



S A E W A

Southern Alberta Energy from Waste Association

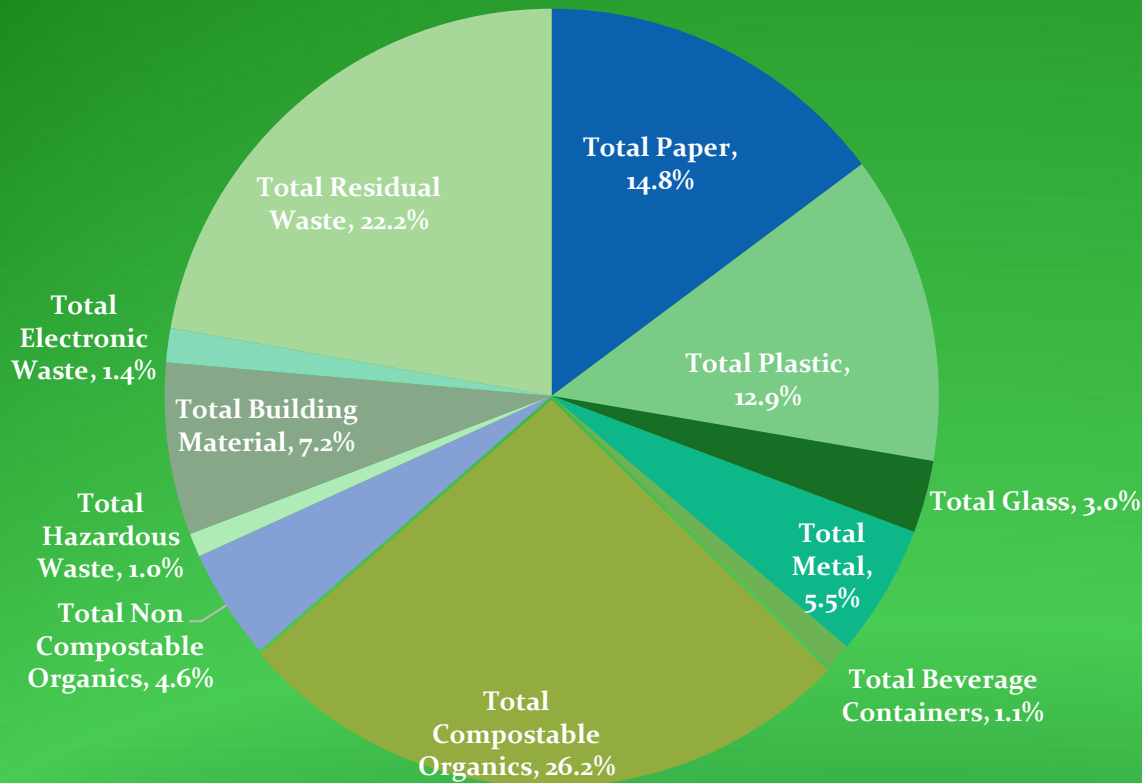
Kneehill County

April 2024

The SAEWA Project

Research and implementation of energy recovery from NON-RECYCLABLE WASTE MATERIALS to reduce long term reliance on landfills.

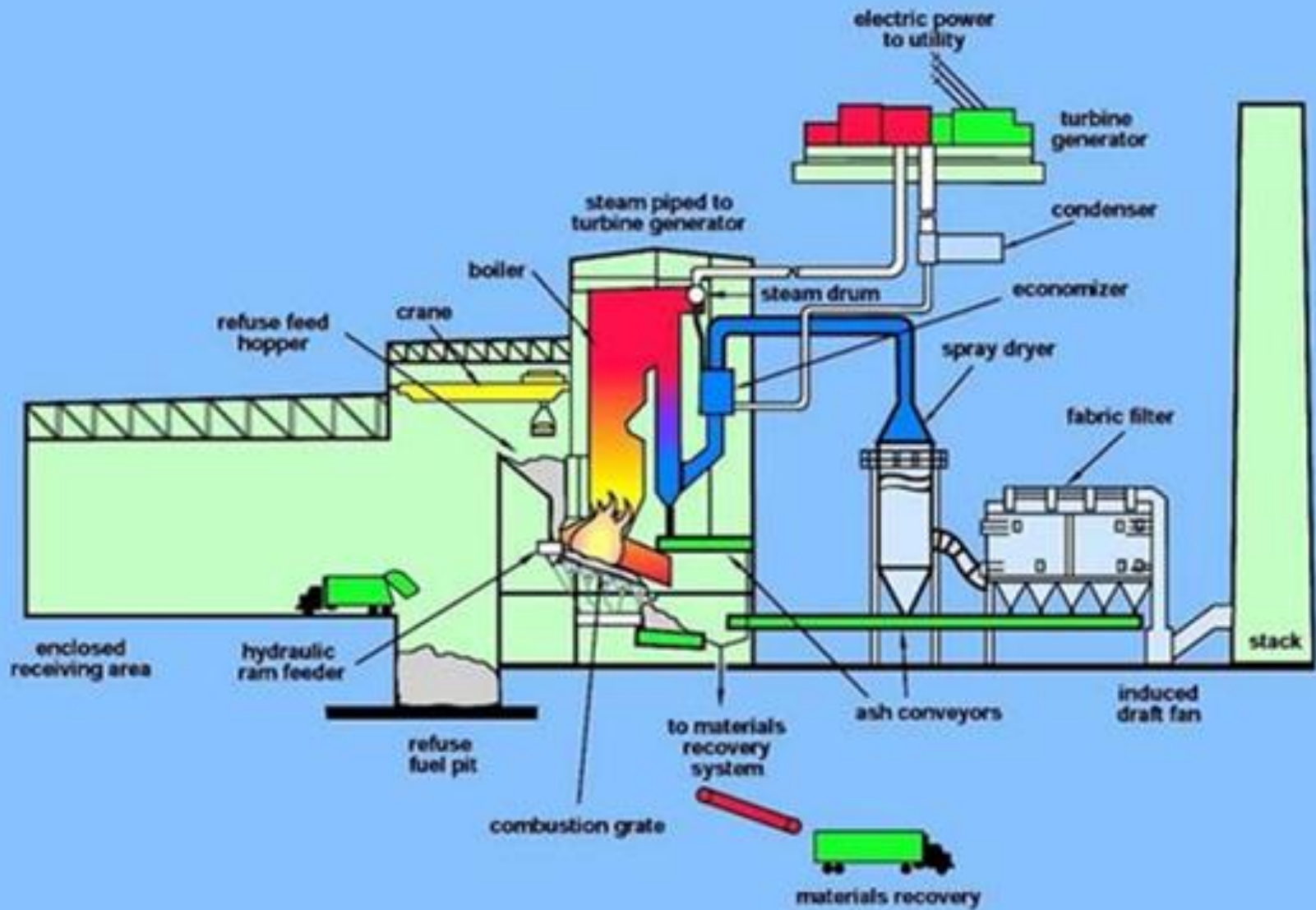
Waste Characterization



Significant waste diversion opportunities still present

Used as input to:

- Volume of waste received at EFW
- Heat content of waste



Feasibility Study

- Task 1 Waste Generation and Sizing
- Task 2 Combustion Technology Evaluation
- Task 3 Waste Collection, Transportation & Handling
- Task 4 Heat Recovery & Cogeneration Options
- Task 5 Air Emissions GHG & Control Options
- Task 6 Permitting Requirements
- Task 7 Capital and Operating Costs

Work Completed (\$1.5m)

- • Project Development Plan
- • Regulatory Requirements Plan
- • Siting Process Plan
- • Communications Plan
- • Procurement Process Plan
- • Initial Business Plan
- • Detailed Business Plan
- • Waste Stream Characterization
- • Member Waste Stream Current Costs
- • Governance Model: Brownlee LLP/Municipal Affairs
- • Siting Analysis: U of A
- • LCA: HDR with 3rd Party Review with O&G Sustainability and Pembina Institute

Overview

- Processing Capacity: Up to 300k tonnes per year.
- Potential Outputs: +/- 50 MW electricity +/- 1 million tonnes process steam
- Estimated tipping fees: \$50 per tonne with higher level (non granted) government support. \$90 per tonne with debt financing.
- Green House Gas Reductions (peer reviewed): 230k tonnes per year 7m tonnes over the life of the project
- Engineers of Record: HDR Inc.
- Funds Expended:
 - Higher level of Governments \$1.5m
 - Municipal support estimated \$2.0m

LCA January 2018

Emissions Over the Study Period	tCO_{2e}	tCO_{2e}/tMSW
Landfilled MSW	7,418,135	0.824
Transportation of MSW to Landfills	56,473	0.006
Total Landfill Alternative Emissions	7,474,607	0.831
Waste Combustion at EfW Facility	2,880,568	0.320
Transportation of Waste to EfW Facility	99,484	0.011
Emissions Displaced from Generated Electricity	(2,435,132)	(0.271)
Emissions Displaced from Metals Recovery	(168,480)	(0.019)
Total EfW Facility Alternative Emissions	376,441	0.042
Reduction in GHG Emissions from EfW Facility Relative to Landfilling	7,098,166	0.789
	95.0%	95.0%

How do we Pay for it?

Municipal infrastructure routinely amortised 20 yrs.
WTEs have a 30 to 50 year lifespan with no post closure costs like landfills.

Could be considered similar to Regional water/wastewater infrastructure for funding

Utility model shares cost over many Municipalities

Public/Private is often used

Private sector Design/Build/Operate is often used

Summary of Financials – Base Case

Cost (\$M)	NPV	2021	2050
Principal repayment	(\$260.15)	(\$10.12)	(\$25.48)
Interest payments	(\$178.62)	(\$15.98)	(\$0.62)
O&M costs	(\$487.79)	(\$22.48)	(\$39.91)
Total facility costs	(\$926.56)	(\$48.57)	(\$66.01)

Operating Revenue (\$M)	NPV	2021	2050
Electricity sales	\$290.24	\$14.70	\$21.18
Recovered metal sales	\$75.68	\$2.45	\$7.83
Carbon offset credit sales	\$32.10	\$3.47	\$0.00
Bottom ash sales	\$6.94	\$0.41	\$0.41
Total operating revenue	\$404.96	\$21.04	\$29.42

Net Cost per Tonne	Levelized (NPV)	2021	2050
Total cost per tonne	(\$183.69)	(\$161.91)	(\$220.03)
Total revenue per tonne	\$80.28	\$70.13	\$98.06
Net cost per tonne	(\$103.41)	(\$91.78)	(\$121.98)

Variable	Units	Values
Debt financing ratio	%	100%
Interest rate	%	3.21%
Term (years)	years	30
Annual debt service	\$M	\$26.10
Bond issuance year	year	2020

Tipping fee of **\$91.78** (2021) required to subsidize facility operating costs

Summary of Financials – Interest-free Loan

Cost (\$M)	NPV	2021	2050
Principal repayment	(\$476.53)	(\$15.88)	(\$15.88)
Interest payments	\$0.00	\$0.00	\$0.00
O&M costs	(\$911.82)	(\$22.48)	(\$39.91)
Total facility costs	(\$1,388.35)	(\$38.36)	(\$55.80)

Operating Revenue (\$M)	NPV	2021	2050
Electricity sales	\$533.42	\$14.70	\$21.18
Recovered metal sales	\$147.15	\$2.45	\$7.83
Carbon offset credit sales	\$45.13	\$3.47	\$0.00
Bottom ash sales	\$12.38	\$0.41	\$0.41
Total operating revenue	\$738.07	\$21.04	\$29.42

Net Cost per Tonne	Levelized (NPV)	2021	2050
Total cost per tonne	(\$154.26)	(\$127.87)	(\$186.00)
Total revenue per tonne	\$82.01	\$70.13	\$98.06
Net cost per tonne	(\$72.25)	(\$57.74)	(\$87.94)

Variable	Units	Values
Debt financing ratio	%	100%
Interest rate	%	0%
Term (years)	years	30
Annual debt service	\$M	\$15.88
Bond issuance year	year	2020

Tipping fee of **\$57.74** (2021) required to subsidize facility operating costs

Summary of Financials – Grant / Utility Model

Cost (\$M)	NPV	2021	2050
Principal repayment	\$0.00	\$0.00	\$0.00
Interest payments	\$0.00	\$0.00	\$0.00
O&M costs	(\$487.79)	(\$22.48)	(\$39.91)
Total facility costs	(\$487.79)	(\$22.48)	(\$39.91)

Operating Revenue (\$M)	NPV	2021	2050
Electricity sales	\$290.24	\$14.70	\$21.18
Recovered metal sales	\$75.68	\$2.45	\$7.83
Carbon offset credit sales	\$32.10	\$3.47	\$0.00
Bottom ash sales	\$6.94	\$0.41	\$0.41
Total operating revenue	\$404.96	\$21.04	\$29.42

Net Cost per Tonne	Levelized (NPV)	2021	2050
Total cost per tonne	(\$96.70)	(\$74.92)	(\$133.05)
Total revenue per tonne	\$80.28	\$70.13	\$98.06
Net cost per tonne	(\$16.42)	(\$4.79)	(\$34.99)

Variable	Units	Values
Debt financing ratio	%	n/a
Interest rate	%	n/a
Term (years)	years	n/a
Annual debt service	\$M	n/a
Bond issuance year	year	n/a

Tipping fee of **\$4.79** (2021) required to subsidize facility operating costs

Site Selection

Request for expressions of interest

- 11 sites submitted for analysis and comparative evaluation (Long List of EFW Sites):
 - Wheatland County (1 Site)
 - Vulcan County (2 Sites)
 - County of Newell (1 Site)
 - Town of Coaldale (3 Sites)
 - Special Areas Board (3 Sites)
 - Town of Claresholm (1 Site)

Preferred Site – Why County of Newell (cont'd)

- **Highest Ranking for Social and Cultural**
 - Furthest from nearest Park
 - Furthest from Residential Areas
 - Furthest from Historic Resources
 - Furthest from Sensitive Receptors
- **Highest Ranking for Land Use**
 - Compatible with existing zoning; "Public Service" already approved for waste management.
 - Part of the Newell Regional Landfill, the site area is used for storing concrete, asphalt, and shredded tires
- **3rd Highest Ranking for Technical**
 - Good design flexibility, although the site is smaller than others (note adjacent property is available is required.)
 - Proximity to major power transmission lines and major highways

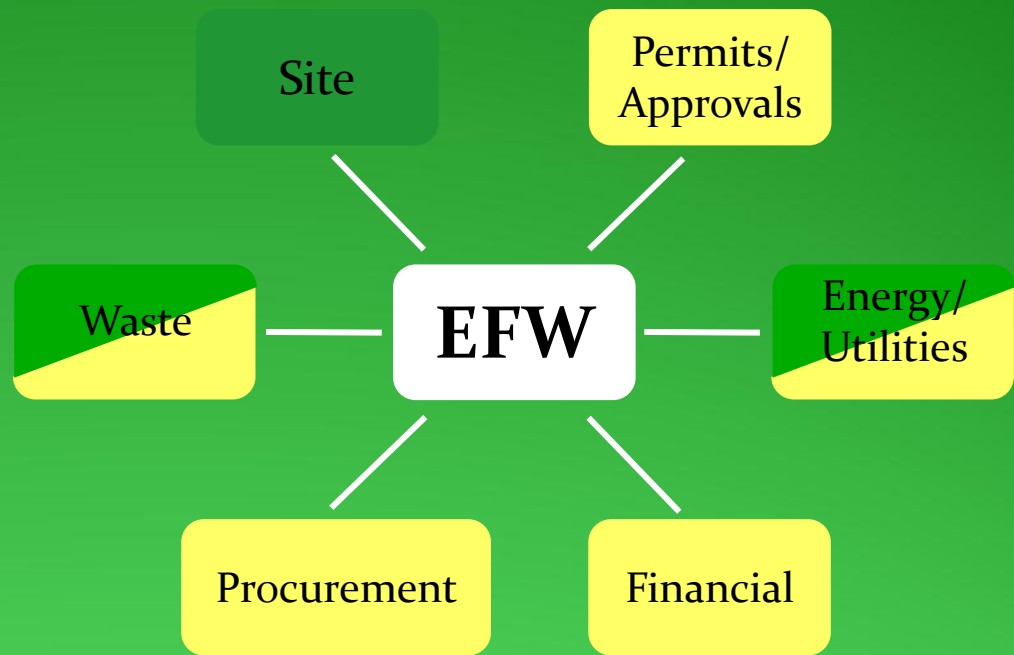
Preferred Site – Why County of Newell

- **Highest Ranking for Cost and Constructability**
 - Limited/No Upgrades required to existing roadway infrastructure
 - Publicly Owned
 - Permitting/Approvals likely easier given it is a brownfield site and already an existing waste management facility
 - High potential for district energy users which could have a significant effect on overall business case for facility
- **Highest Ranking for Environmental**
 - Furthest from nearest water body
 - Fewest number of wetlands in proximity
 - 0 at-risk species were identified within a 1 km radius
 - Already an existing waste management facility

Next Steps

The next steps for the development process overall include:

- confirmation of potential energy users;
- development of a more detailed business case;
- economic analysis and review of financing options;
- examination of securing waste supply;
- consideration of rail access options; and,
- initiation of the facility/technology procurement process.



Request for Expressions of Interest

- Posted on MERX Canada site.
- Closing date extended by 1 month to September 20, 2021 at the request of Technology Vendors.
- Technology not restricted but must be commercially demonstrated.
- 29 Companies have downloaded documents.
- Expect submissions to be at the last minute.
- Strategy was to have REOI's in hand before Municipal Elections and evaluate following.

Who Responded

- <https://www.covanta.com>
- <https://www.hz-inova.com> & <https://www.acciona.com>
- <https://www.suez-na.com/>

Snapshot – Covanta

(Note: Unverified information summarized from EOI submission.)

	Covanta Energy LLC
Primary business	Owner & operator of waste to energy facilities. Head office in New Jersey
Proposed roles	Developer, designer, technology provider, constructor & operator
Corporate Background	<ul style="list-style-type: none">• Established 1939. Formerly Ogden Corporation.• Founded as Covanta in 1983.• Prior to 2018 acquired several other firms.• Owned by Covanta Holding Corporation. Listed on the New York Stock Exchange: CVA
Key Facts	<ul style="list-style-type: none">• 41 operating waste to energy facilities (39 in North America)• Annual capacity to process 21 million tons of waste• Annual capacity to produce 10 million megawatt hours of electricity and 9 billion pounds of steam• 500+ employees

Snapshot – HZI & Acciona Partners

(Note: Unverified information summarized from EOI submission.)

	Hitachi Zosen INOVA (HZI)	Acciona <u>Concesiones</u> , SL (Acciona)
Primary business	Engineering, procurement, construction and operation of energy from waste plants	Developer and operator of renewable energy and infrastructure
Proposed roles	Developer, technology provider, constructor & operator	Developer, constructor & operator
Corporate Background	<ul style="list-style-type: none"> Established 1933 as L von Roll <u>Aktiengesellschaft</u> 1960 became Von Roll in Germany and Japan 1975 entered North American market 2003 Von Roll INOVA acquired by AE&E 2010 acquired by Hitachi Zosen 	<ul style="list-style-type: none"> Based in Madrid, Spain, operates worldwide Listed on the Madrid stock exchange Corporate history goes back 100+ years 2019 partnered with HZI on 300,000 tons/year energy from waste plant in Australia
Key Facts	<ul style="list-style-type: none"> 700+ energy from waste projects since 1933 15 operating waste to energy plants in North America 2 operating anaerobic digestion plants in US 	<ul style="list-style-type: none"> 40 public-private partnerships (6 in Alberta) 2019 involved in energy from waste project in Scotland Owns/operates 10,100 megawatts of wind power generation

Snapshot – Suez

(Note: Unverified information summarized from EOI submission.)

SUEZ

Primary business	Waste management, water and wastewater treatment
Proposed roles	Developer, operations & maintenance. Will sub-contract other services such as engineering, technology provision and construction
Corporate Background	<ul style="list-style-type: none">• SUEZ Group global parent company active in waste management since 1919• Suez Canada established as an Alberta corporation in 2010
Key Facts	<ul style="list-style-type: none">• Operator of Edmonton High Solids Anaerobic Digester, EPCOR Biosolids Dewatering Facilities, Swan Hills Treatment Centre• Constructing compost plant and organic waste <u>biomethanization</u> plant in Montreal• Operates over 60 energy from waste plants around the world processing 9 million tons of waste

Next Steps

- HZI Presentation to Executive
- Executive to Evaluate MOU with HZI
- Executive Recommendation to Board

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