

# LANDFILL GAS UTILIZATION





## THE PROCESS

Landfill gas produced by the decomposition of waste materials in the CESM landfill site is captured by a collection system composed of more than 350 wells and brought to the Gazmont plant, where it is burned in a boiler. The energy produced as steam by the boiler goes directly to a steam turbine, where the thermal energy is transformed into mechanical energy. Finally, this mechanical energy is transformed into electrical energy by an alternator. The electricity is delivered to the Hydro-Québec network at a voltage of 25 kV.

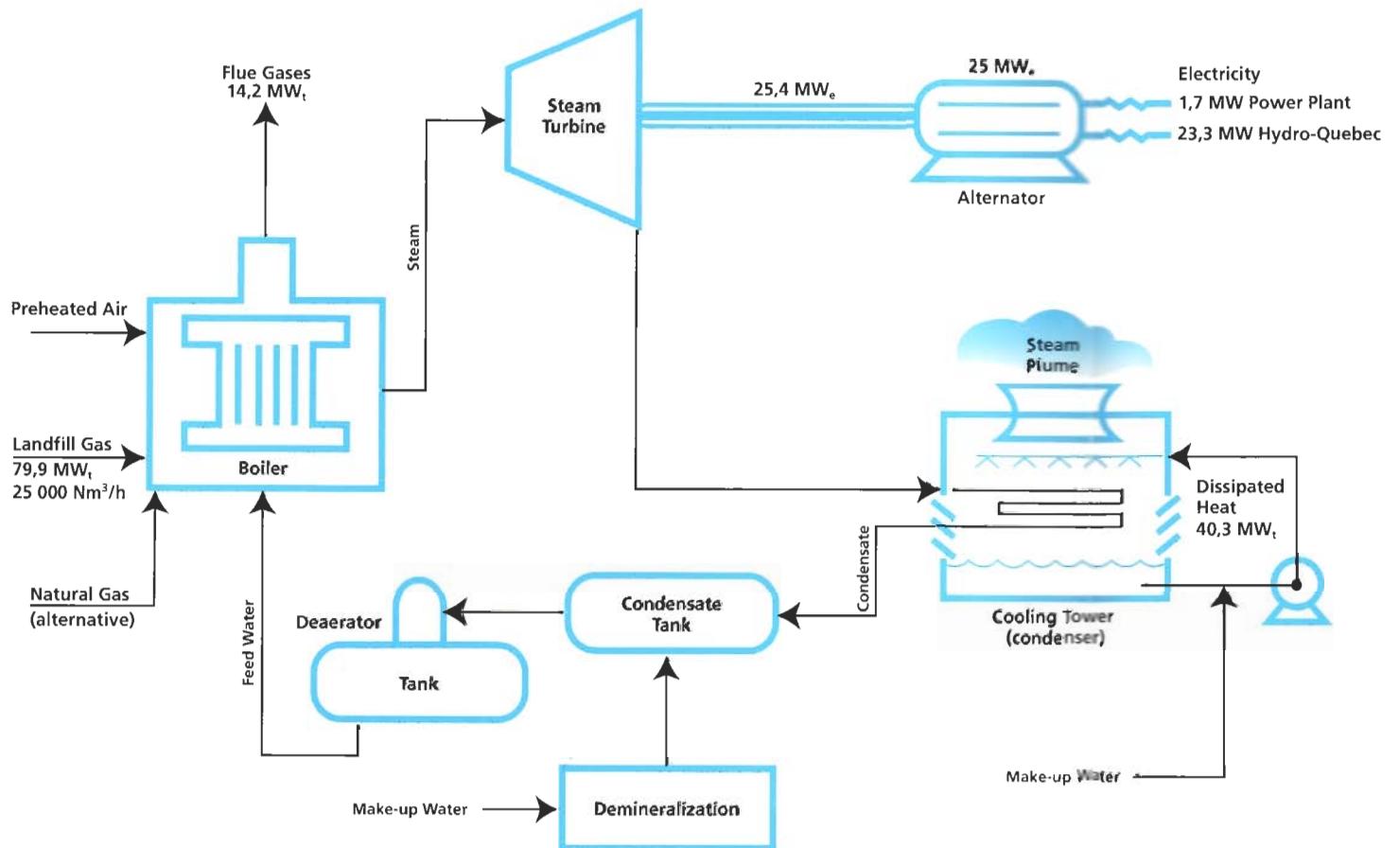
At the turbine exhaust, the steam is condensed in two wet-surface condensers to minimize the formation of steam plumes in winter. The condensed steam is recovered and pumped to the deaerator, which takes out the dissolved air. It is then returned to the boiler after pre-heating in a heat exchanger.

## Reduction of greenhouse gas emissions



### TECHNICAL ASPECTS

Landfill gas flow	25 000 Nm <sup>3</sup> /hr
Heating value (HHV)	12,43 kJ/m <sup>3</sup>
Net heat rate	13 333 kJ/kWhr
Net power rate	23,3 MW
Transmission voltage	25 kV
Annual energy production	189 GWhr/y



## LANDFILL GAS SUPPLY

### CESM LANDFILL GAS COLLECTION SYSTEM

Number of wells	360
Total length of collectors	19 km
Pumping station capacity	42 000 m <sup>3</sup> /hr
Number of compressors	7
Number of flares	5
Suction pressure	-25 kPa (g)
Delivery pressure	35 kPa (g)



## BOILER

Type	Two drum water wall
Steam production - pressure	100 000 kg/hr 8,65 MPa
- temperature	513°C
Flue gas recirculation	2%
Heat input	327 GJ/hr
Burners	2 Low - NO <sub>x</sub>



## TURBINE-ALTERNATOR

Turbine type	Axial flow condensation with 3 extractions
Turbine speed	6800 rpm
Alternator type	3 phase synchronous
Alternator speed	1800 rpm
Outlet power	25 MW
Outlet voltage	13,8 kV



# An alternate clean source of energy

## ATMOSPHERIC EMISSIONS

Particulate matter	4,9 ng/J
HCl	1,1 ng/J
PAH	<1,09 mg/GJ
CO	19,19 ng/J
SO <sub>2</sub>	16 ng/J
NO <sub>x</sub>	19 ng/J
Total VOC	3 ng/J



## CONDENSER

Type	Wet surface condenser
Fan	
- number	2
- diameter	7,9 m
- total air flow	3,925 Mm <sup>3</sup> /hr
Spraying system	
- total flow	62 500 L/min
- spraying pressure	20 kPa

## PARTNERS

Gazmont is a partnership of two Quebec companies that are recognized for their solid expertise in the fields of engineering, energy, and landfill gas: Biothermica and SNC-Lavalin.

Biothermica is a technology company specialized in thermal treatment of gases and solid waste. The Company is active in two (2) fields of activity:

- Landfill gas recovery and energy production;
- Industrial air pollution control.

Since its foundation in 1987, the Company has supplied turnkey projects in the field of VOC control, particulate filtration and landfill gas valorization for more than \$70 million and has been responsible for the reduction of more than 2 million tons eq. CO<sub>2</sub> per year of greenhouse gases (GHG) emissions. Biothermica supplies the patented BIOTOX regenerative thermal oxidizer (RTO) for VOC control and the CLINOX stainless steel baghouse for hot gas particulate removal. Biothermica is also considered a leader in the field of landfill gas control, management and utilization both in Canada and abroad. It finances landfill gas to energy production projects.

Since 1997, the Company has focused his R&D activities by bringing to the market innovative technologies for greenhouse gases (GHG) and global climate change control. In 1999, Biothermica has won the prestigious J. Deane Sensenbaugh Award from AWMA in recognition of leading technological achievements in the air pollution control field.



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SNC-Lavalin Group is one of the leading engineering and construction companies in the world.

The group and its companies deliver project solutions to the chemicals and petroleum, mining and metallurgy, power, infrastructure including mass transit, and defence sectors, and to emerging high growth sectors such as telecommunications, pharmaceuticals, agrifood and facility management.

SNC-Lavalin has offices throughout Canada and in some 30 other countries. It is currently working on projects in approximately 100 countries.

SNC-Lavalin Environment Inc. is one of the leading fully integrated Canadian companies in the field of environmental sciences, environmental engineering and geotechnical engineering.

SNC-Lavalin Environment Inc. recognizes the importance of the climate change issue and has developed an action plan to manage greenhouse gas emissions for its own projects and as a specialty for its clients of both the private and public sectors.



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