RCM/TREE/MH Pre-asks

1. **Reference: IR RCM-TREE-MH I-3 from the 2008/09 and 2009/10 GRA (attached)**

(a) Please update the response with your own best estimate of the current marginal GHG emission factor.

(b) Please recalculate the response assuming exported electricity displaces power generated by combined cycle gas turbine generation in the US.

2. **Reference: Board Order 116/08, Directive 17**

17. MH report to the Board before June 30, 2009, as to whether there are greater global environmental (GHG) and economic benefits to be achieved by exporting hydraulically-generated electricity than would be achieved by fuel switching (from natural gas to electricity) and/or geothermal within Manitoba. The report should address and clearly define the relative environmental and economic benefits of these exports. The overall assumptions and impacts on the Load Forecast should also be included in the report;

[Directive 17 was repeated in Board Order 150/08, which included the following:

3.1 General

Before adjudicating the individual requests by MH, a preliminary matter to be addressed pertains to the Board's Directives in Order 116/08 that are not the subject of MH's requests to Review and Vary specific Directives in Order 116/08. For the unchallenged Directives, the Board understands MH will respond fully and completely, and in a timely manner, as originally directed in Order 116/08.

Question:

Please file the most recent draft response to Directive 17 of 116/08 prepared by Manitoba Hydro together with Manitoba Hydro's comments and caveats on the draft response.

3. (a) How many households in LICO-100 and in LICO-125 receive direct energy bill payments from the provincial government?

(b) How is that split between rental and homeowner?

(c) How is that split between apartment and non-apartment?

4. (a) What is the bill payment coverage of direct energy bill payments from the provincial government?

(b) Does the provincial government pay the entire bill or a portion and if a portion, what percentage does it pay?

5. Does Manitoba Hydro have statistics of the home energy burden of households receiving direct bill payments from the provincial governments?

6. (a) What studies has Manitoba Hydro done to examine the impact on consumption for households receiving direct bill payments from the provincial government?

(b) Is there any evidence that usage has gone up when households receive direct bill payments from the provincial government?

7. Please provide a seasonal residential bill frequency analysis

(a) Winter only

(b) Summer only.

8. For the following rate alternatives, please calculate the residential rate design that would collect the Company's total residential revenue request for the 2011/12 fiscal year:

   a) Case 1: a $6.85 customer charge and a flat energy rate.

   b) Case 2: the Company's originally filed rate design (provided in Appendix 10.4), with a $4.85 customer charge, 6.47¢/kW.h for the first 900 kW.h (the first block), and 7.23¢/kW.h over 900 kW.h (second block).

   c) Case 3: a $4.85 customer charge and a flat energy rate.

   d) Case 4: the same two energy blocks, with a $6.85 customer charge and the first block charge 0.74¢/kW.h lower than second block charge.

   e) Case 5: a two-block rate with the first block set at 1,800 kW.h/month in the winter months (December–March), and remaining at 900 kW.h/month for all other months; a $6.85 customer charge; and the second block priced at 7.23¢/kW.h for all months.

9. For each of the rate designs calculated in response to Pre-Ask 8, please provide customer bills for 250, 750, 900, 1,500, 2,000, 3,000 and 5,000 kW.h/month (for winter and non-winter months separately, in the case of Case 5),

10. For the Case 2, Case 3 and Case 4 rates, please provide the crossover point, in other words, the kW.h/month at which the customer monthly bill would be the same as in the Case 1 rate.

11. For the Case 5 rate, please provide the crossover point (that is, the kW.h/month at which the customer monthly bill would be the same as in the Case 1 rate) separately for:

    a. Winter months

    b. Non-winter months

12. For the residential space heating customer, please provide:

    a. The typical or average annual usage of a space heating customer;

    b. The monthly usage pattern (percentage of annual usage) typical of heating customers.

13. For each component of each of the rate designs calculated in response to Pre-Ask 8, please calculate the percent of change from each of two base cases (a) the interim rates in effect from April 1, 2010 to March 31, 2011 and (b) the interim rates in effect from April 1, 2011.

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Reference: Manitoba Hydro sponsored PHEV conference and Tab 7

c) Please estimate the North American greenhouse gas balance of customers making the following conversions from natural gas to electric service:

i. Natural gas to electric heat (both residential and commercial),
ii. Natural gas to geothermal heat (both residential and commercial),
iii. Natural gas water tank to electric water tank,
iv. Natural gas water tank to electric demand water heater, and
v. Natural gas demand water heater to electric demand water heater.

ANSWER:

The following table compares estimates of the relative global emissions of various residential end-use applications. Commercial applications could vary somewhat, but the general implications can be expected to be consistent. The estimates assume a marginal GHG emission factor of 0.75 t/MWh for electricity within the regional market (Midwest Reliability Organization (MRO)) in which Manitoba Hydro participates.

These estimates are intended to be illustrative rather than definitive. In the longer term strong action taken to reduce electricity sector emissions in the Midwest states could change the conclusions of this assessment improve the performance of geothermal heat pumps relative to high efficiency gas.

Carbon Dioxide Emissions from Various Residential Heating Systems

CO2 Emission Factors & Sources

	kg/cu.m.	kg/kWh
Natural Gas	1.90	0.1836
Marginal Electricity Implications Associated With Exports/Imports	NA	0.7500

Home Heating System	Seasonal Efficiency	Energy Units consumed	Energy Units	CO2 Produced (kg/yr)	Ranking lowest to highest CO2 producer	Increased CO2 compared to Hi-E Gas (kg/yr)
Hi-Efficiency Gas	92%	1838	Cu. M.	3492	1	0
Mid-Efficiency Gas	80%	2114	Cu. M.	4016	2	524
Conventional Gas	60%	2818	Cu. M.	5354	4	1862
Conventional Electricity	100%	17500	kWh	13125	5	9633
Geothermal Heat Pump @SCOP = 2.5	250%	7000	kWh	5250	3	1758

Water Heating System	Energy Factor	Energy Units consumed	Energy Units	CO2 Produced (kg/yr)	Ranking lowest to highest CO2 producer	Increased CO2 compared to Tankless Gas (kg/yr)
Tankless (On Demand) Nat. Gas	82%	386	Cu. M.	734	1	0
Conventional Nat. Gas Tank	59%	537	Cu. M.	1020	2	286
Conventional Electric C-191 Tank	84%	3902	kWh	2927	6	2193
Power Smart Gold Electric Tank	92%	3563	kWh	2672	5	1938
Tankless (On Demand) Electric	95%	3450	kWh	2588	4	1854
Geothermal @ SCOP = 2.5 & PS Gold Tank	121%	2709	kWh	2032	3	1298