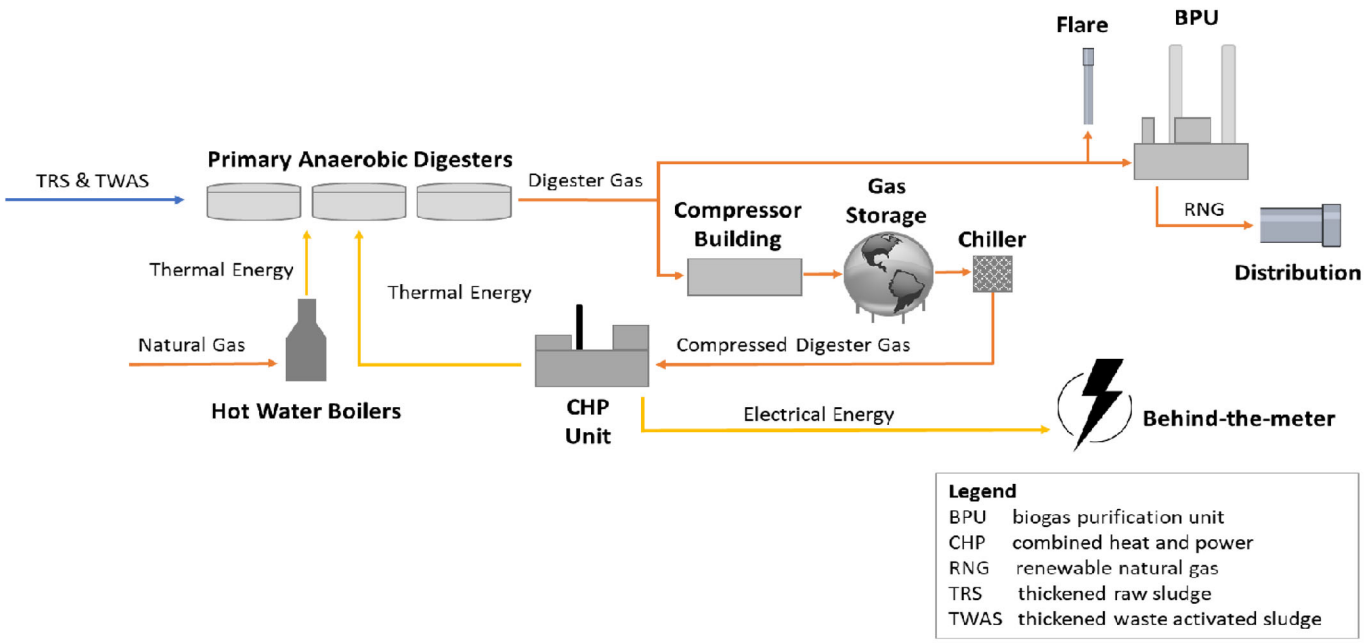


Figure 1. Woodward Avenue WWTP Digester Gas Production and Use

Option 0: Status Quo - Continue existing operations without significant changes rather regular Operations and maintenance.

- Despite gas revenues and city staff support, the project is not generating sufficient positive net benefits, leading to a deteriorating net cash position.

Option 1.1: 100% RNG to Gas Line - Inject all Renewable Natural Gas (RNG) by injecting it into the gas line.

- Most Profitable option when RNG is sold to a third party, however, the third party also receives the associated RNG grid injection GHG emissions credit, decreasing the overall environmental score.

Option 1.2: 100% RNG to City - Renewable Natural Gas (RNG) directly consumed by City.

- This option is not profitable and to produce more methane gas, the City and HRPI should consider upsizing the BPU/CHP unit equipment beyond 15,000 m3/d to accommodate digester gas projections over the next 20 years. Upsizing would also reduce the amount of digester gas going to flare. Additionally, the City can reduce GHG by applying the RNG grid injection GHG emissions credit to the City's overall GHG emissions and improve overall environmental score.

Option 2: 100% CHP - Sell all generated energy through Combined Heat and Power (CHP)

- This option is not profitable. To consider this option as viable, we must negotiate a new O&M contract with better conditions and increase electricity production by improving engine availability and efficiency.

3.2 Glanbrook Landfill

The landfill manages waste decomposition, capturing the resulting landfill gas (LFG) for energy generation. The process includes waste placement, gas collection, and conversion to energy. The facility is operated and maintained by Toromont Power Systems (Toromont) under contract with HRPI, with the contract term ending on December 31, 2027.

Glanbrook Landfill - Future Scenarios

Option 0: Status Quo - Continue existing operations without changes.

- The project is incurring operating losses each year, which is a significant concern.

Option 1.1: 100% RNG to Gas Line - Sell all Renewable Natural Gas (RNG) by injecting it into the gas line.

- Most Profitable option when RNG is sold to a third party, however, the third party also receives the associated RNG grid injection GHG emissions credit, decreasing the overall environmental score.

Option 1.2: 100% RNG to City - Sell all Renewable Natural Gas (RNG) directly to the City.

- This option has less of an economic benefit, however, reduces GHG emissions as the City can apply the RNG grid injection GHG emissions credit to the City's overall GHG emissions and improve overall environmental score.

Option 2: 100% Electricity - Sell 100% Electricity

- This option is not profitable. To consider this option as viable, we must negotiate a new O&M contract with better conditions and increase electricity production by improving engine availability and efficiency.

WSP Report on LFG collection efficiency:

It is unlikely that the Glanbrook Landfill would achieve a high LFG collection efficiency (60-85%) for the following reasons:

- **Old Waste:** Parts of the landfill contain waste from the 1980s, where most LFG generation has likely already occurred.
- **Final Cover Design:** The landfill's final cover is designed to allow water infiltration, which increases the risk of LFG escaping vertically if not properly managed.
- **Methane Oxidation:** Some methane may be naturally reduced as it passes through the soil cover, but this effect is usually minimal (0-10%). (Harwood, 2023)

3.3 DORMANCY/ WINDING DOWN OPTION

The council instructed City staff to present a report on June 13, 2024 on dormancy and winding down costs. The report was subsequently presented to the council on September 12, 2024. Following presents a summary of the report and is available in Dormancy Termination Status Quo.xlsx

- **Dormancy Option:** The City of Hamilton will incur financial losses totaling **$998,000** by the end of 2024 due to the loss of methane gas sales. Despite this, other expenses, including O&M contracts, insurance, communications, and City staff support, will continue to be incurred.

- **Winding Up Option:** The City of Hamilton is going to incur the following financial losses:
  - Year 1 – ($1.8 M)
  - Year 2 – ($811 K)
  - Year 3 – ($811 K)
  - At the end of year three, the total estimated financial cost to the City of Hamilton is estimated **$3.4 M.**
  - The total environmental impact to the City is approximately 10,593 (tCo2e) tons of carbon dioxide emissions equivalent. This is equivalent to 2,357 gasoline powered passenger vehicles being driven for one year. (Kyere, 2024)

If the project is made dormant or fully terminated, it will lead to substantial financial losses for the City.

4. FUTURE OPPORTUNITIES

4.1 Solar Renewable Generation

As part of its commitment to decarbonizing the local community, the City has set targets to cover 50% of municipal buildings with rooftop solar PV covering at least 30% of each building's load by 2050. The City is also planning to add 280 MW of ground-mount solar within City limits by 2050. The City of Hamilton currently leases roof space to Alectra Utilities for a 250-kW rooftop solar PV installation at the Wentworth Operations Centre. Hamilton Public Library installed a 30-kW rooftop solar PV on the Valley Park Library and Community Centre as part of its LEED Gold certification and has located its Parkdale Branch in a Passive House-certified apartment complex powered in part by a 30-kW rooftop solar PV system.

The Pathway to Net Zero has identified 10 solar PV installation opportunities within the next five years, with two of the identified projects at Harry Howell Arena and Morgan Firestone Arena currently in progress. The PNZ has also identified three further solar heating opportunities within the Recreation portfolio. Hamilton Water is undertaking a feasibility study to identify suitable solar PV sites to be completed by the end of 2024. City will explore various alternate delivery models to implement identified solar renewable energy generation projects. (Conservation and Demand Management Plan , 2024)

Future assessments will be conducted on solar renewable power projects, with the possibility of HRP Inc. being involved in the O&M portion.

4.2 Sewer Thermal Energy Utilization

Sewer Thermal Energy Utilization (STEU) represents a cutting-edge approach to sustainable energy, capitalizing on the thermal energy present in wastewater. This innovative technology involves capturing the heat from sewage systems, which maintains a relatively stable temperature year-round, and repurposing it for heating, cooling, or electricity generation. By integrating STEU into Hamilton Renewable Power Inc.'s portfolio, the company can significantly enhance its commitment to environmental sustainability and energy efficiency.

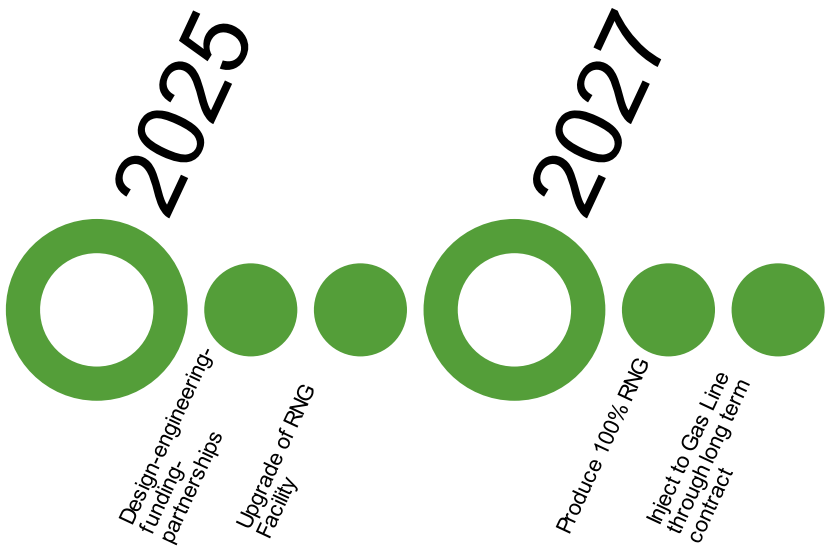
The STEU process typically employs heat exchangers to extract thermal energy from wastewater, which can then be used directly in district heating networks or converted into electricity. This technology offers a continuous and reliable energy source, given the consistent flow and temperature of wastewater in urban settings. The benefits of STEU extend beyond energy efficiency; it also reduces greenhouse gas emissions, lowers reliance on fossil fuels, and provides a cost-effective alternative to traditional heating and cooling methods.

By investing in STEU, HRP Inc. can position itself as a leader in the renewable energy sector, particularly in urban environments where the demand for sustainable solutions is growing. This aligns with HRPI's broader strategy of diversifying its energy portfolio while meeting the city's sustainability goals. Moreover, STEU's scalability makes it an attractive option for future expansion, offering both environmental and economic advantages to the community.

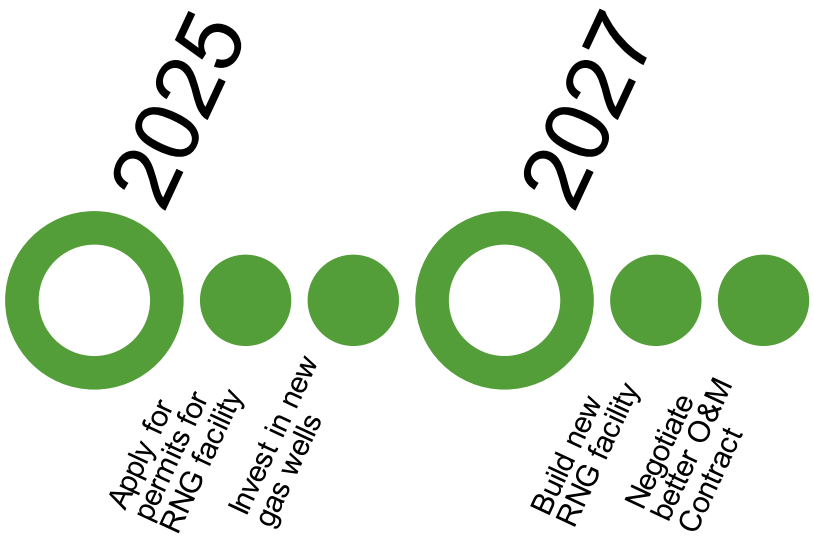
5. RECOMMENDATIONS

The recommendations will be presented in a phased approach for consideration. These are the short-term plans for HRP Inc. until the O&M and IESO contracts expire as well as the plan for minimizing the loss as we gear up for transformation to low carbon fuel scenario.

- **Woodward Wastewater Treatment Plant**



- **Glanbrook Landfill**



6.1 Combined RNG and CHP Strategy

Phase 1: Status Quo (Years 1-3)

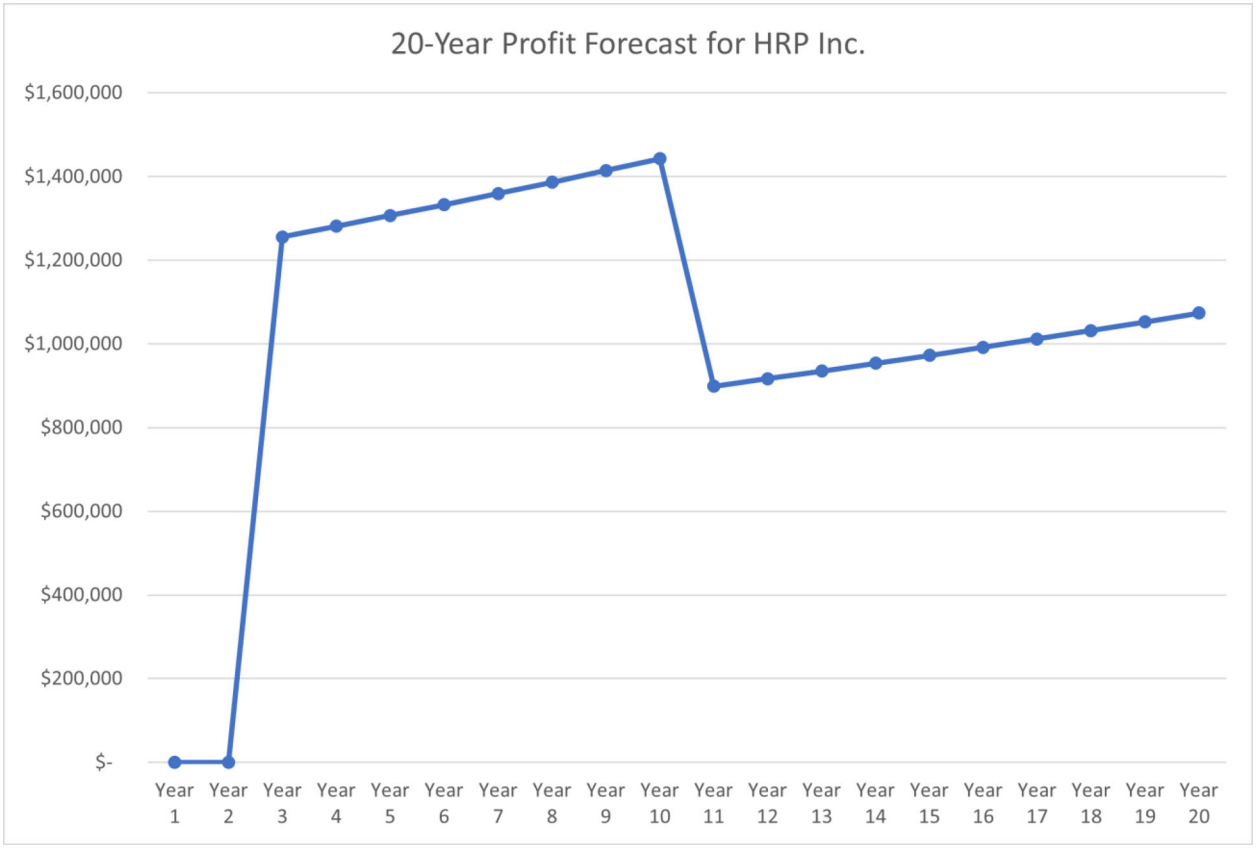
- Maintain current operations without changes until expiration of current electricity contracts.

Phase 2: High-Value RNG Sales (Years 4-10)

- Sell 100% of Renewable Natural Gas (RNG) by injecting it into the gas line to maximize revenue from higher market prices.

Phase 3: Strategic RNG Supply to the City (Years 11-20)

- Sell 100% of Renewable Natural Gas (RNG) to the City, enabling it to benefit from carbon credits, support sustainability initiatives, and advance its goal of achieving net-zero carbon emissions by 2050.



Following metric will be used to assess financial viability of different options.

1. **Positive NPV:** The NPV indicates that the project is expected to generate a value greater than its costs, in today's dollars. This means the project is expected to be profitable.
2. **Shorter Payback Period:** 7–10-year payback period is relatively reasonable for large projects, indicating that the initial investment will be recovered within this period, after which the project will generate profit.
3. **IRR:** Higher IRR reflects that the project's return exceeds the minimum return required by potential investors, making it an attractive investment.

6.2 Funding Strategy

Federal and Provincial Grants: Including Federation of Canadian Municipalities (FCM), The Atmospheric Fund (TAF), and Low Carbon and Zero Emission Fuel Fund.

Investment Tax Credit (Clean Electricity ITC): 15% of the investment cost.

Long-term Borrowing: 60-70% financed at a 6% interest rate.

Equity from the City: 30-40% financed with a Return on Equity expectation of 10%.

Clean Fuels Fund V2.0: “Energy Innovation Program – Stream 2 – Renewable Energy Demonstrations Call”

7. REFERENCES

(2024). *Conservation and Demand Management Plan .* Hamilton.

(2023). *Landfill Gas Generation Estimates.* WSP, Harwood, A

(2024). *Financial Impact of the Losses of Hamilton Renewable Power Inc. on the City of Hamilton.* Hamilton, Kyere, C.