Alternative Sources of Energy
Distributed Generation

economics,
variability factors,
capacity contributions, and
environmental considerations
related to utility integration issues.
turbines, cogeneration, solar, distributed generation and wind.

What is Distributed Generation?

Small-scale power generation technologies located close to where electricity is used to provide an alternative to or an enhancement of the traditional electric power system.

Difference from emergency generators?

Why the Interest?

Blackouts

Ice Storm

Electricity shortages and prices

RELIABILITY and SECURITY

Economics?

- Depends on the relative price of fuel in to electricity out (spark gap)
- Electricity may be a variable price
- Depends on the proponent (fuel cells in Berlin)

Is DG GREEN?

Not necessarily!

Renewable DG is certainly

Fossil-fueled DG may be if heat is utilized year round.

Depends on source of grid electricity.

Multiple Sites Responding

- Response to price, shortage, etc
- Communication by internet or electrical
- Use of existing stand by generators

75 kW Microturbine CHP Application

Project Description

2301 Midland Avenue, Scarborough has the first Canadian installation of a micro-turbine supplying electricity and waste heat to a building. The gas-fired unit was intended to operate continuously, providing 75 kW electric and 155 kW thermal heat. Natural gas consumption by the building's boilers has been reduced by the application of recovered heat to space heating systems in winter and humidity control systems in summer.

Project Description

2301 Midland Avenue, Scarborough

Site Description

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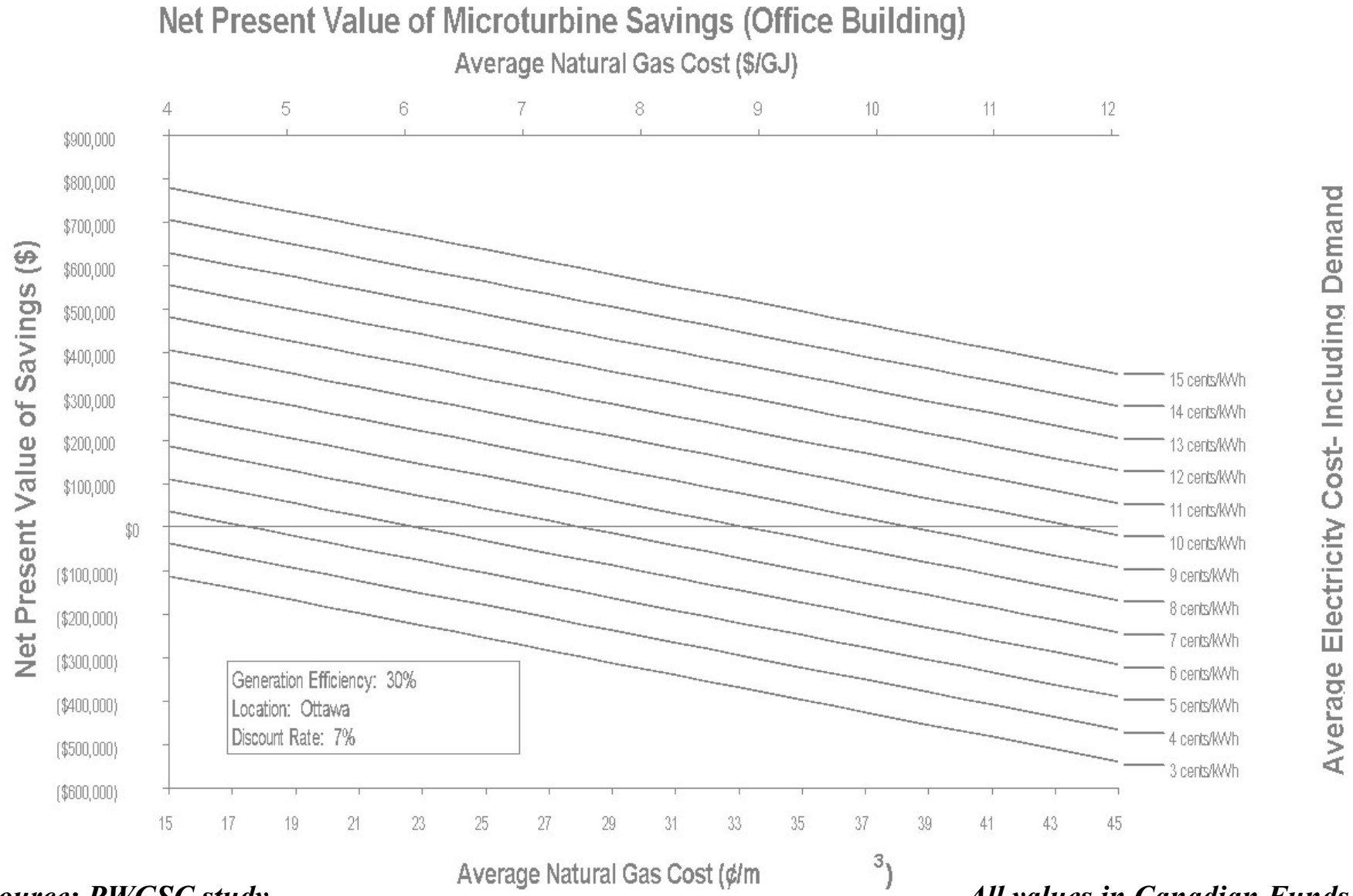
Reasons for doing the project



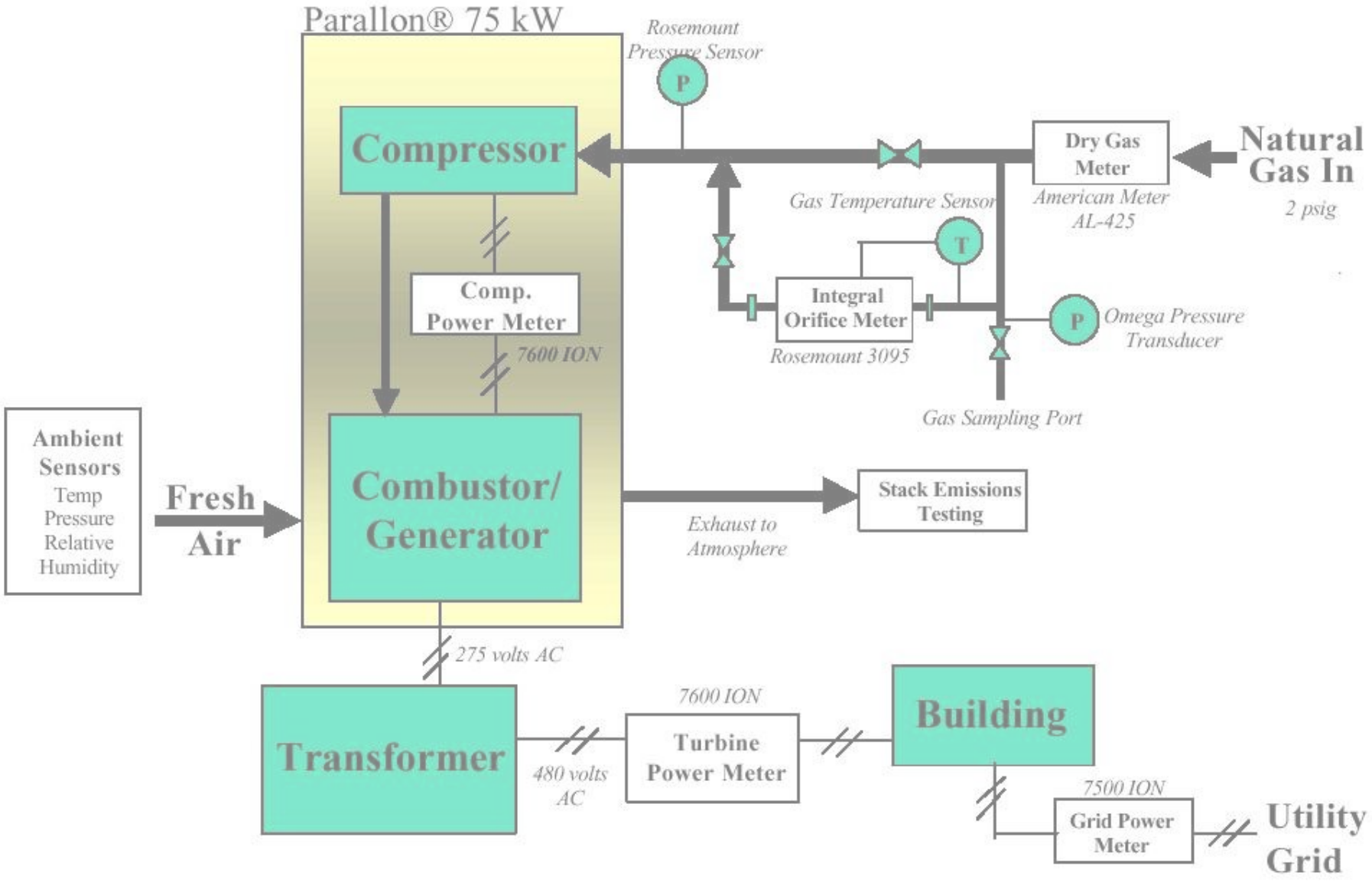
Source: PWGSC study

All values in Canadian Funds

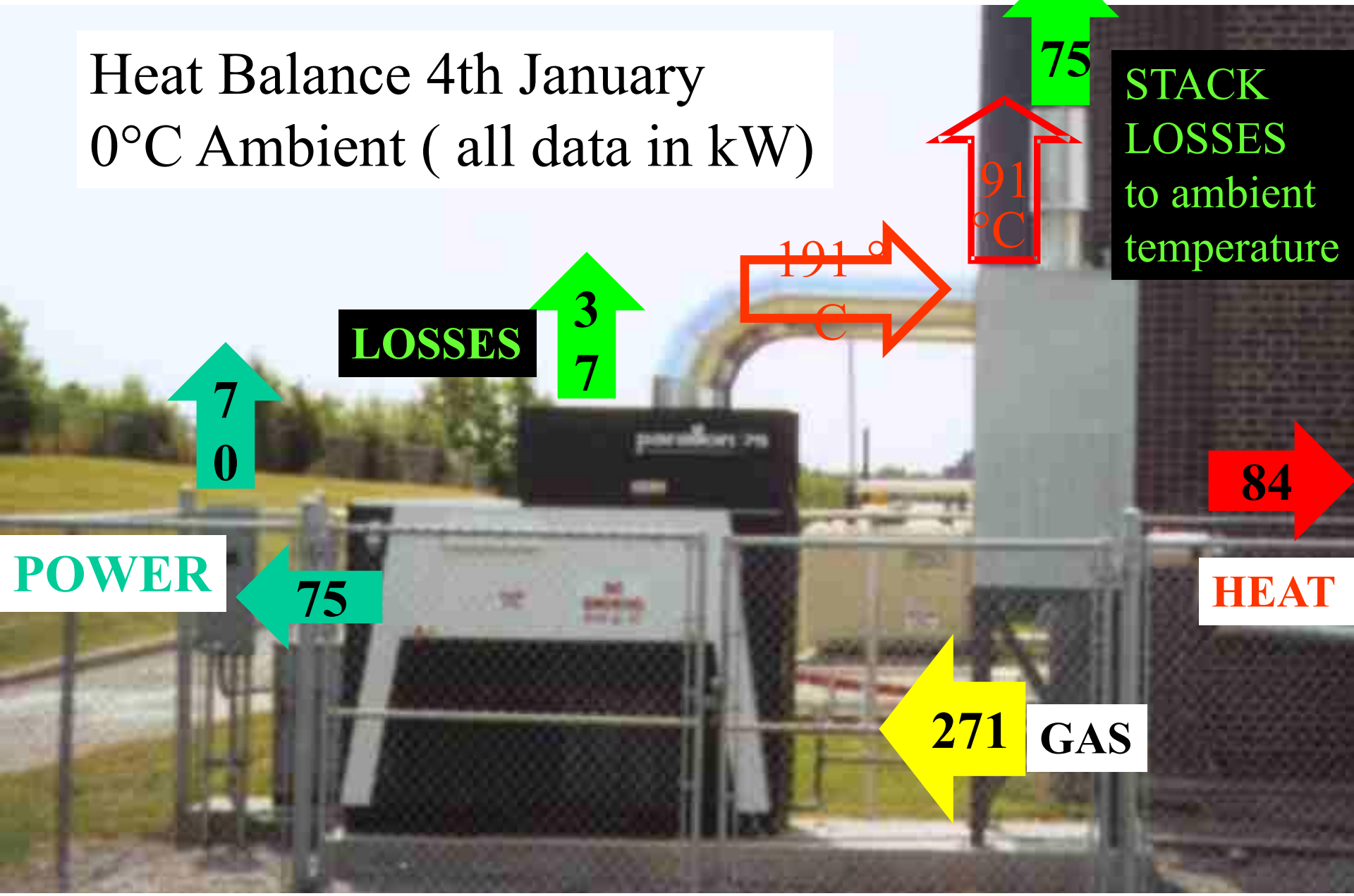
Project chronology: 2000 - 2001

- April 12, 2000 – Equipment Delivery (originally planned for September 30, 1999)
- June 9, 2000 – Commissioned (originally planned for October 30, 1999)
- November 7, 2000 – Unit shut down pending ETS Field Certification
- June 9, 2000 - November 7, 2000 – Availability: 60%
- Gas compressor and core replaced after 2000 hours of operation
- January, 2001 – Monitoring Underway (originally planned for November 30, 1999)
- January 4 – Emissions Testing
- January 26 – A minor gas leak was detected by Enbridge and repaired by Honeywell.
- February 5 – Versatech (mechanical contractor) replaced the bottom flange of gas meter and installed a flexible connector to the cogeneration unit.
- February 6 – Vestar restarted the co-gen unit at 10:30 a.m. Logging was restarted at 12:00 noon (after 2614 hours of operation).
- February 8 – Turbine stopped at 2 p.m.

Schematic of Typical Measurement System



Source: EPA Environmental Technology Verification Report


Heat Balance 4th January
0°C Ambient (all data in kW)
75
STACK
LOSSES
to ambient
temperature
91
°C
191 °
C
LOSSES
3
7
7
0
POWER
75
84
HEAT
271
GAS


Emission Testing January 4th
Canada

Site Description

Building Host:

Health Canada Laboratory Building
@ 2301 Midland Avenue
3-story building
approximate altitude of 600 ft.

The building has also recently undergone a FBI (Federal Buildings Initiative) project that reduces its energy consumption by 50% through more efficient lighting, controls and a conversion of the constant volume ventilation to a variable volume system. (Retrofit done by Vestar, an energy services company supplying third party financing.)

75 kW Microturbine CHP Application

Reasons for doing the project

Benefits of CHP (Combined Heat and Power) microturbines:

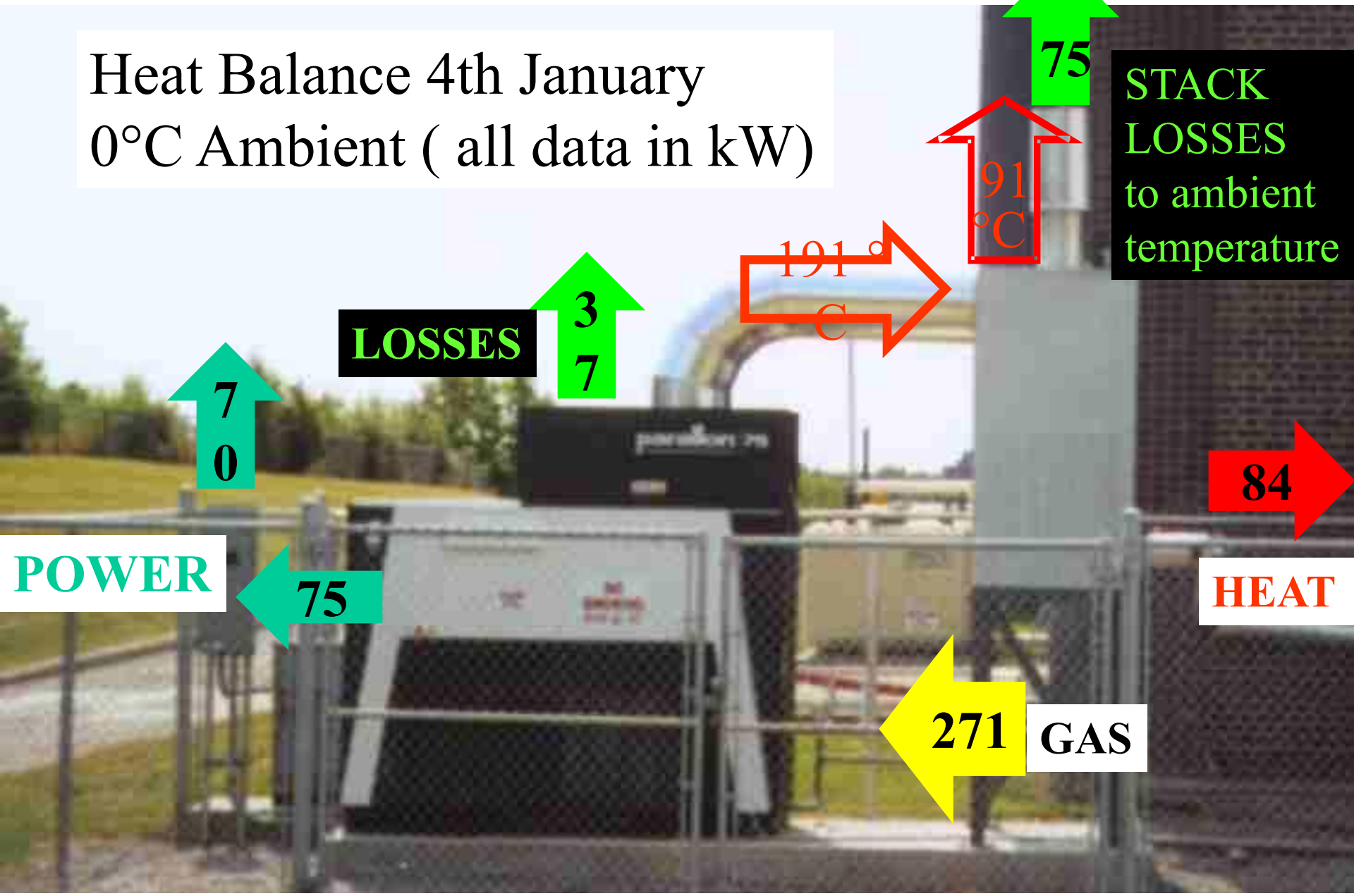
- Reduction of greenhouse gas production

- Potential energy cost savings

- Versatility and stand-alone capability

- Possibility of selling power back to grid

Site Description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Conclusions

- ***The heat recovery was lower than expected (62.4 vs 155 kW) due to thermal losses on uninsulated parts of the recuperator and a reduced thermal output in winter.***
- ***The heating circuit design was a success using water instead of glycol in an outside freezing environment.***
- ***The noise issue, which had originally concerned the building operator, proved not to be a problem.***
- ***The emission data was found to be within specifications.***