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**District Energy**

LATAM Conference 2023

SEP 27 - 29 | CARTAGENA | CO



Cartagena

| 27, 28 y 29 de septiembre |

# District Energy in Canada: An Overview of Enwave's Systems

Carlyle Coutinho, CEO  
Enwave Energy Corporation

Fecha/Date (28/09/2023)

Bandera país de  
origen

**Carlyle Coutinho, CEO  
Enwave Energy Corporation,  
Canada**



**Frases como//Phrases like::**

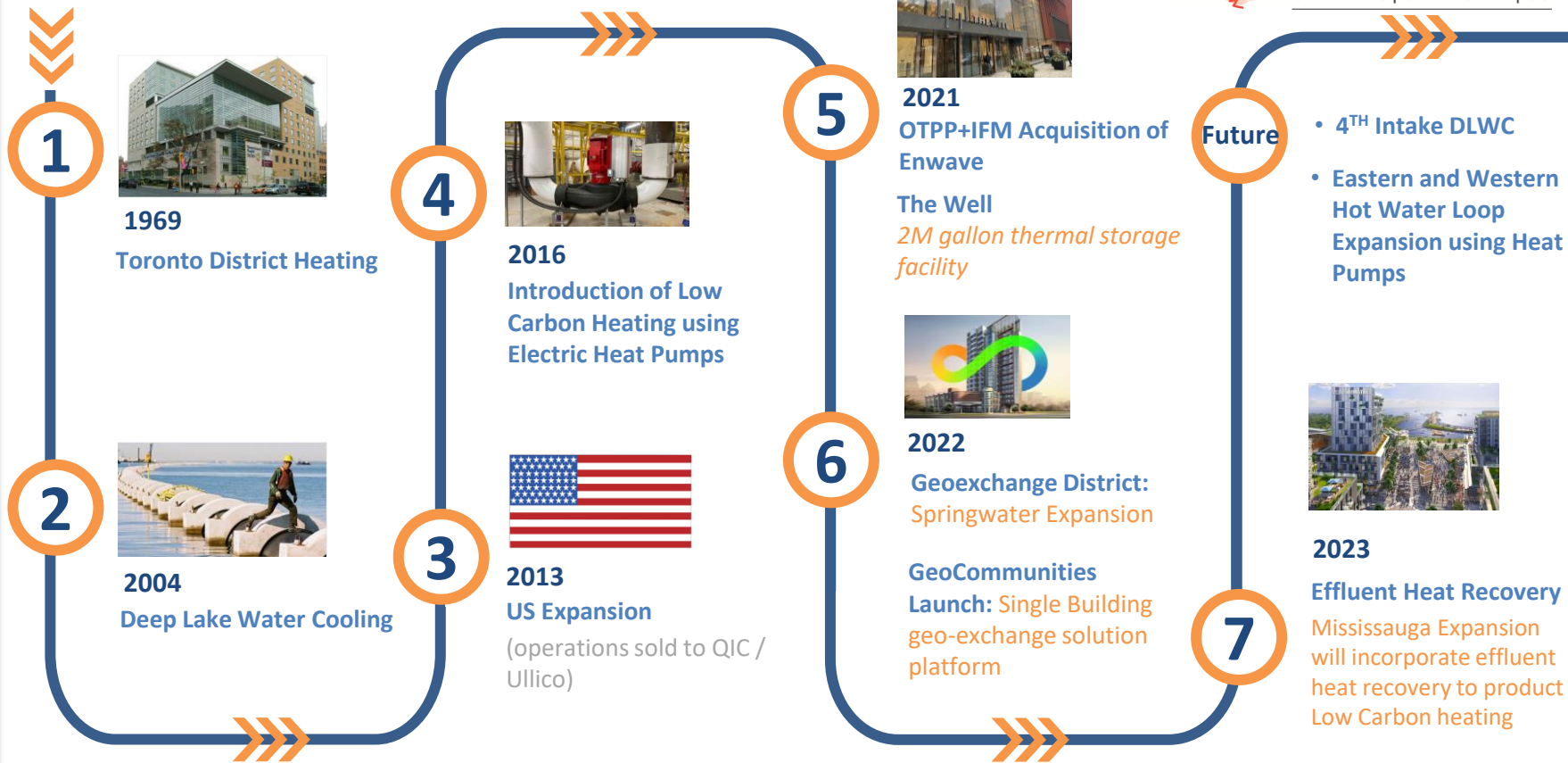
***“Los hombres tienen que ser fuertes, valientes, aguerridos”***

***“Las mujeres son el sexo débil”***

**Son estereotipos de género (are gender stereotypes)**

ENWAVE

# Enwave's Journey



# Enwave as Technology Integrator

We integrate a variety of

## Low Carbon Technologies

on a commercial basis that we can make available to our customers based on the scale of our districts

**104K**

Cooling capacity (Tons)

**2.7M**

Heating capacity (MBH)

**400+**

Buildings served

**450**

Geo Boreholes in Operation





# DEEP LAKE WATER COOLING

# System at a Glance

## INSTALLED CAPACITY

**178 MW** (with additional **91 MW** coming online in 2025)

## ORIGIN

**Public-Private Partnership was necessary to launch this project:**

1. **OMERS:** Financial investment & portfolio of buildings
2. **City of Toronto:** Municipal approval and partnership with Toronto Water
3. **Enwave:** Developer of DLWC system

Privatization and commercialization enabled scale from **10 to 100+** buildings served

## POLICIES

Toronto Green Standards dictates GHG intensity permitted in new construction

# Environmentally Friendly Energy

Servicing >100 buildings in Toronto's downtown core

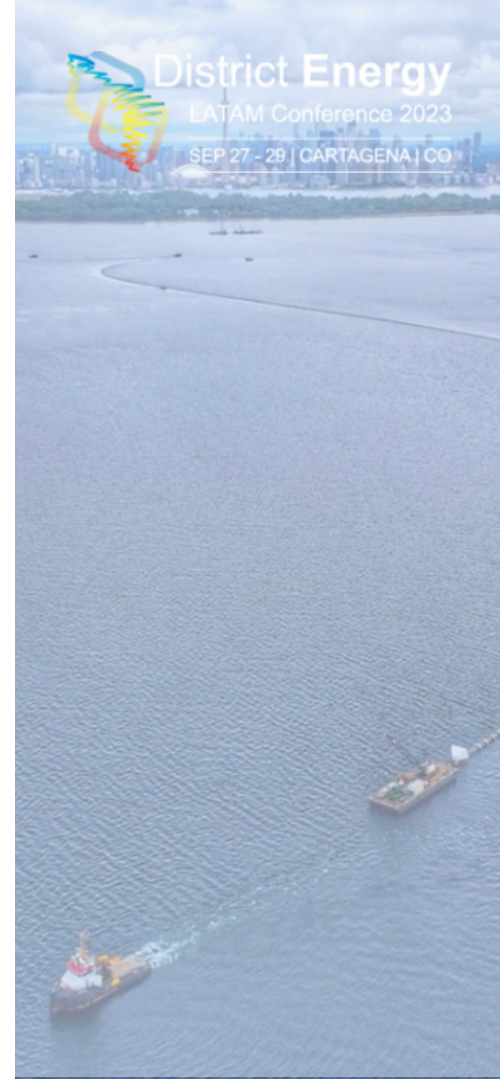
Electrical consumption reduced **92 Million kWh/Yr**

Electrical use reduced by **90%** over chillers

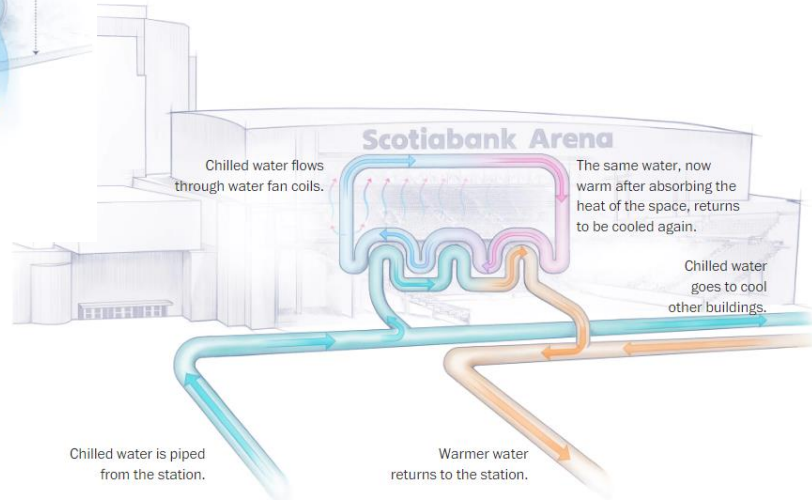
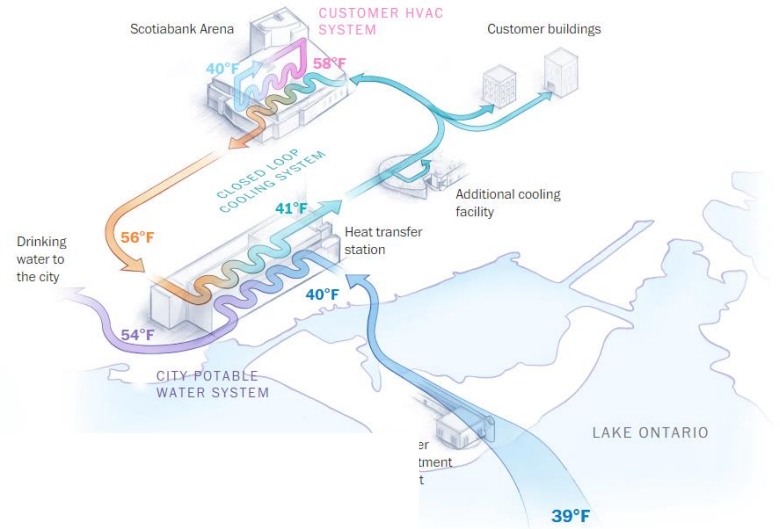
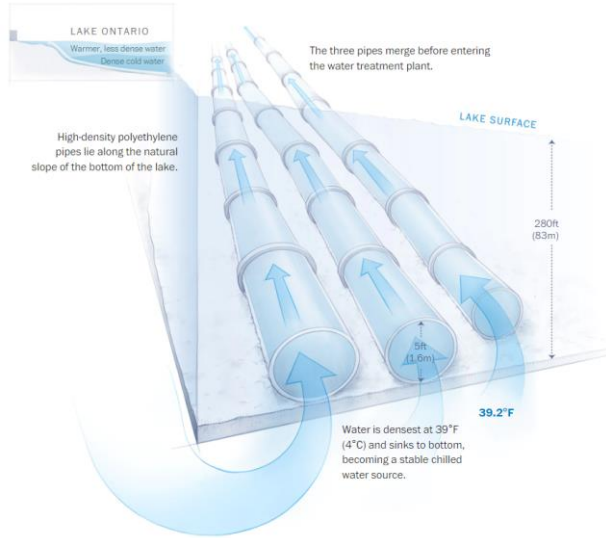
City electrical demand reduced by **61 MW**

Annual Emissions reduced by **~3000 tonnes/yr**

**714 million liters** less water used in cooling towers

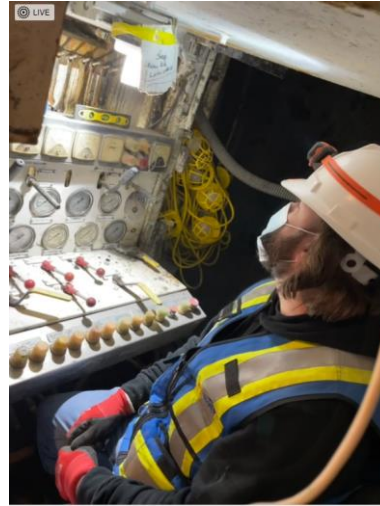


# How it Works

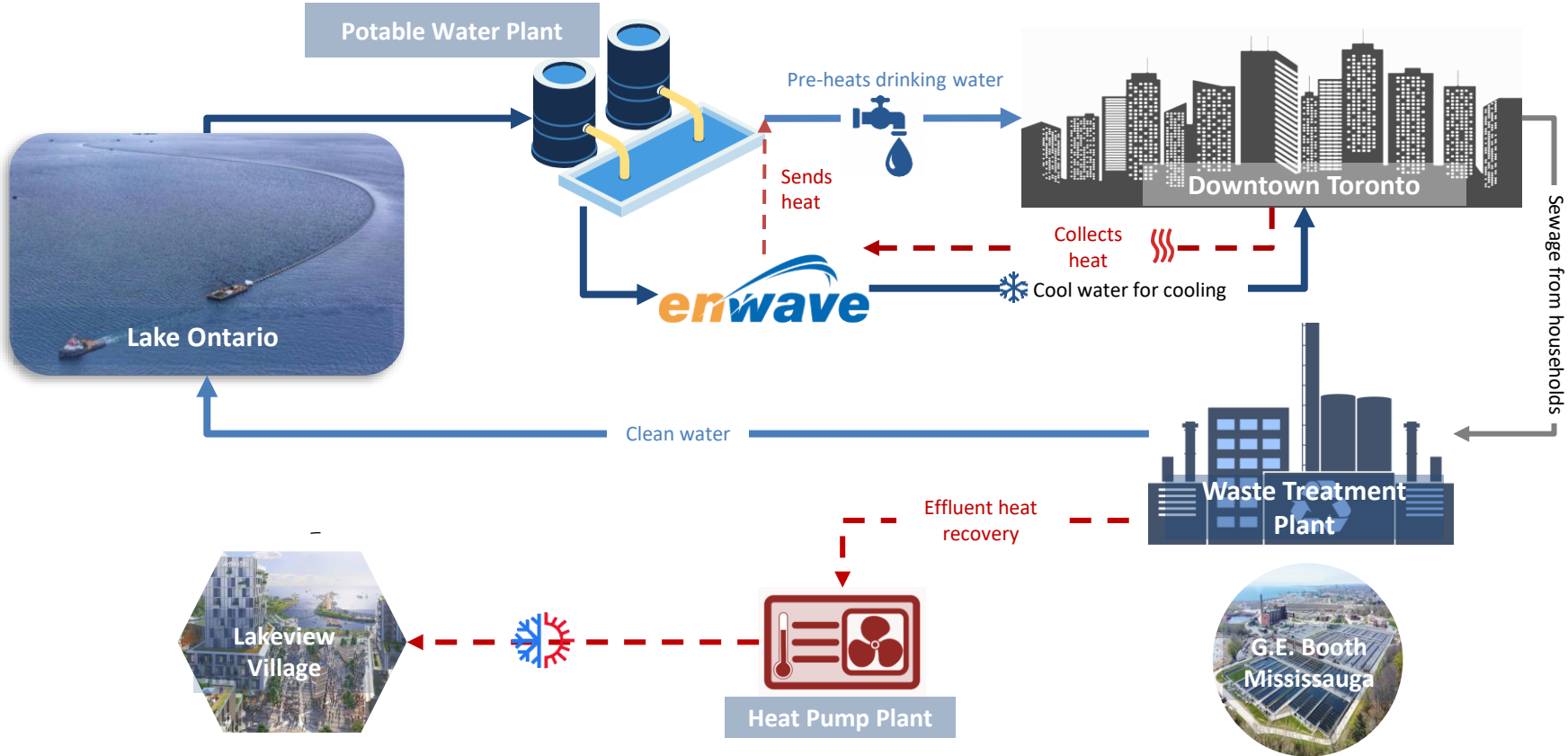


# Building a Sustainable City

Deep Lake Water Cooling







# Enwave in the Circular Economy






# Challenges and Opportunities

## CHALLENGES

-  Complex infrastructure requirements with large capital costs
-  Building infrastructure in congested, urban areas
-  Working with partners on ESAs
-  Working multiple stakeholder groups, including First Nations

## OPPORTUNITIES

-  Scaling our technology to bring low carbon solutions to our customers
-  Providing relief to the congested electricity grid; as each connected building reduces strain on the grid
-  Provide significant water savings compared to BAU



# GEO-EXCHANGE

# System at a Glance

## OPERATIONAL

**312 single-family homes** in Springwater Community & **3 high-rises**

## PIPELINE

**>70** customers with **1000+** boreholes in development in the Greater Toronto Area with **8 MW installed capacity**  
District geo-exchange project at **Etobicoke Civic Centre**

## ORIGIN

**Partnership that facilitated this development:**

1. **City of Markham:** Municipal access agreements
2. **Mattamy Homes:** Homebuilder
3. **Enwave:** Geo-exchange owner-operator

Worked together to develop a near net-zero community cost-neutral to conventional HVAC

## POLICIES

City of Markham's Net-Zero commitment provided pathway to development agreement

# Using the Earth as a Battery

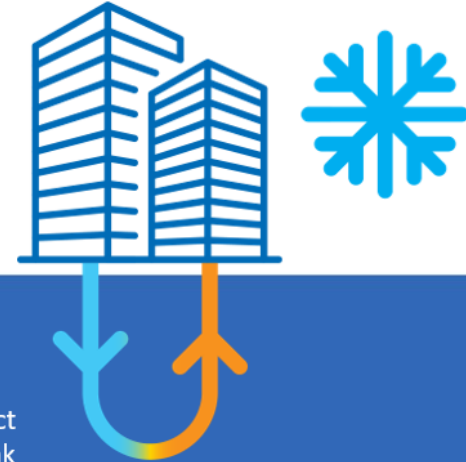
## SUMMER

In the summer, heat is collected from the buildings and transferred to the ground (heat sink)



## WINTER

In the winter, heat is collected from the ground and used to warm the buildings (heat source)



The earth is effectively used as a battery to store thermal energy and leveraging the near constant temperature of the ground, it can act both as a heat source and a heat sink

# Springwater Community - Markham Ontario



A geo-exchange system that supplies sustainable heating and cooling to the neighborhood of **312 net-zero-ready homes**



Innovative design that has been integrated into standard right-of-way construction to offer a **highly replicable solution**



Eliminated requirement for central plant



Buried infrastructure, does not affect appearances of community



# Challenges and Opportunities

## CHALLENGES

- Construction challenges (digging in rights of way; in urban areas; retrofits)
- Sizing of systems challenging for high-rise buildings
- Competition in market place
- Availability of drilling equipment

## OPPORTUNITIES

- Integrate geo-exchange with our existing platforms
- Leverage expertise in building out entire districts, as well as single-building solutions
- Provide near net-zero heating and cooling solutions

# BIOMASS & WASTE-TO-ENERGY

# System at a Glance

## OPERATIONAL

**145** buildings in Charlottetown, PEI

## CAPACITY

**30MW** with potential expansion of Waste to Energy capacity

## ORIGIN

### Partnership required to enable system development:

1. **PEI Government:** Requirement to address waste challenge on a small island
2. **Municipal and institutional offtakers:** UPEI, Hospital, and ~145 additional heating customers
3. **Charlottetown District Energy (Enwave):** system developer

Worked together to develop a local fuel source, as the province was dependent on imported fuel oil and electricity. The Waste to Energy facility also reduces the volume of every waste tonne produced by **90%**

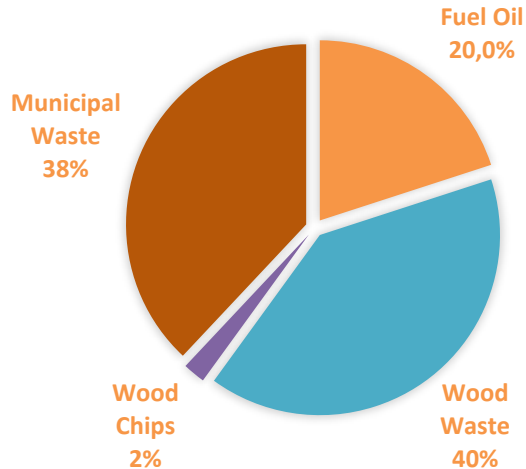
## POLICIES

PEI's vision to become **Canada's first Net-Zero province** (by 2040)

# Production Profile



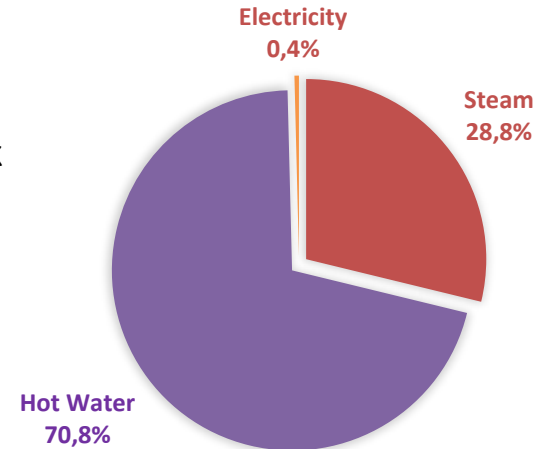
Production Source



**19 km**  
District Heating Network



Energy Sales



# Waste-to-Energy

Curbside sorted waste;  
Compost; Recyclables

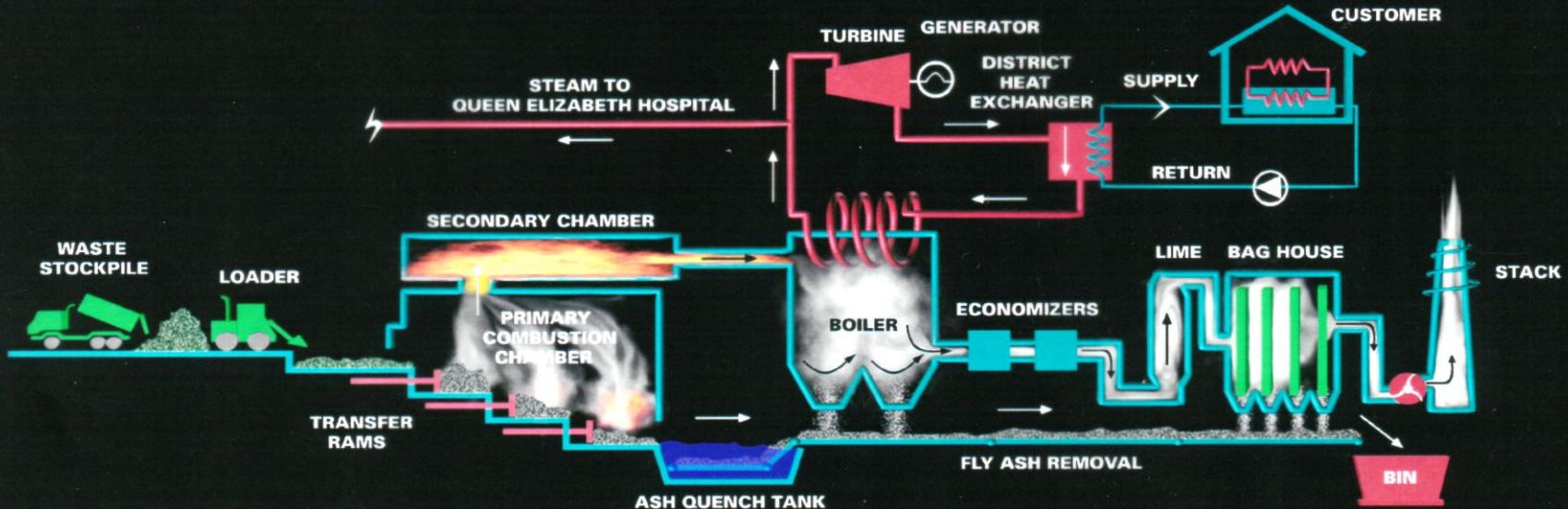
**Fuel**

3.25 Tonnes/hr

**Capacity**

Five Solios dry lime &  
activated carbon injection

**Air Pollution Control**



# Biomass

Wood waste – forestry  
& sawmill residue

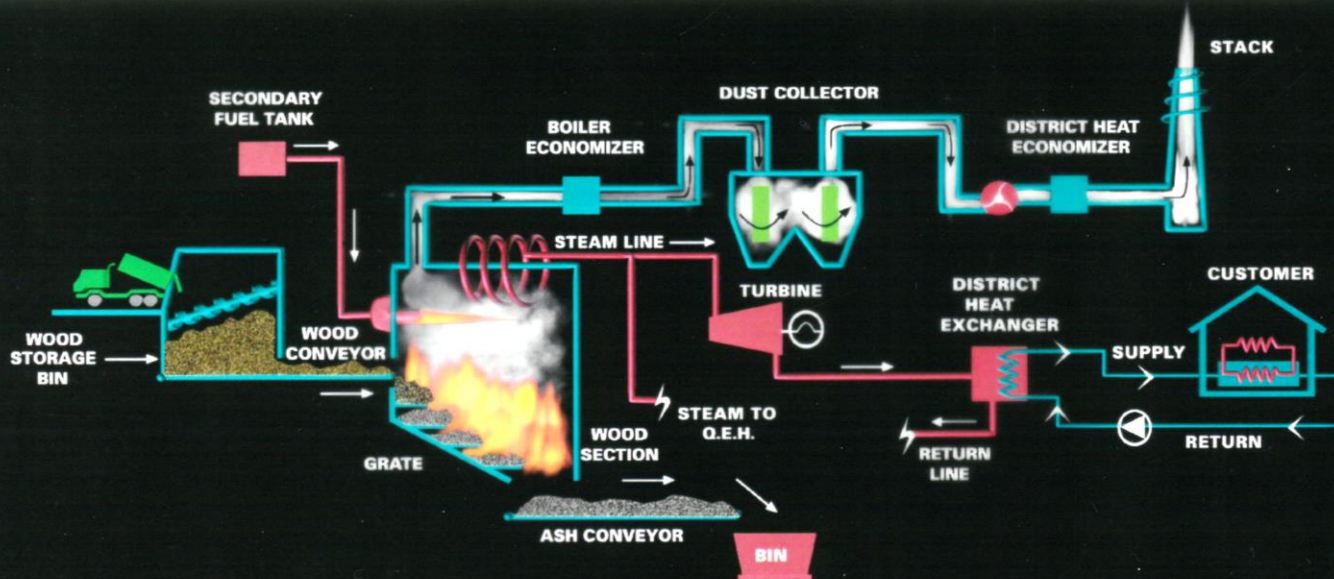
8 Tonnes/hr

Joy Multicyclone Particulate  
Removal System

**Fuel**

**Capacity**

**Air Pollution Control**

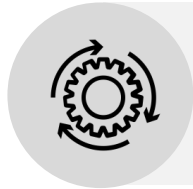


# System Benefits



## Local Energy Supply

- Best in class waste management and energy recovery process
- Solid waste processing offsets approximately **8M litres** of fuel oil
- Sawmill waste generates new source of revenue for harvesters
- Biomass offsets **8M litres** of fuel oil per year



## Supports Circular Economy

- ESG and Economics benefits through **efficient use of resources**, **reduced emissions**, **job creation**, and **fostering local innovation**
- Enhances waste diversion rates
- 70% retention rate in local economy for dollar spent on biomass fuel



## Climate Change Mitigation & Resiliency

- Reduced fuel oil consumption provides **net GHG savings**
- Significant **reduction of methane**
- We provide **consistent services** to critical infrastructure during frequent climate change environment

# Challenges and Opportunities

## CHALLENGES

- Mitigating GHGs associated with municipal solid waste and fuel oil requirements
- The island and the facility itself are both increasingly subject to climate events, making the need to climate-proof our operations critical

## OPPORTUNITIES

- Expansion of Waste to Energy facility likely to take place, significantly reducing reliance of fuel oil
- Continuing to alleviate PEI's waste challenge by using MSW as a fuel input



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**¡GRACIAS!**

**Carlyle Coutinho, CEO**

[Carlyle.Coutinho@enwave.com](mailto:Carlyle.Coutinho@enwave.com)

