

Manitoba Hydro Undertaking #125

Manitoba Hydro to recalculate the response to RCM/TREE/MH I-3 from the 2008/09 and 2009/10 GRA, assuming exported electricity displaces power generated by combined cycle gas turbine generation in the U.S.

The following table presents the sensitivity results with that of reasonably efficient combined cycle gas turbines which corresponds to emissions of 0.39 kg/kW.h. (Note: Manitoba Hydro's assumes 0.75 kg/kW.h corresponding to displacement of a blend of coal-fired and gas-fired generation.)

Carbon Dioxide Emissions for Electric & Gas Residential Heating Systems
Sensitivity to Very Low Export Displacement Assumptions (CCGT Levels)

CO2 Emission Factors & Sources

	kg/cu.m.	kg/kWh or tonnes/MWh	
Natural Gas	1.90	0.1836	
Electricity displaced by MB Hydro Exports	NA	0.3900	(Sensitivity - Very Low Level)

Home Heating System	Seasonal Efficiency	Energy Units consumed	Energy Units	CO2 Produced (kg/yr)	Ranking lowest to highest CO2 producer	Increased CO2 compared to GeoHP (kg/yr)
Hi-Efficiency Gas	92%	1745	Cu. M.	3316	2	725
Mid-Efficiency Gas	80%	2006	Cu. M.	3811	3	1221
Geothermal Heat Pump @ SCOP = 2.5	250%	6642	kWh	2590	1	0
Conventional Gas	60%	2675	Cu. M.	5083	4	2492
Conventional Electricity	100%	16605	kWh	6476	5	3886

Water Heating System	Seasonal Efficiency	Energy Units consumed	Energy Units	CO2 Produced (kg/yr)	Ranking lowest to highest CO2 producer	Increased CO2 compared to Tankless Gas (kg/yr)
Condensing Nat. Gas Water Heater	90%	325	Cu. M.	618	1	0
Tankless (On Demand) Mid Efficient Nat. Gas	80%	365	Cu.M.	694	2	76
Side Vent Nat. Gas Tank	62%	471	Cu.M.	895	3	277
Conventional Nat. Gas Tank	57%	513	Cu.M.	975	4	357
Geothermal @SCOP = 2.5 & PS GOLD Tank	115%	2630	kWh	1026	5	408
Tankless (On Demand) Electric	95%	3183	kWh	1241	6	624
Power Smart Gold Electric	92%	3287	kWh	1282	7	664
Conventional Electric C-191 Tank	84%	3600	kWh	1404	8	787