

Microturbine CHP – 60kW iCHP

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Organisation

- Project Manager – Ameresco Canada, Mike Newmarch
- Funding Partners – Region of Peel
- Engineer - Ameresco Canada, Scott Branton
- Project Plan Vs Actual dates
 - Equipment Delivery October October
 - System Commissioned January February
 - Monitoring Underway TBD TBD

Project Summary

- Installation of one (1) C60 ICHP - The heat recovery module is part of a 35% propylene glycol loop that includes two condensing natural gas boilers and supplies heat to a heat pump loop, domestic hot water exchanger and make-up air heating coils. The glycol loop operates with a return glycol temperature as low as 95°F. The normal glycol supply temperature is 135°F.
- Two 2000 MBH condensing boilers, Microturbine heat recovery module all three heat sources have their own pump and are piped as injection heat sources

1700MBH domestic hot water brazed plate heat exchanger

- - two make-up air heating coils 2160 MBH total
- - Heat pump loop design load 1,500 MBH
- - Microturbine make-up air unit 60 MBH
- Total potential maximum heat sink 5,420 MBH

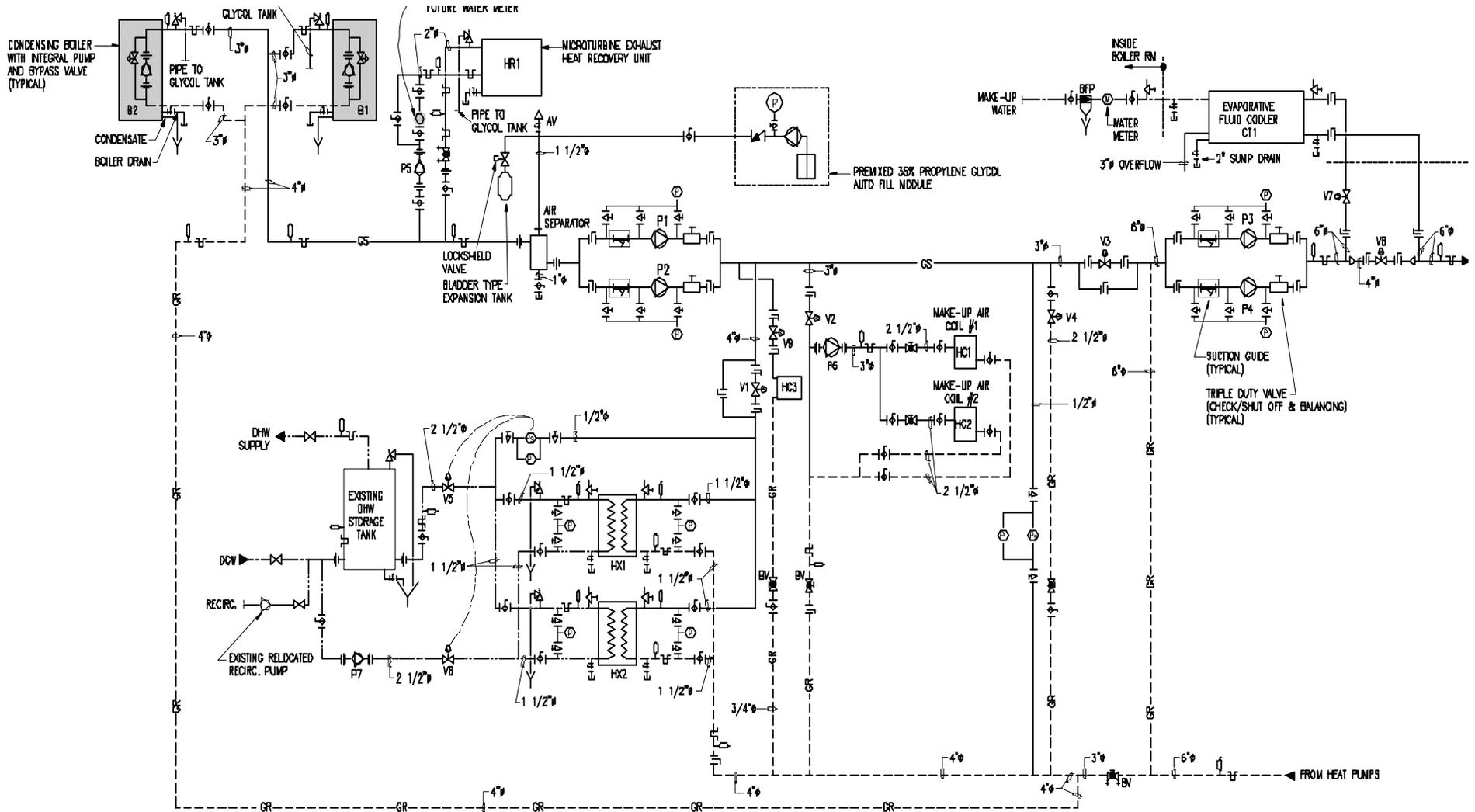
Project Summary

- The unit will be enabled by the building automation system whenever a thermal load is present to take full advantage of the heat recovery. This will result in the ICHP operating for 9-10 months of the year continuously. For the remaining 2-3 months of the year, the unit will be started whenever the domestic hot water provides enough of a heat sink for the full capacity of the heat recovery module to be utilized.
- The microturbine installation is part of a much larger electric to natural gas heating conversion.

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pictures of installation

Plus system piping diagram



Cost Table in US\$

	Canadian \$ *	Canadian \$ **	U.S. \$ **	100% Hindsight	50th Installation
Turbine & Accessories	\$ 120,000	\$ 120,000	\$ 99,600	\$ 99,600	74,700.00
Mechanical	\$ 35,100	\$ 53,820	\$ 44,671	42,437	33,502.95
Electrical	\$ 22,500	\$ 34,500	\$ 28,635	27,203	21,476.25
Civil	\$ 13,500	\$ 20,700	\$ 17,181	16,322	12,885.75
Engineering	\$ 10,800	\$ 16,560	\$ 13,745	13,058	10,308.60
Project Management	\$ 7,200	\$ 11,040	\$ 9,163	8,705	6,872.40
Sub Total	\$ 90,000	\$ 138,000	\$ 114,540	108,813	85,905.00
Total	\$ 210,000	\$ 258,000	\$ 214,140	208,413	\$ 160,605
Cost / kW	\$ 3,500	\$ 4,300	\$ 3,569	3,474	\$ 2,677

* Cost of installation as part of overall building retrofit to economize on costs, i.e., craning

** Cost of just doing the microturbine

* waste gas projects identify compressor
and gas cleanup costs as a sub item

** Target cost

Electrical Performance

- Hours of operation to December 31 2005 - 0
- Average Electrical Performance %
 - Power Delivered to Load/LHV Fuel
- Estimated Parasitic Losses in kW – 4kW
- Power Quality
 - Report on any Power Quality Issues

Thermal Performance

- Thermal Output measured in kW (MMBtu/hr)
- Average water return temperatures and Delta T across HX
- CHP Efficiency (we suggest the use of HHV)
- Expected Peak Total System Efficiency
- (Electrical + Thermal) state which fuel heating value used

Emission Performance

- Report on any emission testing done.
- NO_x, CO, THC in ppm and gm/kWh
- Are emissions in line with equipment suppliers estimates?

O&M Performance

- Availability
 - Number of Hours Unit was not available to run due to equipment failure or maintenance requirements
- What would be the current estimate of annual O&M costs excluding major hot end replacement in total annual US\$ and c/kWh

Institutional Experience

- What approvals were required/obtained?
TSSA, Interconnection Agreement with Utility
- Estimate of overhead burden in obtaining approvals, will it decrease implementation
- Any issues around electrical interconnection? No

Supplier Support

- General Information that would be useful to suppliers in regard to product support.
- Adequacy of Technical Support and factory after sales support
- Supply and Costs of Spare parts
- Warranty Issues – 2nd year warranty purchased

General Experience

- What areas need to be improved for future installations
- What is the opinion of the future market opportunities
- Are there any R&D or development areas that should be looked at