REFERENCE: Elenchus report, page ii.

PREAMBLE:
The Elenchus report states that "While it is not possible to forecast either the timing or the impact of grid parity, it is reasonable to expect that … the cost of self-generation technologies will be lower for large consumers than for small consumers.

QUESTION:
Please explain your reasoning for this statement. Would MH have a similar benefit from new technology to put in service for customers rather than larger consumers making similar investments?

RESPONSE:
Existing self-generation technologies exhibit economies of scale. Assuming the further evolution of these technologies result in grid parity, it is reasonable to expect that the cost per kW and per kWh of self-generation will be lower for large consumers than small consumers. For example, larger scale solar and wind farms have unit cost that are lower than rooftop solar and wind installations, as do existing storage technologies, when full life cycle costs are considered. In addition, some technologies, such as gas-fired cogeneration, are only practical on a larger scale and are unlikely to be adopted by any customers other than large industrials.

At the same time, given that rates for small volume customers (e.g., residential) tend to be higher than rates for larger customers (e.g., large commercial and industrial) grid parity could be achieved for both large and small scale customers. Furthermore, many commentators anticipate the development of micro-grids which would facilitate the aggregation of cluster of small volume customers (e.g., a residential or commercial development) that could serve customers on a cost-effective basis “in competition” with the grid.

It can be anticipated that once grid parity becomes a reality, electricity distributors will face an evolution of the electricity market that is similar to the evolution of the telecommunications market with the evolution of cellular phones, deregulation and more recently VOIP technologies. Although grid parity is not currently a threat to grid power in Manitoba, innovation and developments in other markets could result in a “tipping point” that triggers rapid change.

The risk of grid parity does also present an opportunity for distributors/generators such as Manitoba Hydro to take the lead in bringing new technologies to the market. Again, telecommunications provides an example where the traditional telephone monopolies adapted to become the leaders in the provision of cellular and internet service. By adapting, the telcos have profited from the new competitive environment.

REFERENCE: Elenchus report, page 4.

PREAMBLE:

QUESTION:
Please file, or require Manitoba Hydro to file, the 2009 residential survey on the record.

RESPONSE:
Please refer to the attached 2009 Residential Energy Use Survey by Manitoba Hydro below.

2009
Residential Energy Use Survey

Dear Customer:

You have been randomly selected to participate in the Manitoba Hydro, Residential Energy Use Survey. Your response may represent up to two hundred other similar households in the province, so it is very important that each selected customer complete and return their questionnaire. Please invest your time so that we can better serve you and effectively plan for the future. All responses will be treated in the strictest confidence.

Please answer the survey for the address shown BELOW. Return the completed questionnaire within the next TWO WEEKS, in the postage paid envelope provided.

123 MAIN AVE
WINNIPEG MB
412345602

Manitoba Hydro
POWER SMART

*Manitoba Hydro is a licensee of the Trademark and Official Mark.

All responses will be treated in the strictest confidence. Personal information requested in this form is collected for the purposes of administration of this program pursuant to section 36(1)(b) of The Freedom of Information and Protection of Privacy Act of Manitoba. For inquiries concerning the collection of personal information contained in this form or if you have any questions concerning this survey please contact:

RESIDENTIAL ENERGY USE SURVEY
MARKET FORECAST DEPARTMENT
Manitoba Hydro
P.O. Box 815, Station Main
Winnipeg, Manitoba R3C 2P4

204.360.4629
204.360.3447
(Weekdays 8:00 a.m. to 3:00 p.m.)

Outside Winnipeg, call collect.

A postage paid envelope is provided for your convenience.
Please return the completed questionnaire within the next **two weeks.**

THANK YOU FOR YOUR TIME AND COOPERATION

Section 1 Your Residence

Please answer all the questions by marking an "x" in the box(es) beside the appropriate answer OR print your answer in the space provided. If you are unsure of a particular answer, mark the "Do not know" box.

1 What best describes your residence?

1 ☐ Single Family House (Detached)
2 ☐ Side by Side (Two Attached Units)
3 ☐ Duplex (Upper Unit)
4 ☐ Duplex (Lower Unit)
5 ☐ Triplex/Fourplex
6 ☐ Mobile Home/Trailer
7 ☐ Rowhouse/Townhouse (Exterior Entrance)
8 ☐ Apartment Suite or Condominium unit
9 ☐ Cottage or Seasonal Home
10 ☐ Other: _____

2 Do you OWN or RENT this residence?

1 ☐ Own/Buying
2 ☐ Rent/Lease
3 ☐ Other

3 Do you live at this residence year round?

1 ☐ Yes, all year
2 ☐ No, only part of the year

4 What type of DWELLING STRUCTURE do you live in?

1 ☐ 1 storey
2 ☐ 1 1/2 storey
3 ☐ 1 3/4 storey
4 ☐ 2 storey
5 ☐ 2 1/2 storey
6 ☐ 3 storey
7 ☐ Bi-level
8 ☐ 2 level split
9 ☐ 4 level split
10 ☐ Cab - Over
11 ☐ Suite
12 ☐ Other: _____

5 How many walls in your residence are ATTACHED to other residences or heated structures?

1 ☐ None
2 ☐ One
3 ☐ Two
4 ☐ Three

6 When was your residence originally BUILT?

1 ☐ 2000 - present
2 ☐ 1990 - 1999
3 ☐ 1980 - 1989
4 ☐ 1970 - 1979
5 ☐ 1960 - 1969
6 ☐ 1950 - 1959
7 ☐ 1940 - 1949
8 ☐ 1930 - 1939
9 ☐ 1920 - 1929
10 ☐ 1910 - 1919
11 ☐ 1900 - 1909
12 ☐ 1899 or before

7 **What is the SIZE of your residence in square feet?**
(EXCLUDE BASEMENT AND GARAGE AREAS. ANSWER "7a", IF POSSIBLE.)

a) Specify size if KNOWN: _____ *square feet.*

b) If UNKNOWN, choose the approximate size range in square feet.

1 ☐ Under 500 sq ft	7 ☐ 1,501-1,700 sq ft	13 ☐ 2,701-2,900 sq ft
2 ☐ 501-700 sq ft	8 ☐ 1,701-1,900 sq ft	14 ☐ 2,901-3,100 sq ft
3 ☐ 701-900 sq ft	9 ☐ 1,901-2,100 sq ft	15 ☐ 3,101-3,300 sq ft
4 ☐ 901-1,100 sq ft	10 ☐ 2,101-2,300 sq ft	16 ☐ 3,301-3,500 sq ft
5 ☐ 1,101-1,300 sq ft	11 ☐ 2,301-2,500 sq ft	17 ☐ over 3,500 sq ft
6 ☐ 1,301-1,500 sq ft	12 ☐ 2,501-2,700 sq ft	

8 **What is the ELECTRIC PANEL size servicing your residence?**

1 ☐ 60 amp	3 ☐ 150 amp	5 ☐ 400 amp	7 ☐ Do not know
2 ☐ 100 amp	4 ☐ 200 amp	6 ☐ Other: _____	

9 **What type of WINDOWS are in your residence?** (CHECK ALL THAT APPLY.)

1 ☐ Single Pane with Storm Window
1 ☐ Two Pane Slider
1 ☐ Dual Pane
1 ☐ Triple Pane
1 ☐ Dual Pane with Low E coating(s) or Insulating Spacer Bar(s)
1 ☐ Triple Pane with Low E coating(s) or Insulating Spacer Bar(s)
1 ☐ Argon Gas (dual pane)
1 ☐ Argon Gas (triple pane)
1 ☐ Other : _____

a) How many exterior DOORS do you have in your residence? *(Indicate by door type)*

___ Patio Doors ___ Wood Doors ___ Steel Insulated Doors
___ Storm Doors ___ PVC Doors

b) What best describes the quality of WINDOWS in your residence?

1 ☐ Excellent	3 ☐ Average	5 ☐ Poor
2 ☐ Very Good	4 ☐ Fair	

c) What best describes the quality of EXTERIOR DOORS in your residence?

1 ☐ Excellent	3 ☐ Average	5 ☐ Poor
2 ☐ Very Good	4 ☐ Fair	

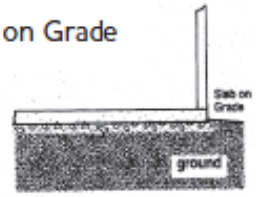
10 **What best describes the overall level of INSULATION in your residence?**
(EXCLUDE BASEMENT)

1 ☐ Excellent	3 ☐ Average	5 ☐ Poor
2 ☐ Very Good	4 ☐ Fair	

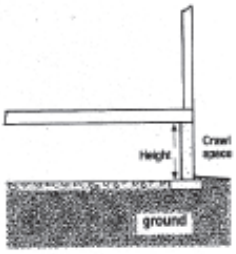
11 **Please indicate which of the following best describes the BASEMENT (foundation) of your residence:**

a) 1 ☐ No Basement (foundation) – Go to Question 12

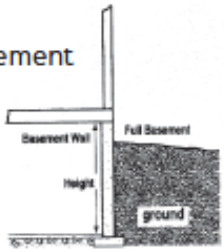
2 ☐ Slab on Grade



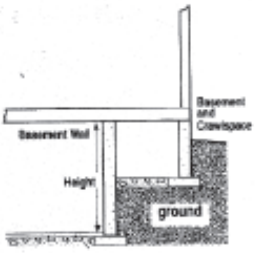
6 ☐ Crawl Space
(including cottages and mobile homes)



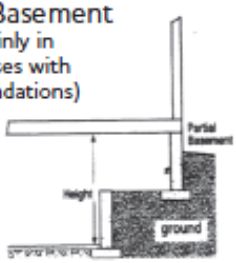
3 ☐ Full Basement



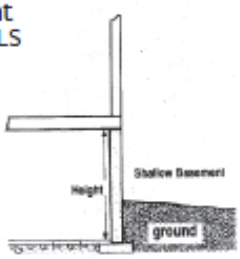
7 ☐ Partial Basement and Crawl Space
(includes houses with ground level additions)



4 ☐ Partial Basement
(found mainly in older houses with stone foundations)



8 ☐ Shallow Basement
(includes SPLIT LEVELS and BI-LEVELS)



5 ☐ Other: _____ 9 ☐ Do Not Know

b) What percentage of your home's BASEMENT (foundation) walls are insulated?

1 ☐ No Insulation – Go to Question 12
2 ☐ 10% Insulated
3 ☐ 20% Insulated
4 ☐ 30% Insulated
5 ☐ 40% Insulated
6 ☐ 50% Insulated
7 ☐ 60% Insulated
8 ☐ 70% Insulated
9 ☐ 80% Insulated
10 ☐ 90% Insulated
11 ☐ 100% Insulated
12 ☐ 2 ft Below Grade Only
13 ☐ Other: _____
14 ☐ Do not know

c) Main type of INSULATION

1 ☐ Fibreglass Batting
2 ☐ Rigid
3 ☐ Spray Foam
4 ☐ Other: _____
5 ☐ Do not know

d) What % of your basement is finished?

1 ☐ No Basement
2 ☐ 0%
3 ☐ 1 - 20%
4 ☐ 21 - 40%
5 ☐ 41 - 60%
6 ☐ 61 - 80%
7 ☐ 81 - 100%
8 ☐ Do not know

12 **Does this residence have any of the following PROBLEMS?**
(CHECK ALL THAT APPLY.)

- 1 ☐ Odours, cooking smells, stale air
- 1 ☐ High humidity in winter
- 1 ☐ Low humidity in winter
- 1 ☐ Window condensation
- 1 ☐ Condensation in attic
- 1 ☐ Mold and mildew
- 1 ☐ Ice dams on roof
- 1 ☐ Water leakage in basement
- 1 ☐ Cold floor on slab on grade foundation
- 1 ☐ Difficult to heat rooms
- 1 ☐ Inadequate supply of hot water
- 1 ☐ Short life of hot water tank (less than five years)
- 1 ☐ No problems

13 **In the last THREE YEARS, have you done any of the following projects at this residence?** (CHECK ALL THAT APPLY.)

- 1 ☐ Insulated basement or crawlspace
- 1 ☐ Re-sided your house or upgraded the exterior walls
- 1 ☐ Added insulation to your attic or ceiling
- 1 ☐ Caulked the house to reduce air leakage
- 1 ☐ Replaced some or all of the windows
- 1 ☐ Improved the ventilation system in your home
- 1 ☐ Upgraded electrical service/wiring
- 1 ☐ Upgraded size of electrical panel
- 1 ☐ Built an addition to the house
- 1 ☐ Installed a natural gas BBQ hookup
- 1 ☐ Replaced incandescent with compact fluorescent lighting
- 1 ☐ Replaced heating system
- 1 ☐ Replaced air conditioning
- 1 ☐ Replaced hot water tank
- 1 ☐ No projects done

14 **Are any FARMING ACTIVITIES requiring electricity or natural gas conducted at this location?**

- 1 ☐ Yes, primarily farming
- 2 ☐ Yes, hobby farming
- 3 ☐ No

15 **Are any ADDITIONAL BUILDINGS using ELECTRICITY at this location?**
(CHECK ALL THAT APPLY.)

- 1 ☐ None
- 1 ☐ Workshop
- 1 ☐ Garage
- 1 ☐ Storage Shed
- 1 ☐ Barn
- 1 ☐ Pumphouse
- 1 ☐ Grain Dryer
- 1 ☐ Grain Bin(s)
- 1 ☐ Greenhouse
- 1 ☐ Other: _____

16 **Are any ADDITIONAL BUILDINGS using NATURAL GAS at this location?**
(CHECK ALL THAT APPLY.)

- 1 ☐ None
- 1 ☐ Workshop
- 1 ☐ Garage
- 1 ☐ Storage Shed
- 1 ☐ Barn
- 1 ☐ Pumphouse
- 1 ☐ Grain Dryer
- 1 ☐ Grain Bin(s)
- 1 ☐ Greenhouse
- 1 ☐ Other: _____

Section 2 Heating System

1 **How do you pay for your SPACE HEATING costs?**

1 ☐ Payment is made directly to Manitoba Hydro (part of utility bill)
2 ☐ Cost is included in rent or common service fees
3 ☐ Other: _____
4 ☐ Do not know

2 **What is the MAIN HEATING FUEL used to heat your residence?** (CHECK ONLY ONE.)

1 ☐ Electricity
2 ☐ Natural Gas
3 ☐ Fuel Oil
4 ☐ Wood
5 ☐ Propane
6 ☐ Other: _____
7 ☐ Do not know

3 **What is the MAIN HEATING SYSTEM used to heat your residence?**
(CHECK ONLY ONE.)

1 ☐ Hi-efficiency Gas (+ 90%) Central Forced Air Furnace
2 ☐ Mid-efficiency Gas (80-85%) Central Forced Air Furnace
3 ☐ Standard-efficiency Gas (65%) Central Forced Air Furnace
4 ☐ Gravity Air Furnace (no fan)
5 ☐ Electric Baseboards
6 ☐ Electric Forced Air Furnace
7 ☐ Radiant Cables/Panels
8 ☐ Heat Pump - Geothermal (Ground Source)
9 ☐ Heat Pump - Air Source
10 ☐ Wood Stove
11 ☐ Outside Wood Boiler
12 ☐ Hot Water Boiler - with Pump
13 ☐ Hot Water Boiler - no Pump
14 ☐ Space Heater (Oil/Kerosene)
15 ☐ Dual Fuel - Wood/Electric Furnace
16 ☐ Dual Fuel - Wood/Oil Furnace
17 ☐ Other: _____
18 ☐ Do not know

4 **What is the AGE of the main heating system?**

1 ☐ 0 - 3 years
2 ☐ 4 - 6 years
3 ☐ 7 - 9 years
4 ☐ 10 - 12 years
5 ☐ 13 - 15 years
6 ☐ 16 - 20 years
7 ☐ 21 - 25 years
8 ☐ Over 25 years
9 ☐ Do Not Know

5 **What SUPPLEMENTAL heating fuel is used to heat your residence?**

1 ☐ None
2 ☐ Electricity
3 ☐ Natural Gas
4 ☐ Fuel Oil
5 ☐ Wood
6 ☐ Propane
7 ☐ Other: _____
8 ☐ Do not know

6 **What other HEATING SYSTEMS are used in your home?**
(CHECK ALL THAT APPLY.)

- 1 ☐ None
- 1 ☐ Forced Air Furnace
- 1 ☐ Electric Baseboards
- 1 ☐ Electric Portable Heater
- 1 ☐ Stove/Spaceheater
- 1 ☐ Gas Fireplace (not decorative)
- 1 ☐ Wood Stove
- 1 ☐ Wood Fireplace (with glass doors)
- 1 ☐ Wood Fireplace (no glass doors)
- 1 ☐ Outside Wood Boiler
- 1 ☐ Pellet Stove
- 1 ☐ Heat Pump
- 1 ☐ Other: _____
- 1 ☐ Do not know

7 **How is the central forced air furnace fan motor normally operated?**

- 1 ☐ No Central Forced Air Furnace
- 2 ☐ Comes on only when furnace is running
- 3 ☐ Two speed (high, low) - continuous
- 4 ☐ Continuous - one speed on
- 5 ☐ Continuous Variable Direct Current Motor (on select hi-efficiency furnaces)
- 6 ☐ Do not know

8 **Do you perform annual maintenance checks on your heating system?**

- 1 ☐ Not applicable
- 2 ☐ No, never
- 3 ☐ Once a year
- 4 ☐ Every 2 to 3 years
- 5 ☐ Every 4 or more years
- 6 ☐ Do not know

9 **Do you regularly change or clean your furnace filter?**

- 1 ☐ Not applicable
- 2 ☐ No, never
- 3 ☐ Yes, every 3 to 4 months
- 4 ☐ Yes, every year or more
- 5 ☐ Do not know

10 **If you use WOOD to provide heat for your home, how many FULL CORDS were burned in the past 12 months?**
(A FULL CORD OF WOOD IS 4 FT X 4 FT X 8 FT.)

- 1 ☐ No wood used
- 2 ☐ Under 1
- 3 ☐ 1 - 2
- 4 ☐ 3 - 4
- 5 ☐ 5 - 6
- 6 ☐ 7 - 8
- 7 ☐ 9+
- 8 ☐ Do not know

11 **What type of THERMOSTAT controls the main heating system?**

- 1 ☐ No Thermostat
- 2 ☐ Individual Unit or Room Control
- 3 ☐ Manual Central Control
- 4 ☐ Programmable Thermostat
- 5 ☐ Flue Gauge (located on a wood stove chimney)
- 6 ☐ Other: _____
- 7 ☐ Do not know

12 **How often do you TURN DOWN the temperature at night during the heating season?**

- 1 ☐ Every Night
- 2 ☐ Most Nights
- 3 ☐ Occasionally
- 4 ☐ Never
- 5 ☐ No Thermostat
- 6 ☐ Do not know

13 What is the average TEMPERATURE set for heating?
(CHECK ONE FOR EACH TIME PERIOD.)

°C	°F	Day	Evening	Night
17° or less	64° or less	1 ☐	2 ☐	3 ☐
18°-19°	65°-67°	1 ☐	2 ☐	3 ☐
20°-21°	68°-70°	1 ☐	2 ☐	3 ☐
22°-23°	71°-73°	1 ☐	2 ☐	3 ☐
24°-25°	74°-77°	1 ☐	2 ☐	3 ☐
26° plus	78° plus	1 ☐	2 ☐	3 ☐
Do not know		1 ☐	2 ☐	3 ☐

14 Do you use a dehumidifier?

1 ☐ Yes 2 ☐ No 3 ☐ Do not know

15 Do you use a humidifier?

1 ☐ Yes 2 ☐ No 3 ☐ Do not know

Section 3 Ventilation & Air Quality

1 What type of VENTILATION SYSTEM(s) is/are used to control the air quality in your home? (CHECK ALL THAT APPLY.)

1 ☐ Central Exhaust System
1 ☐ Heat Recovery Ventilator
1 ☐ Furnace Fan
1 ☐ Kitchen/Bathroom Fans
1 ☐ Ceiling Fans
1 ☐ Portable Fans
1 ☐ Roof Turbine Vent
1 ☐ Windows/Doors
1 ☐ Other: _____
1 ☐ No Ventilation System
1 ☐ Do not know

2 What type of AIR FILTRATION system is used?

1 ☐ None
2 ☐ Standard Furnace Air Filter
3 ☐ Room Air Filter(s)
4 ☐ Electrostatic (Electronic) Air Filter/Cleaner
5 ☐ Other: _____
6 ☐ Do not know

3 Is there a FRESH AIR INTAKE to your central forced air furnace?

1 ☐ Yes
2 ☐ No
3 ☐ No Central Forced Air Furnace
4 ☐ Do not know

4 What best describes the air quality in your home during the winter months?

1 ☐ Too Dry 2 ☐ Too Humid 3 ☐ Comfortable

Section 4 Air Conditioning

1 **What type of AIR CONDITIONER is used to COOL your residence?**

1 ☐ No Air Conditioner – Go to SECTION 5

2 ☐ Heat Pump

3 ☐ Window or Wall Air Conditioner: How many?

1 ☐ One 2 ☐ Two 3 ☐ Three or More

4 ☐ Central Air Conditioner: How many?

1 ☐ One 2 ☐ Two 3 ☐ Three or More

2 **How do you pay for your AIR CONDITIONING costs?**

1 ☐ Payment is made directly to Manitoba Hydro (part of utility bill)

2 ☐ Cost is included in rent or common service fee

3 ☐ Other: _____

4 ☐ Do not know

3 **What is the age of the MAIN air conditioning system?**

1 ☐ 0 - 3 years
2 ☐ 4 - 6 years
3 ☐ 7 - 9 years
4 ☐ 10 - 12 years
5 ☐ 13 - 15 years
6 ☐ 16 - 20 years
7 ☐ 21 - 25 years
8 ☐ Over 25 years
9 ☐ Do not know

4 **What is the AVERAGE TEMPERATURE set for cooling?**

(CHECK ONE FOR EACH TIME PERIOD.)

°C	°F	Day	Evening	Night
17° or less	64° or less	1 ☐	2 ☐	3 ☐
18°-19°	65°-67°	1 ☐	2 ☐	3 ☐
20°-21°	68°-70°	1 ☐	2 ☐	3 ☐
22°-23°	71°-73°	1 ☐	2 ☐	3 ☐
24°-25°	74°-77°	1 ☐	2 ☐	3 ☐
26° plus	78° plus	1 ☐	2 ☐	3 ☐
Do not know		1 ☐	2 ☐	3 ☐

Section 5 Hot Water

1 **Is there a HOT WATER TANK used at your residence?**

1 ☐ No Hot Water Tank – Go to SECTION 6
2 ☐ Shared Central Supply (Serving two or more residences.) – Go to SECTION 6
3 ☐ Private Individual Hot Water Tank (Used solely by your household.)
4 ☐ Instantaneous tankless water heater

2 **How do you pay for your water heating costs?**

1 ☐ Payment is made directly to Manitoba Hydro (part of utility bill)
2 ☐ Cost is included in rent or common service fee
3 ☐ Other: _____
4 ☐ Do not know

3 **What is the temperature setting of your hot water?**

1 ☐ less than 120°F (warm)
2 ☐ 120°F to 130°F (very warm)
3 ☐ 130°F to 140°F (hot)
4 ☐ 140°F to 150°F (very hot)
5 ☐ More than 150°F (scalding)
6 ☐ Do not know

4 **What type of fuel is used to HEAT your WATER?**

1 ☐ Electricity
2 ☐ Natural Gas
3 ☐ Propane
4 ☐ Fuel Oil
5 ☐ Wood
6 ☐ Solar
7 ☐ Other: _____
8 ☐ Do not know

5 **Have you always heated the water with the HEATING FUEL mentioned in Question #4?**

1 ☐ Yes, Always
2 ☐ No, Previously Heated
With:_____
Year Converted: _____ (e.g., 1992)
3 ☐ Do not know

6 **What is the AGE of your hot water tank?**

1 ☐ 0 - 3 years
2 ☐ 4 - 6 years
3 ☐ 7 - 9 years
4 ☐ 10 - 12 years
5 ☐ 13 - 15 years
6 ☐ 16 - 20 years
7 ☐ 21 - 25 years
8 ☐ Over 25 years
9 ☐ Do not know

7 **What is the approximate total size of your hot water tank(s)?**

1 ☐ Small (under 30 gal.)
2 ☐ Medium (30-50 gal.)
3 ☐ Large (60-90 gal.)
4 ☐ Extra Large (over 90 gal.)
5 ☐ Other: _____
6 ☐ Do not know

8 How many SHOWERHEADS are installed in your home?

1 ☐ None 2 ☐ One 3 ☐ Two 4 ☐ Three or more

9 On average, how many total showers are taken by your household per day?

1 ☐ None
2 ☐ Rarely shower
3 ☐ One
4 ☐ Two
5 ☐ Three
6 ☐ Four
7 ☐ Five
8 ☐ Six or more

10 On average, how many tub baths are taken by your household per day?

1 ☐ None
2 ☐ Rarely take tub baths
3 ☐ One
4 ☐ Two
5 ☐ Three
6 ☐ Four
7 ☐ Five
8 ☐ Six or more

11 Have you done any of the following been done to CONSERVE water?
(CHECK ALL THAT APPLY.)

1 ☐ Installed Energy Efficient Showerhead(s) (6 gal/min)
1 ☐ Installed Energy Efficient Faucet Aerator(s)
1 ☐ Installed Water Heater Blanket/Insulation
1 ☐ Installed Energy Efficient Toilets (1.6 or less gal/flush)
1 ☐ Lowered Water Heater Temperature
1 ☐ Installed Pipe Wrap
1 ☐ None
1 ☐ Do not know

12 Do you have an ELECTRIC WATER PUMP installed on your water system?
(CHECK ALL THAT APPLY.)

1 ☐ No Pump
1 ☐ Well Pump
1 ☐ Pressure Pump
1 ☐ Sump Pump
1 ☐ Sewage Pump
1 ☐ Do not know

Section 6 Major Appliances

1 Please indicate the COOKING APPLIANCE(S) used in your home.
(CHECK ALL THAT APPLY.)

1 ☐ None
1 ☐ Electric Range with Standard Oven
1 ☐ Electric Range with Self-Cleaning Oven
1 ☐ Electric Range with Convection Oven
1 ☐ Electric Counter Cooktop
1 ☐ Electric Wall Oven
1 ☐ Gas Cooktop
1 ☐ Gas Range
1 ☐ Gas Wall Oven
1 ☐ Wood Stove/Oven
1 ☐ Other: _____

a) WEEKLY USAGE: _____ *(Average number of cooked meals each week.)*

2 **Is a MICROWAVE OVEN used in your home?**

1 ☐ No 2 ☐ Yes

a) Daily usage _____ *(average minutes per day)*

3 **How many REFRIGERATORS are used in your home?**

1 ☐ None – Go to Question 4 2 ☐ One 3 ☐ Two 4 ☐ Three or More

*a) Please describe the **MAIN REFRIGERATOR** that is used in your home.*

- TYPE: 1 ☐ Frost-Free 2 ☐ Manual Defrost
- DOORS: 1 ☐ Single Door 4 ☐ French Door, Bottom Freezer
  2 ☐ Two Door, Top Freezer 5 ☐ Side-By-Side
  3 ☐ Two Door, Bottom Freezer
- SIZE: 1 ☐ Small (12 cu. ft. or less) 3 ☐ Large (16.1 to 20 cu. ft.)
  2 ☐ Medium (12.1 to 16 cu. ft.) 4 ☐ Extra Large (Over 20 cu. ft.)
- AUTOMATIC WATER DISPENSER: 1 ☐ yes 2 ☐ no
- AUTOMATIC ICE DISPENSER: 1 ☐ yes 2 ☐ no

- AGE: (years)
  1 ☐ 0 - 3 years 4 ☐ 10 - 12 years 7 ☐ 21 - 25 years
  2 ☐ 4 - 6 years 5 ☐ 13 - 15 years 8 ☐ Over 25 years
  3 ☐ 7 - 9 years 6 ☐ 16 - 20 years 9 ☐ Do not know

*b) Please describe the **SECOND REFRIGERATOR** that is used in your home.*

1 ☐ None – Go to Question 4

- TYPE: 1 ☐ Frost-Free 2 ☐ Manual Defrost
- DOORS: 1 ☐ Single Door 4 ☐ French Door, Bottom Freezer
  2 ☐ Two Door, Top Freezer 5 ☐ Side-By-Side
  3 ☐ Two Door, Bottom Freezer
- SIZE: 1 ☐ Small (12 cu. ft. or less) 3 ☐ Large (16.1 to 20 cu. ft.)
  2 ☐ Medium (12.1 to 16 cu. ft.) 4 ☐ Extra Large (Over 20 cu. ft.)

- AGE: (years)
  1 ☐ 0 - 3 years 4 ☐ 10 - 12 years 7 ☐ 21 - 25 years
  2 ☐ 4 - 6 years 5 ☐ 13 - 15 years 8 ☐ Over 25 years
  3 ☐ 7 - 9 years 6 ☐ 16 - 20 years 9 ☐ Do not know

c) Is the second fridge operating all year?

1 ☐ Yes, all year 2 ☐ No, only part of the year.

d) Location of second refrigerator?

1 ☐ Garage 3 ☐ Porch 5 ☐ Other: _____
2 ☐ Basement 4 ☐ Main floor or above

4 **How many stand-alone FREEZERS are used in your home?**
(DO NOT INCLUDE FREEZER COMPARTMENT OF YOUR REFRIGERATOR)

1 ☐ None – Go to Question 5 2 ☐ One 3 ☐ Two 4 ☐ Three or More

*a) Please describe the **MAIN** stand-alone FREEZER that is used.*

- TYPE: 1 ☐ Frost-Free 2 ☐ Manual Defrost
- STYLE: 1 ☐ Upright 2 ☐ Chest
- SIZE: 1 ☐ Small (12 cu. ft. or less) 3 ☐ Large (16.1 to 20 cu. ft.) 2 ☐ Medium (12.1 to 16 cu. ft.) 4 ☐ Extra Large (Over 20 cu. ft.)
- AGE: (years) 1 ☐ 0 - 3 years 4 ☐ 10 - 12 years 7 ☐ 21 - 25 years 2 ☐ 4 - 6 years 5 ☐ 13 - 15 years 8 ☐ Over 25 years 3 ☐ 7 - 9 years 6 ☐ 16 - 20 years 9 ☐ Do not know

b) Location of main freezer?

1 ☐ Garage 3 ☐ Porch 5 ☐ Other: _____
2 ☐ Basement 4 ☐ Main floor or above

*c) Please describe the **SECOND** stand-alone FREEZER that is used.*

1 ☐ None – Go to Question 5

- TYPE: 1 ☐ Frost-Free 2 ☐ Manual Defrost
- STYLE: 1 ☐ Upright 2 ☐ Chest
- SIZE: 1 ☐ Small (12 cu. ft. or less) 3 ☐ Large (16.1 to 20 cu. ft.) 2 ☐ Medium (12.1 to 16 cu. ft.) 4 ☐ Extra Large (Over 20 cu. ft.)
- AGE: (years) 1 ☐ 0 - 3 years 4 ☐ 10 - 12 years 7 ☐ 21 - 25 years 2 ☐ 4 - 6 years 5 ☐ 13 - 15 years 8 ☐ Over 25 years 3 ☐ 7 - 9 years 6 ☐ 16 - 20 years 9 ☐ Do not know

d) Is the second freezer operating all year?

1 ☐ Yes, all year 2 ☐ No, only part of the year.

e) Location of second freezer?

1 ☐ Garage 3 ☐ Porch 5 ☐ Other: _____
2 ☐ Basement 4 ☐ Main floor or above

5 **Is there an automatic DISHWASHER used in your home?**

1 ☐ No Dishwasher – Go to Question 6 2 ☐ Yes

- LOADS PER WEEK: ____ (loads/week)
  (Average number of times the dishwasher is operating each week.)
- AGE: (years) 1 ☐ 0 - 3 years 4 ☐ 10 - 12 years 7 ☐ 21 - 25 years 2 ☐ 4 - 6 years 5 ☐ 13 - 15 years 8 ☐ Over 25 years 3 ☐ 7 - 9 years 6 ☐ 16 - 20 years 9 ☐ Do not know

a) What type of DRYING CYCLE do you use most often:

1 ☐ Heat Dry (Sanitizing Cycle) 2 ☐ Air Dry (Econo) 3 ☐ Do not know

b) Do you use the Water Heat Temperature Boost option?

1 ☐ Not available
2 ☐ Available, and used always
3 ☐ Available, but choose not to use it
4 ☐ Available, and use occasionally

6 **Is there a CLOTHES WASHER used in your home?** (CHECK TYPE USED MOST OFTEN)

1 ☐ Do not have a Clothes Washer – Go to Question 7
2 ☐ Hand Washing – Go to Question 7
3 ☐ Use laundry facility outside the home (e.g., apartment block or laundromat) (Serving two or more residences.) – Go to Question 7
4 ☐ Top Load Automatic Clothes Washer (Used solely by this residence.)
5 ☐ Front Load Automatic Clothes Washer (Used solely by this residence.)
6 ☐ Compact/Spinner Washer
7 ☐ Wringer Washer

a) WATER TEMPERATURE for the WASH/RINSE CYCLE:
(Setting used most often, choose only one.)

1 ☐ Hot/Hot
2 ☐ Hot/Warm
3 ☐ Hot/Cold
4 ☐ Warm/Warm
5 ☐ Warm/Cold
6 ☐ Cold/Cold
7 ☐ Do not know

- LOADS PER WEEK: ____ (loads/week)
  (Average number of times the clothes washer is operating each week.)

- AGE: (years)
  1 ☐ 0 - 3 years
  2 ☐ 4 - 6 years
  3 ☐ 7 - 9 years
  4 ☐ 10 - 12 years
  5 ☐ 13 - 15 years
  6 ☐ 16 - 20 years
  7 ☐ 21 - 25 years
  8 ☐ Over 25 years
  9 ☐ Do not know

7 **Is there a CLOTHES DRYER used in your home?** (CHECK TYPE USED MOST OFTEN.)

1 ☐ No Clothes Dryer – Go to Section 7
2 ☐ Clothes Line/Rack – Go to Section 7
3 ☐ Use laundry facility outside the home (e.g., apartment block or laundromat) (Serving two or more residences.) – Go to Section 7
4 ☐ Automatic Clothes Dryer (Used solely by this residence.)

- DRYER FUEL:
  1 ☐ Electricity
  2 ☐ Natural Gas
  3 ☐ Propane
  4 ☐ Other: _____
- DRYER TEMP: (Used most often.)
  1 ☐ Cold (Low)
  2 ☐ Delicate
  3 ☐ Warm (Medium)
  4 ☐ Permanent Press
  5 ☐ Hot (High)
  6 ☐ Automatic
- LOADS/WEEK: _____ (loads/week) (Average number of times the dryer is operating each week.)
- MINUTES/LOAD: _____ (minutes/load)
  1 ☐ Automatic
  (Average number of minutes the dryer is operating for each load.)

- AGE: (years)
  1 ☐ 0 - 3 years
  2 ☐ 4 - 6 years
  3 ☐ 7 - 9 years
  4 ☐ 10 - 12 years
  5 ☐ 13 - 15 years
  6 ☐ 16 - 20 years
  7 ☐ 21 - 25 years
  8 ☐ Over 25 years
  9 ☐ Do not know

Section 7 Home Electronics and Lighting

1 **For the top 3 most frequently used television sets in your home, please check the most appropriate boxes below:**

*a) Please describe the **MAIN TELEVISION** that is used in your home.*

1 ☐ Do not have a television set – Go to Question 3

- TYPE: 1 ☐ Tube (CRT) 2 ☐ Plasma 3 ☐ LCD 4 ☐ LED 5 ☐ Projection 6 ☐ Do not know
- SIZE: 1 ☐ Under 21" 2 ☐ 21" - 29" 3 ☐ 30" - 39" 4 ☐ 40" - 49" 5 ☐ Over 49" 6 ☐ Do not know
- AGE: (years) 1 ☐ 0 - 3 years 2 ☐ 4 - 6 years 3 ☐ 7 - 9 years 4 ☐ 10 - 12 years 5 ☐ Over 12 years 6 ☐ Do not know
- USAGE: 1 ☐ 0 hours 2 ☐ 1 - 3 hours 3 ☐ 4 - 6 hours 4 ☐ 7 - 9 hours 5 ☐ Over 9 hours 6 ☐ Do not know

*b) Please describe the **SECOND TELEVISION** that is used in your home.*

1 ☐ Do not have a second television set – Go to Question 2

- TYPE: 1 ☐ Tube (CRT) 2 ☐ Plasma 3 ☐ LCD 4 ☐ LED 5 ☐ Projection 6 ☐ Do not know
- SIZE: 1 ☐ Under 21" 2 ☐ 21" - 29" 3 ☐ 30" - 39" 4 ☐ 40" - 49" 5 ☐ Over 49" 6 ☐ Do not know
- AGE: (years) 1 ☐ 0 - 3 years 2 ☐ 4 - 6 years 3 ☐ 7 - 9 years 4 ☐ 10 - 12 years 5 ☐ Over 12 years 6 ☐ Do not know
- USAGE: 1 ☐ 0 hours 2 ☐ 1 - 3 hours 3 ☐ 4 - 6 hours 4 ☐ 7 - 9 hours 5 ☐ Over 9 hours 6 ☐ Do not know

*c) Please describe the **THIRD TELEVISION** that is used in your home.*

1 ☐ Do not have a third television set – Go to Question 2

- TYPE: 1 ☐ Tube (CRT) 2 ☐ Plasma 3 ☐ LCD 4 ☐ LED 5 ☐ Projection 6 ☐ Do not know
- SIZE: 1 ☐ Under 21" 2 ☐ 21" - 29" 3 ☐ 30" - 39" 4 ☐ 40" - 49" 5 ☐ Over 49" 6 ☐ Do not know
- AGE: (years) 1 ☐ 0 - 3 years 2 ☐ 4 - 6 years 3 ☐ 7 - 9 years 4 ☐ 10 - 12 years 5 ☐ Over 12 years 6 ☐ Do not know
- USAGE: 1 ☐ 0 hours 2 ☐ 1 - 3 hours 3 ☐ 4 - 6 hours 4 ☐ 7 - 9 hours 5 ☐ Over 9 hours 6 ☐ Do not know

2 **For the top 3 most frequently used set top box or cable converter box in your home, please check the most appropriate boxes below.**

*a) Please describe the **MAIN SET-TOP OR CABLE CONVERTER BOX** that is used in your home.*

1 ☐ Do not have a set-top or cable converter box – Go to Question 3

- SERVICE PROVIDER: 1 ☐ Cable company 2 ☐ Telephone company 3 ☐ Satellite 4 ☐ Do not know
- FEATURES: 1 ☐ Digital 2 ☐ Digital PVR 3 ☐ HD 4 ☐ HD PVR 5 ☐ Do not know
- AGE: (years) 1 ☐ 0 - 3 years 2 ☐ 4 - 6 years 3 ☐ 7 - 9 years 4 ☐ 10 - 12 years 5 ☐ Over 12 years 6 ☐ Do not know

*b) Please describe the **SECOND MAIN SET-TOP OR CABLE CONVERTER BOX** that is used in your home.*

1 ☐ Do not have a second set-top or cable converter box – Go to Question 3

- SERVICE PROVIDER: 1 ☐ Cable company 2 ☐ Telephone company 3 ☐ Satellite 4 ☐ Do not know
- FEATURES: 1 ☐ Digital 2 ☐ Digital PVR 3 ☐ HD 4 ☐ HD PVR 5 ☐ Do not know
- AGE: (years) 1 ☐ 0 - 3 years 2 ☐ 4 - 6 years 3 ☐ 7 - 9 years 4 ☐ 10 - 12 years 5 ☐ Over 12 years 6 ☐ Do not know

*c) Please describe the **THIRD MAIN SET-TOP OR CABLE CONVERTER BOX** that is used in your home.*

1 ☐ Do not have a third set-top or cable converter box – Go to Question 3

- SERVICE PROVIDER: 1 ☐ Cable company 2 ☐ Telephone company 3 ☐ Satellite 4 ☐ Do not know
- FEATURES: 1 ☐ Digital 2 ☐ Digital PVR 3 ☐ HD 4 ☐ HD PVR 5 ☐ Do not know
- AGE: (years) 1 ☐ 0 - 3 years 2 ☐ 4 - 6 years 3 ☐ 7 - 9 years 4 ☐ 10 - 12 years 5 ☐ Over 12 years 6 ☐ Do not know

3 **For the top 3 most frequently used computers in your home, please check the most appropriate boxes.**

*a) Please describe the **MAIN COMPUTER** that is used in your home.*

1 ☐ Do not have a computer – Go to Question 5

- TYPE: 1 ☐ Desktop 2 ☐ Laptop 3 ☐ Do not know
- SCREEN: 1 ☐ Tube (CRT) 2 ☐ LCD
- AGE: (years) 1 ☐ 0 - 3 years 2 ☐ 4 - 6 years 3 ☐ 7 - 9 years 4 ☐ 10 - 12 years 5 ☐ Over 12 years 6 ☐ Do not know
- USAGE: 1 ☐ On 24 hours 2 ☐ On when necessary 3 ☐ Do not know

b) *Please describe the* ***SECOND COMPUTER*** *that is used in your home.*

1 ☐ Do not have a second computer – Go to Question 4

- TYPE: 1 ☐ Desktop 2 ☐ Laptop 3 ☐ Do not know
- SCREEN: 1 ☐ Tube (CRT) 2 ☐ LCD
- AGE: (years) 1 ☐ 0 - 3 years 3 ☐ 7 - 9 years 5 ☐ Over 12 years
  2 ☐ 4 - 6 years 4 ☐ 10 - 12 years 6 ☐ Do not know
- USAGE: 1 ☐ On 24 hours 2 ☐ On when necessary 3 ☐ Do not know

c) *Please describe the* ***THIRD COMPUTER*** *that is used in your home.*

1 ☐ Do not have a third computer – Go to Question 4

- TYPE: 1 ☐ Desktop 2 ☐ Laptop 3 ☐ Do not know
- SCREEN: 1 ☐ Tube (CRT) 2 ☐ LCD
- AGE: (years) 1 ☐ 0 - 3 years 3 ☐ 7 - 9 years 5 ☐ Over 12 years
  2 ☐ 4 - 6 years 4 ☐ 10 - 12 years 6 ☐ Do not know
- USAGE: 1 ☐ On 24 hours 2 ☐ On when necessary 3 ☐ Do not know

4 **Do you have internet access at your residence?**

1 ☐ No 2 ☐ Yes

5 **What LIGHT FIXTURES listed below are used in your home?** (CHECK ALL THAT APPLY.)

a) ***Bedrooms***

1 ☐ Compact Fluorescent 1 ☐ LED 1 ☐ Tube Fluorescent
1 ☐ Incandescent 1 ☐ Halogen

b) ***Kitchen***

1 ☐ Compact Fluorescent 1 ☐ LED 1 ☐ Tube Fluorescent
1 ☐ Incandescent 1 ☐ Halogen

c) ***Hallway***

1 ☐ Compact Fluorescent 1 ☐ LED 1 ☐ Tube Fluorescent
1 ☐ Incandescent 1 ☐ Halogen

d) ***Living/Family Room / Dining Room***

1 ☐ Compact Fluorescent 1 ☐ LED 1 ☐ Tube Fluorescent
1 ☐ Incandescent 1 ☐ Halogen

e) ***Laundry Area***

1 ☐ Compact Fluorescent 1 ☐ LED 1 ☐ Tube Fluorescent
1 ☐ Incandescent 1 ☐ Halogen 1 ☐ No laundry area

f) ***Basement area***

1 ☐ Compact Fluorescent 1 ☐ LED 1 ☐ Tube Fluorescent
1 ☐ Incandescent 1 ☐ Halogen 1 ☐ No basement area

6 **How many HALOGEN TORCHIERE LAMPS are used at your residence?**

1 ☐ None 2 ☐ One 3 ☐ Two or more

7 **Are there any strings of OUTDOOR SEASONAL LIGHTS hung at your residence?**

1 ☐ No 3 ☐ Yes, Incandescent lights
2 ☐ Yes, LED lights 4 ☐ Yes, both LED and Incandescent lights

Section 8 Hot Tub, Pool & Sauna

EXCLUDING HOT TUBS, POOLS AND SAUNAS IN APARTMENT/TOWNHOUSE COMPLEXES

1 **Is there a HOT TUB/JACUZZI installed in your home?**

1☐ No 2☐ Yes, total seating capacity _____

2 **Is there a SAUNA installed in your home?**

1☐ No 2☐ Yes

3 **Does your home have a SWIMMING POOL?**

1☐ No – Go to SECTION 9 2☐ Yes, Indoor 3☐ Yes, Outdoor

a) SIZE OF PUMP MOTOR:

1☐ No Pump 3☐ 1 hp 5☐ Do not know
2☐ 3/4 hp or less 4☐ 1 1/4 hp

b) HEATING FUEL:

1☐ Not Heated 3☐ Natural Gas 5☐ Solar
2☐ Electric 4☐ Propane 6☐ Do not know

Section 9 Your Vehicle

1 **How many VEHICLES are usually plugged in by your household during the winter months?** (NOVEMBER – MARCH)

1☐ None – Go to SECTION 10 3☐ Two 5☐ Four or More
2☐ One 4☐ Three

2 **For your most COMMONLY used vehicle, please indicate your normal routine during the winter months.** (NOVEMBER – MARCH)

a) PARKED IN: 1☐ Detached Garage 3☐ Carport/Shelter 5☐ Outside
2☐ Attached Garage 4☐ Underground Parkade

b) CAR TIMER FOR BLOCKHEATER: 1☐ Yes 2☐ No

c) INTERIOR CAR WARMER: 1☐ Yes 2☐ No

d) What best describes the routine for plugging in your vehicle(s)? (CHOOSE ONLY ONE.)

1☐ Do not plug-in
2☐ Plug-in every day
3☐ Plug-in occasionally - # of DAYS PER WEEK:_____ (1 to 7)
4☐ Dependent on the overnight temperature:_____ (Celsius) or _____ (Fahrenheit)

e) When you do plug-in your vehicle(s), how many HOURS PER DAY ON AVERAGE is the block heater operating? ON A WEEKDAY (MON. TO FRI.)

1☐ None 3☐ 3 - 4 hours 5☐ 7 to 8 hours
2☐ 1 - 2 hours 4☐ 5 - 6 hours 6☐ Over 8 hours

Section 10 Services and Programs

1 **Please indicate how you or anyone in your household USUALLY pays the Manitoba Hydro bill?** (CHECK ONLY ONE.)

- 1 ☐ In-Person - at a Manitoba Hydro office
- 2 ☐ In-Person - at a designated agency
- 3 ☐ By Mail
- 4 ☐ On-Line
- 5 ☐ Pre-Authorized Payment Plan
- 6 ☐ Other: _____
- 7 ☐ Do not know

2 **Are you aware of Manitoba Hydro's MYBILL method of receiving bills by email?**

1 ☐ Yes 2 ☐ No

3 **Would you be interested in receiving your Manitoba Hydro bill by email?**

1 ☐ Yes 3 ☐ Not sure 5 ☐ Have no internet access
2 ☐ No 4 ☐ Already receive monthly Hydro bill by email

4 **In the last year, how many times did you access the Manitoba Hydro website?**

1 ☐ Zero 2 ☐ 1 to 5 3 ☐ 6 to 10 4 ☐ Over 10 5 ☐ Have no internet access

5 **Do you read the monthly Energy Matters news bulletin that comes with your bill?**

1 ☐ Yes, Always 2 ☐ Yes, Occasionally 3 ☐ No, Never

6 **Do you read the special bill inserts describing new Power Smart programs Manitoba Hydro is offering?**

1 ☐ Yes, Always 2 ☐ Yes, Occasionally 3 ☐ No, Never

7 **Have you participated in any programs as a result of reading the special bill insert?**

1 ☐ Yes 2 ☐ No

8 **Please check all the programs you have PARTICIPATED in while at your PRESENT RESIDENCE?** (CHECK AS MANY AS APPLY.)

- 1 ☐ Have participated in no programs at this point
- 1 ☐ Power Smart Natural Gas Furnace Replacement Program
- 1 ☐ Power Smart Natural Gas Boiler Replacement Program
- 1 ☐ Power Smart New Home Program
- 1 ☐ Power Smart Residential Loan
- 1 ☐ WISE Program - Seniors Helping Seniors
- 1 ☐ Earth Power (Geothermal) Loan
- 1 ☐ Home Evaluation Program On-line
- 1 ☐ Power Smart Home Insulation Program
- 1 ☐ Power Smart Energy Efficient Appliance Program
- 1 ☐ Power Smart Compact Flourescent Lighting Promotions
- 1 ☐ Seasonal LED Lights Turn-in Program
- 1 ☐ Torchiere Lamp - Turn-In Halogen Program
- 1 ☐ ENERGY STAR Light Fixtures - Mail-In Rebate
- 1 ☐ Home Evaluation Program - Mail-in
- 1 ☐ Power Smart In-Home Energy Evaluation program
- 1 ☐ Lower Income Energy Efficiency Program

Section 11 Household Demographics

The following questions are of a personal nature, but are very important in explaining energy usage. Please try to answer these questions. If you are uncomfortable in answering any of them, just mark the 'Choose not to answer' box. All responses are kept strictly confidential.

1 **Including yourself, how many persons usually live in your home?**

1 ☐ One (myself) 3 ☐ Three 5 ☐ Five 7 ☐ Seven or more
2 ☐ Two 4 ☐ Four 6 ☐ Six 8 ☐ Choose not to answer

2 **Please indicate the number of people usually living in your home, within each AGE GROUP.**

_____Under 6 years _____25-34 years _____55-64 years
_____6-18 years _____35-44 years _____65 and older
_____19-24 years _____45-54 years ☐ Choose not to answer

3 **How many people who live in your home are EMPLOYED either FULL-TIME or PART-TIME?**

a) ____ Full-Time b) ____ Part-Time c) ____ Choose not to answer

4 **What is your approximate total annual household INCOME?** (ALL SOURCES BEFORE TAXES)

1 ☐ Under $20,000 7 ☐ $50,000-$54,999 13 ☐ $80,000-$89,999
2 ☐ $20,000-$24,999 8 ☐ $55,000-$59,999 14 ☐ $90,000-$99,999
3 ☐ $25,000-$29,999 9 ☐ $60,000-$64,999 15 ☐ $100,000-$124,999
4 ☐ $30,000-$34,999 10 ☐ $65,000-$69,999 16 ☐ $125,000-$149,999
5 ☐ $35,000-$39,999 11 ☐ $70,000-$74,999 17 ☐ $150,000 or over
6 ☐ $40,000-$49,999 12 ☐ $75,000-$79,999 18 ☐ Choose not to answer

5 **Please indicate the highest EDUCATION LEVEL attained by each head of household?**

	Person 1	Person 2
No Formal Education	1 ☐	1 ☐
Elementary (Grades 1-6)	2 ☐	2 ☐
Junior High (Grades 7-9)	3 ☐	3 ☐
Senior High (Grades 10-12)	4 ☐	4 ☐
Trade School	5 ☐	5 ☐
Community College	6 ☐	6 ☐
University (Bachelor)	7 ☐	7 ☐
Graduate (Master's or PHD)	8 ☐	8 ☐
Other _____	9 ☐	9 ☐
Choose not to answer	10 ☐	10 ☐

We welcome any comments you may wish to make. Please record your comments in the space below.

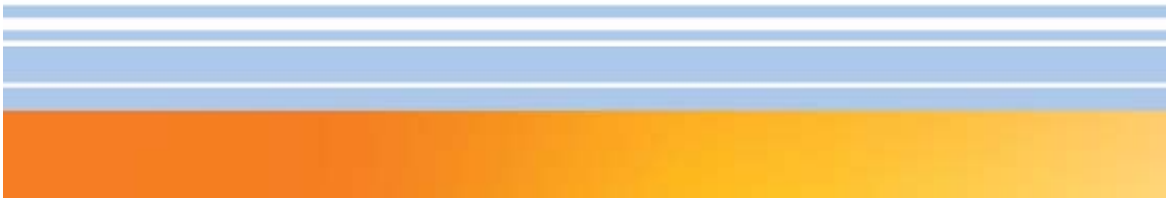
Please mail this completed form in the postage paid self-addressed envelope to:

RESIDENTIAL ENERGY USE SURVEY
MARKET FORECAST DEPARTMENT
Manitoba Hydro
P.O. Box 815, Station Main
Winnipeg, Manitoba R3C 2P4

THANK YOU
FOR YOUR TIME AND COOPERATION

Please answer the survey for the address shown on the FRONT COVER. Return the completed questionnaire within the next TWO WEEKS, in the postage paid envelope provided.

LARRY & BEV SIMPSON
PO BOX 6 STN MAIN
ARNAUD MB R0A 0B0



REFERENCE: Elenchus report, page 5.

PREAMBLE:
Manitoba Hydro's 2013 Electric Load Forecast assumes 24,000 electric vehicles by 2032/33.

QUESTION:
How does this projection compare to other Canadian jurisdictions?

RESPONSE:
Elenchus is of the opinion that this forecast is a conservatively reasonable projection at this time. Numerous sources are available to support a growth in the sale of electric vehicles. Recently Ontario released its 2013 Long Term Energy Plan which highlighted the following assumptions for growth in the Electric Vehicles in Ontario.

Electric Vehicle Demand Assumptions

Average Annual Driving Distance (km)	16,000		
Energy/km/EV	0.19kWh/km		
Average Annual Energy/EV	3 MWh		
Charger Type	20% level-1		
	60% level-2		
	20% level-3		
Charging Pattern	50% night		
	30% evening		
	20% daytime		
	2010	**2020**	**2031**
# of Cars (million)	7.3	8.1	9
# of EVs (million)	~0	0.4	1
%EVs	~0	5%	11%
Total EV Energy Consumption	~0	1.3 TWh	3.1 TWh
Total EV Peak Contribution (coincident)	~0	72 MW	171 MW

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ONTARIO POWER AUTHORITY

[Towards an Ontario Action Plan for Plug-In-Electric Vehicles (PEVs)]
[Navigant forecasts 18.6% CAGR for plug-ins in North America to 2022]
[Ontario Long-Term Energy Plan 2013]

REFERENCE: Elenchus report, page 8.

PREAMBLE:
The Elenchus report states that "It also appears that this model has exhibited a declining ability to predict the change in number of all electric customers going forward, based on reported R2 values."

QUESTION:
Please provide a high-level explanation of the concept of R2 values / coefficients of determination and their acceptable ranges for load forecasting purposes.

RESPONSE:
In statistics, the coefficient of determination denoted R2 and pronounced R-squared, indicates how well data points fit a statistical model. The R2 is a measure of the explanatory power of an equation. The equation may then be used to predict of future outcomes and the R2 serves as a measure of how well the equation is expected to predict the future outcome based on the past performance of the equation. In many instances where R2 is used, the predictors are calculated by ordinary least-squares regression. In this case, R2 will tend to increase as we increase the number of variables in the model. This illustrates a drawback to one possible use of R2, where one might keep adding variables to increase the R2 value. The R2 will never decrease as variables are added and will probably experience an increase due to chance alone.

R2 is often interpreted as the proportion of response variation "explained" by the regressors in the model. Thus, R2 = 1.0 indicates that the fitted model explains all variability, while R2 = 0 indicates no explanatory relationship. An interior value such as R2 = 0.7 may be interpreted as follows: "Seventy percent of the variation in the response variable can be explained by the explanatory variables. The remaining thirty percent can be attributed to unknown, lurking variables or inherent variability."

This leads to the alternative approach of looking at the adjusted R2. The explanation of this statistic is almost the same as R2 but it penalizes the statistic as extra variables are included in the model. The use of an adjusted R2 is an attempt to take account of the phenomenon of the R2 automatically and spuriously increasing when extra explanatory variables are added to the model. It is a modification due to Theil of R2 that adjusts for the number of explanatory terms in a model relative to the number of data points. The adjusted R2 value will always be less than or equal to that of R2. Unlike R2, the adjusted R2 increases when a new explanator is included only if the new explanator improves the R2 more than would be expected in the absence of any explanatory value being added by the new explanator. If a set of explanatory variables with a predetermined hierarchy of importance are introduced into a regression one at a time, with the adjusted R2 computed each time, the level at which adjusted R2 reaches a maximum, and decreases afterward, would be the regression with the ideal combination of having the best fit without excess/unnecessary terms. Hence, when alternate models are being tested the model with the highest adjusted R2 is generally deemed to be the best" model.

Note that neither the R2 nor the adjusted R2 serves as a good indicator of the predictive power of an equation in cases where there is a structural change in the relationship being modelled.

REFERENCE: Elenchus report, page 10.

PREAMBLE:
Elenchus suggests that it may be more appropriate to use regression and time series techniques to develop a forecast of Residential customers than to use a "people per household" factor.

QUESTION:
Please explain your reasoning as to why this suggestion would lead to greater accuracy with respect to Residential load forecasting. In your view, would this remove periodic over- or under-estimating as suggested by Chart 2?

RESPONSE:
Elenchus reasons that regression and time series techniques are time honoured tools that allow history to project the future. The tools provide measures of correlation to test the explanatory power of the model without any embedded assumed relationship.

Reliance on the “people per household” factor embeds the assumption that there is a stable relationship between the number of people per households and household electricity consumption. This relationship can be reflected in a regression equation along with other explanatory variables.

REFERENCE: Elenchus report, pages 11-12.

PREAMBLE:
The Elenchus report states that "Another potential issue is the timeliness of the population forecast given recent trends in immigration to Manitoba."

Elenchus calculates that a reduction in average annual immigration from 15,100 to 13,100 would Result in reduced load growth of 258 GWh by 2032/33, and reliance on Spatial Economics' projection would reduce load growth by 666.5 GWh.

a) QUESTION:
Is Elenchus aware of any changes to the Provincial Nominee Program or other immigration initiatives that would suggest a permanent downward trend in Manitoba Immigration or is Elenchus merely identifying population projections as a risk factor.

RESPONSE:
Elenchus remarks are identifying the risk of a downward trend in immigration according to the various reports available on the Citizenship and Immigration Canada web site. As shown below immigrant receiving permanent status in Manitoba in 2012 declined by 2,651 from 2011. Further, in the first two quarters of 2013 immigrants receiving permanent status in Manitoba declined by 655 compared to the same two quarters in 2012. While this is not an empirical study it shows that a slowing down of migration is expected by Citizenship and Immigration Canada.

Canada – Permanent residents by province or territory and category

Number										
Category	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Economic immigrants	4,079	4,999	5,724	7,376	8,328	8,694	10,905	13,274	13,152	10,337
Refugees	1,234	1,252	1,094	1,238	1,170	972	1,098	1,032	1,303	1,140
Other immigrants	147	57	86	101	134	167	159	124	108	96
Manitoba	6,503	7,426	8,096	10,048	10,954	11,218	13,521	15,807	15,963	13,312

Canada – Permanent residents by province or territory and category

Canada - Permanent residents by province or territory and urban area

	2012						2013		
Urban area	Q1	Q2	YTD	Q3	Q4	Total	Q1	Q2	YTD
Manitoba	3,246	3,581	6,827	3,234	3,251	13,312	2,610	3,562	6,172

Canada - Permanent residents by province or territory and urban area

b) QUESTION:
Confirm that population fertility analysis was not undertaken by MH and that changes in assumed immigration indicated by the most current forecast should be a factor considered.

RESPONSE:
Elenchus confirmed that population fertility analysis was not undertaken by MH.

Manitoba Hydro advised Elenchus that it does not perform analysis on population fertility when producing their consensus forecast. MH's population estimates are generated annually by performing a simple average of several independent forecasts.

REFERENCE: Elenchus report, executive summary page i.

PREAMBLE:
One type of uncertainty associated with Manitoba Hydro's forecast over the long run is the possibility of significant on anticipated changes in the demographic and/or economic trends that are currently expected based on historical trends. This type of risk is addressed by Manitoba Hydro using sensitivity analysis.

QUESTION:
Please elaborate on the sensitivity analysis undertaken by Manitoba Hydro which addresses unanticipated changes in demographic or economic trends and comment on the adequacy of the analysis.

RESPONSE:
Elenchus notes that Manitoba Hydro addresses unanticipated changes on a large scale by utilizing sensitivity analysis to address potential risks to the forecast. This is shown on page ii of the executive summary of the 2013 Electric Load Forecast. Elenchus notes that Manitoba Hydro would have the opportunity to raise the issues resulting from the potential of changes in demographic trends but has not chosen to do so.

Sensitivity analysis is most appropriate when preceded by careful analysis of the scale of the potential variance that could lead to forecast errors.

REFERENCE: Elenchus report, page 13.

PREAMBLE:
Elenchus describes the three different approaches used by Manitoba Hydro to predict new customers by heating type over time.

QUESTION:
Which of the three approaches, if any, does Elenchus recommend? On what basis?

RESPONSE:
Elenchus reported that three models have been utilized by Manitoba Hydro in predicting electric heat customers. These were:

- Pre 2009 use of a logistic regression (LOGIT) model
- 2009 to 2012 use of a linear regression model using change in residential customers and the price of electricity and gas
- 2013 use of 2009 Residential Survey

Manitoba Hydro is challenged in this area of forecasting. Electric space heating is recognized as a very sizable driver of energy consumption and demand for the utility worthy of isolated analysis. However, customers billing record information make this extremely challenging to identify affected customers upon which to apply statistical modeling tools. Compounding the challenge is the changing landscape of the gas sector with respect to supply and prices. The spread in the difference in annual costs between heating with electricity versus gas have widened over the last few years, making the switch to gas heating attractive to home owners.

Elenchus is a strong proponent of the use of linear regression models to prepare forecasts. Elenchus realises that Manitoba Hydro's previous use of this model failed due to use of incorrect hypothesis data and limitations on available data. Using the 2009 residential survey was a reasonable approach but the currency of the data adds error risk to the forecast. As suggested by Elenchus the residential survey should be updated as an initial step.

REFERENCE: Elenchus report, page 13.

PREAMBLE:
The Elenchus report states that "While Manitoba Hydro analyzed the effect of Residential customers "switching to" electric heat, it did not specifically address a "switch away" from electric heat. For modelling purposes, the effect should be assumed to be "at least`` symmetrical.

QUESTION:
Please explain your reasoning that the effect would be at least symmetrical.

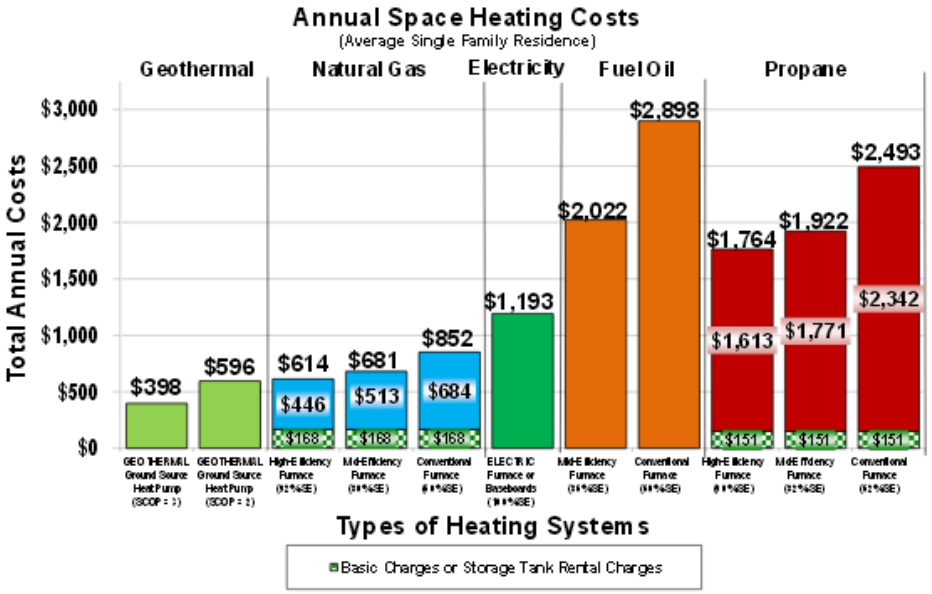
RESPONSE:
Manitoba Hydro suggests that it expects 10% of residential customers will switch to electric space heating. This implies conversions of about 45,600 customers based on 2012/13 residential customers to 56,500 customers in 2032/33. In an informal response to Elenchus IR's Manitoba Hydro noted that the 2009 residential survey determined that there were potentially 11,400 customers using wood, propane or fuel oils as their primary source of space heating. This represents only 2.5% of the potential number of customers that MH expects to convert to electricity.

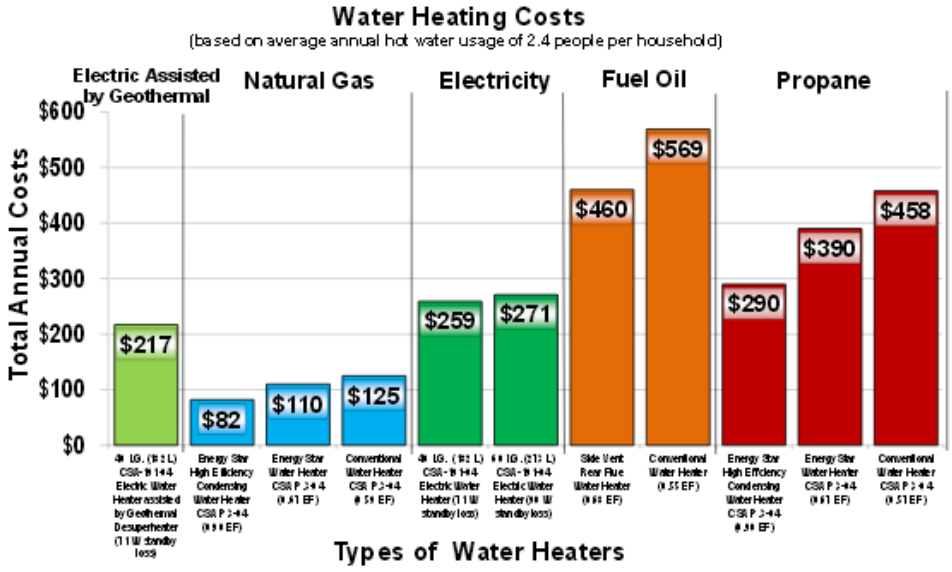
Based on the cost comparison charts reproduced below (obtained from Manitoba Hydro's web site) there is a financial incentive for customers to convert from fuel oil and propane to electricity. However, to achieve the projected number of conversions to electric space heating it will be necessary for a significant number of customers currently using natural gas to convert to electricity. The cost charts suggest that there would need to be a significant increase in gas prices relative to electricity for the implied conversion from natural gas to occur over the next twenty years.

Conversely customer demand for gas space heating could result in areas where gas is available but presently under-served. There is also the potential for public demand for service in areas where gas is not available that could be economically feasible for service. If the disparity in prices between the two commodities continues then there could be added demand from areas that not economically feasible but accessible with modification in rate structure.

Political action could also affect conversion rates. For example, the promotion of green energy over fossil fuels, perhaps by way of a carbon tax could discourage use of natural gas. On the other hand, the promotion of natural gas use by government recognising the benefit of reduced heating costs, including the potential increase in disposable income could lead to the promotion of natural gas space heating. Natural gas is being actively promoted in many US states.

Elenchus would suggest that if Manitoba Hydro facilitates the economic fuel choices by residential customers, it should result in at least symmetrical conversion away from electrical space heating as there will be away from natural gas.


Annual Space Heating Costs
(Average Single Family Residence)
Geothermal
Natural Gas
Electricity
Fuel Oil
Propane
Total Annual Costs
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
$398
$596
$614
$446
$168
$681
$513
$168
$852
$684
$168
$1,193
$2,022
$2,898
$1,764
$1,613
$151
$1,922
$1,771
$151
$2,493
$2,342
$151
GEOTHERMAL Ground Source Heat Pump (SCOP = 3)
GEOTHERMAL Ground Source Heat Pump (SCOP = 2)
High-Efficiency Furnace (92%AFUE)
Mid-Efficiency Furnace (84%AFUE)
Conventional Furnace (78%AFUE)
ELECTRIC Furnace or Baseboards (100%AFUE)
Mid-Efficiency Furnace (84%AFUE)
Conventional Furnace (84%AFUE)
High-Efficiency Furnace (96%AFUE)
Mid-Efficiency Furnace (92%AFUE)
Conventional Furnace (92%AFUE)
Types of Heating Systems
Basic Charges or Storage Tank Rental Charges


Water Heating Costs
(based on average annual hot water usage of 2.4 people per household)
Electric Assisted by Geothermal
Natural Gas
Electricity
Fuel Oil
Propane
Total Annual Costs
$600
$500
$400
$300
$200
$100
$0
$217
$82
$110
$125
$259
$271
$460
$569
$290
$390
$458
Energy Star High Efficiency Condensing Water Heater (0.94 EF)
Energy Star Water Heater (0.67 EF)
Conventional Water Heater (0.59 EF)
Side Vent Rear Flue Water Heater (0.61 EF)
Conventional Water Heater (0.55 EF)
Energy Star High Efficiency Condensing Water Heater (0.94 EF)
Energy Star Water Heater (0.67 EF)
Conventional Water Heater (0.59 EF)
Types of Water Heaters

REFERENCE: Elenchus report, pp. 20-21.

PREAMBLE:
The Elenchus report states that "A key driver of the forecast is the annual forecast change in Residential Basic customers. Therefore, the concerns about the long-term forecast for Manitoba's population, immigration and assumed persons per household that are of concern in the Residential customer forecast are also of concern for the GS Mass Market forecast."

QUESTION:
Given Elenchus' comments, does Elenchus agree with Manitoba Hydro having switched to a forecasting approach for General Service customers that places increased reliance on the Residential forecast?

RESPONSE:
Elenchus would agree with Manitoba Hydro changing the forecasting approach for this class as previous models were not very robust. Elenchus could agree that using the residential class may be a reasonable driver to assume in the model as growth in population allows for growth in small commercial services and potential attraction for larger commercial industry with a growing labour force.

Elenchus notes however that by using this approach our concerns about the formulation of the residential forecast extend to the forecast for the mass market sector which depends on the residential forecast. The lack of transparency by Manitoba Hydro with respect to its review of alternatives to using this model, as noted in the evidence, is a related concern.

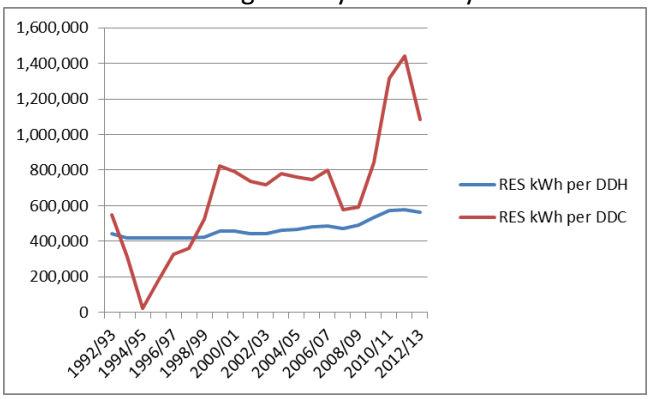
REFERENCE: Elenchus report, page 29.

PREAMBLE:
Page 28 of the Elenchus report provides a chart of degree-day sensitivity coefficients.

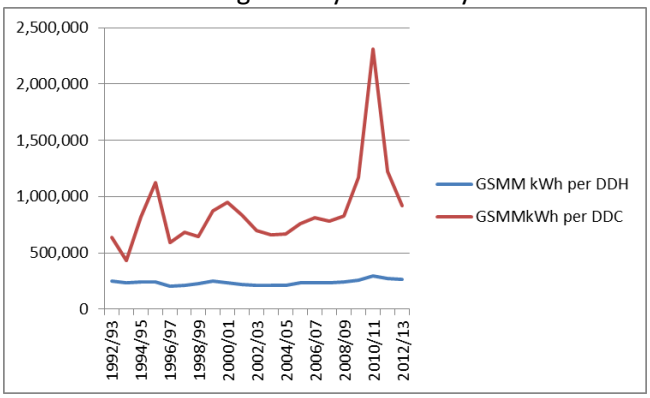
a) QUESTION:
Please provide a graph listing the calendar year in the x-axis and the sensitivity coefficients on the y-axis for each of the customer classes.

RESPONSE:

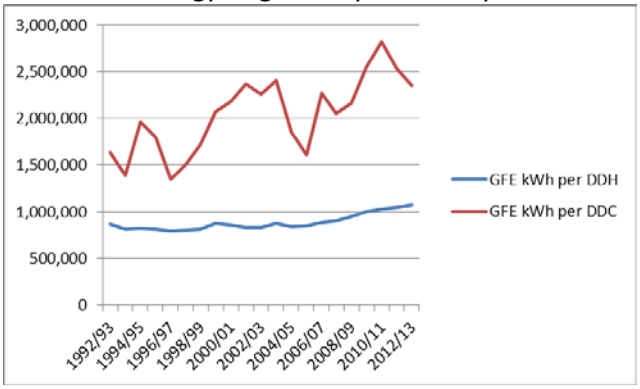
Residential Basic Degree-Day Sensitivity Coefficients



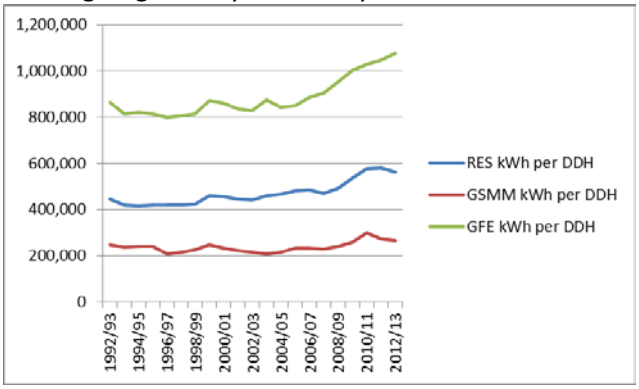
GS Mass Market Degree-Day Sensitivity Coefficients



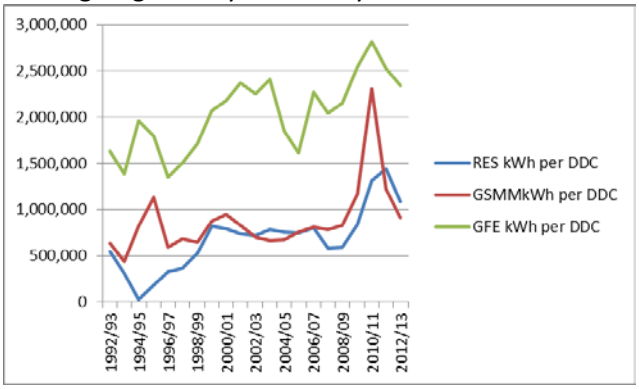
Gross Firm Energy Degree-Day Sensitivity Coefficients



Heating Degree-Day Sensitivity Coefficients



Cooling Degree-Day Sensitivity Coefficients



b) QUESTION:

There appears to be a general increase in the sensitivity coefficients for all customer classes, but in particular to the residential class. Can Elenchus comment on the likely reasons for this increase? In particular, please comment on the likely impact of fuel switching on DDH sensitivity and the pervasiveness of air conditioning on DDC sensitivity. Would it be reasonable to expect such trends to continue?

RESPONSE:

Elenchus would agree that there is a trending increase in sensitivity coefficients for all customer classes.

Elenchus has no empirical support for any particular explanation for the observed increase in sensitivity; however, we would agree that hypothesized reasons appear reasonable.

c) QUESTION:

To the extent that the changes are the result of short-term variability rather than general trends, what timeframe would Elenchus suggest to calculate sensitivity coefficients? Is a 10-year timeframe sufficient? Conversely, is a 25-year timeframe too long to capture shorter-term trends?

RESPONSE:

Elenchus is of the opinion that a 10 year timeframe, versus a 25 year timeframe, would allow for the incorporation of shorter term variability effects. This can have some undue influence over the future projections. Statistically a longer time's series makes for higher degrees of freedom improving the accuracy of estimates going forward. Thus Elenchus believes using a 25 year timeframe is reasonable in the absence of evidence that there have been structural changes that cannot be captured through the inclusion of appropriate variables in the regression.

REFERENCE: Elenchus report executive summary page (iv).

PREAMBLE:
Elenchus states that "In summary, it is our view that the NFAT process would be enhanced if Manitoba Hydro prepared a more thorough Electric Load Forecast with alternative economic and weather scenarios. A more thorough description of the forecasting methodology with full documentation of processes and any methodological changes, as well as within sample forecast accuracy would also allow for a more thorough assessment of the forecast reasonableness. A description of potential assumptions around the economic factors affecting Top Consumers and a range of scenarios would also allow stakeholders to more appropriately assess the risks around the forecast for that sector. Ideally, in addition to the five scenarios suggested above (and used until 2009 by Manitoba Hydro), scenarios that demonstrate the impact of selected market transformation scenarios, such as grid parity for small scale generation, would impact on future loads."

QUESTION:
In light of the observations and recommendations made, please indicate to what extent the current load forecast is appropriate for the NFAT economic analysis and comment on the implications to that analysis given the limitations raised?

RESPONSE:
Elenchus believes the current load forecast is overly optimistic of future growth and therefore not appropriate for the NFAT economic analysis. Elenchus has identified passed practices that have been discarded in favour of more simplistic approaches. Lack of transparency in reasons for change is cause for concern.

The implication is that the financial risks associated with actual future demand falling below the current forecast of demand should be carefully considered. Certainly, there is an opportunity for Manitoba Hydro to address the identified concerns with it current forecasting methodology before committing to a significant investment in the development of Conawapa.

Most important the risk and financial consequences of grid parity which could depress the value of grid power in both the domestic and export markets should be carefully assessed before committing to major investments that may be unsustainable in a grid parity scenario. Again, this issue could be thoroughly addressed and subjected to careful scrutiny in a future Conawapa NFAT.

REFERENCE: Elenchus report, page 34.

PREAMBLE:

a) QUESTION:
Explain the implications of weather-adjusted load being under forecast pre-2005 and being over forecast post-2005.

RESPONSE:
Elenchus identified the trends of over and under estimating load forecasts as being cyclical and pronounced over a long period of time. Twenty year forecasts are a useful tool especially in a capital intensive market that Manitoba Hydro is dealing with. Development of hydro generation and transmission plant necessary for consumer consumption requires years of planning and development in order to have the power available when and where it is needed. Under estimation of need may lead to high cost short term solutions, or shortages. Over estimation of need can potentially result in long term idle plant. Both have potential unnecessary financial impact on ratepayers.

b) QUESTION:
Explain how this affects the domestic rates going forward to 2032.

RESPONSE:
Reason would suggest that both under and over forecasting would have an increasing effect on domestic rates over time as a result of potential investment decision made assuming inaccurate information.

REFERENCE: Elenchus report, pp. 37-38.

PREAMBLE:

QUESTION:
Please provide an overview of Manitoba Hydro's 2012 load forecast and indicate whether the following are over- or under-estimated for each of 2022 and 2032:

- Residential
- Mass Market
- Distribution Losses
- Transmission Losses
- Total Domestic Load.

RESPONSE:
Elenchus cannot perform this request as it requires comparison of actual results.

REFERENCE: Appendix 11.3, p. 271 and 272.

PREAMBLE:

QUESTION:

Please provide your opinion on Manitoba Hydro's projected domestic load out to 2042 and 2062. Are these realistic projections?

RESPONSE:

Given the concerns raised by Elenchus in the evidence related to Manitoba Hydro's current load forecasting methodology and the risk of structural changes such as grid parity, Elenchus believe that very little weight should be given to any specific load forecast. Elenchus is of the view that any 30 to 50 year forecast of electricity consumption, and especially any forecast of the consumption of grid power, is essentially speculative. Decisions should be based on the acceptability of extreme variances from forecast in consumption recognizing that Manitoba Hydro may have to alter its plans radically in response to changing market conditions.

See attached table below.

Development Plan **K19 Sales C25 750 MW**
Development Plan Scenario: **Economics:Ref Rev:Ref Cap:Ref**

ELECTRIC OPERATIONS
AVERAGE UNIT REVENUE/COST

For the year ended March 31	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
VOLUMES (in GW.h)																									
Demand:																									
Manitoba Domestic Energy Sales	21748	22330	22547	22781	22987	23336	23720	23945	24333	24701	25078	25462	25854	26233	26605	27003	27415	27825	28232	28638	29044	29468	29891	30313	30734
Domestic energy Losses	3400	3267	3191	3216	3213	2847	2898	2890	2923	2959	3009	3085	3156	3211	3375	3417	3476	3546	3608	3652	3718	3788	3855	3919	3981
Firm & Opportunity Export Sales to Canada	756	830	627	624	625	622	609	600	498	472	465	473	455	453	630	822	803	789	796	789	775	761	745	745	753
Firm & Opportunity Export Sales to US	8690	8183	6579	6352	6141	6165	5694	5923	8665	9327	9160	8661	8258	9148	11822	12209	11964	11603	11388	11136	10824	10452	10107	9616	8867
Export Transmission Losses	813	804	649	626	606	605	555	578	819	869	851	796	748	878	1164	1206	1176	1135	1113	1083	1047	1006	966	920	864
Total Demand Volumes:	**35407**	**35414**	**33593**	**33599**	**33573**	**33575**	**33476**	**33937**	**37238**	**38329**	**38563**	**38477**	**38470**	**39924**	**43596**	**44656**	**44833**	**44899**	**45136**	**45299**	**45409**	**45474**	**45564**	**45513**	**45199**
Supply:																									
MH Hydraulic Generation	32904	32232	30943	30926	30908	30845	30724	31255	34204	35009	35228	35042	34882	37198	40886	41638	41743	41742	41956	42041	42094	42100	42118	42143	42182
MH Thermal Generation	85	84	349	383	381	390	384	331	226	244	240	236	258	221	217	209	213	211	204	205	203	200	200	195	196
Purchased Energy	2418	3098	2301	2291	2283	2340	2368	2351	2808	3075	3094	3199	3331	2505	2493	2809	2877	2946	2977	3053	3112	3174	3246	3175	2821
Total Supply Volumes:	**35407**	**35414**	**33593**	**33599**	**33573**	**33575**	**33476**	**33937**	**37238**	**38329**	**38563**	**38477**	**38470**	**39924**	**43596**	**44656**	**44833**	**44899**	**45136**	**45299**	**45409**	**45474**	**45564**	**45513**	**45199**
REVENUE/COST (in milions of dollars)																									
Manitoba Domestic Energy Sales:																									
Manitoba Domestic Energy Sales @ Approved Rates	1 330.90	1 360.89	1 373.68	1 389.71	1 403.71	1 424.30	1 446.83	1 461.82	1 484.57	1 506.29	1 528.52	1 551.63	1 575.36	1 598.08	1 620.51	1 644.11	1 668.56	1 692.91	1 716.96	1 741.06	1 765.41	1 789.53	1 813.68	1 837.90	1 862.11
Additional General Consumers Revenue	0.00	47.63	104.20	164.43	228.05	296.75	370.45	446.76	530.22	618.68	712.92	813.51	920.74	1 033.96	1 153.82	1 281.73	1 418.00	1 562.30	1 714.81	1 876.24	1 057.31	1 075.83	1 122.73	1 156.57	1 211.36
Total Manitoba Domestic Energy Sales	1 330.90	1 408.52	1 477.88	1 554.14	1 631.76	1 721.05	1 817.28	1 908.58	2 014.79	2 124.97	2 241.44	2 365.14	2 496.10	2 632.04	2 774.33	2 925.84	3 086.56	3 255.21	3 431.77	3 617.30	2 822.72	2 865.36	2 936.41	2 994.47	3 073.47
Extraprovincial Revenue:																									
Total Export Sales to Canada	28.32	20.90	19.59	22.29	24.36	25.57	26.12	26.98	25.04	24.36	24.69	26.46	26.13	26.73	39.12	54.40	54.82	55.80	58.60	60.07	60.97	61.86	62.68	65.13	68.52
Total Export Sales to USA	297.03	299.41	292.81	326.10	341.33	363.41	353.20	388.78	664.38	768.67	779.52	756.29	743.32	780.69	1 032.98	1 083.77	1 091.23	1 084.13	1 088.97	1 091.43	1 085.37	1 071.22	1 058.33	1 017.86	931.68
Other Non-Energy Related Revenues	14.47	7.43	2.90	2.98	3.06	3.12	3.18	3.23	3.29	3.35	3.41	3.47	3.53	3.60	3.66	3.73	3.80	3.86	3.93	4.00	4.08	4.15	4.22	4.30	4.38
Transmission Credits	17.16	16.74	18.16	18.67	19.19	19.53	19.88	20.24	20.61	20.98	21.35	21.74	22.13	22.53	22.93	23.35	23.77	24.19	24.63	25.07	25.52	25.98	26.45	26.93	27.41
Total Extraprovincial Revenue	356.98	344.48	333.46	370.04	387.95	411.63	402.38	439.23	713.32	817.35	828.98	807.96	795.11	833.54	1 098.69	1 165.24	1 173.61	1 167.99	1 176.14	1 180.59	1 175.94	1 163.22	1 151.69	1 114.22	1 031.99
Water Rentals & Assessments:																									
MH Water Rentals	109.63	107.74	103.38	103.32	103.26	103.05	102.65	104.42	114.27	116.97	117.70	117.07	116.54	124.28	136.60	139.11	139.46	139.46	140.17	140.46	140.64	140.66	140.72	140.80	140.93
Assessments	4.74	5.24	5.73	5.93	6.14	6.30	6.46	6.63	6.80	6.97	7.15	7.33	7.52	7.72	7.91	8.12	8.33	8.54	8.76	8.99	9.22	9.39	9.57	9.75	9.94
Other Costs	2.67	2.81	2.84	2.87	2.90	2.93	2.96	2.99	3.03	3.06	3.09	3.12	3.16	3.19	3.23	3.26	3.30	3.34	3.38	3.41	3.45	3.49	3.53	3.58	3.62
Total Water Rentals & Assessments	117.05	115.79	111.95	112.13	112.31	112.28	112.07	114.04	124.10	126.99	127.94	127.53	127.22	135.19	147.74	150.49	151.09	151.34	152.31	152.86	153.31	153.55	153.82	154.13	154.48
Fuel & Power Purchased:																									
MH Thermal Generation	6.79	5.67	17.94	21.66	23.30	25.36	26.48	25.33	20.24	22.63	23.08	23.43	26.41	24.00	24.46	24.49	25.77	26.34	26.34	27.43	28.05	28.65	29.43	29.75	30.87
Purchased Energy	82.33	105.96	97.62	104.36	108.68	113.77	117.05	118.84	137.29	150.53	156.13	163.91	173.56	137.70	141.13	157.27	164.23	171.22	176.59	184.73	192.57	200.53	210.07	209.82	191.07
Other Non-Energy related Costs	7.52	11.46	7.40	6.49	6.69	6.89	7.10	7.31	8.40	8.80	9.03	9.26	9.51	9.76	10.02	10.28	10.56	10.84	11.12	11.42	11.72	12.03	12.35	11.80	11.97
Transmission Charges	46.27	43.10	44.15	45.38	52.55	53.50	54.46	55.44	56.44	57.46	58.49	59.54	60.62	61.71	62.82	63.95	65.10	66.27	67.46	68.68	69.91	71.23	72.58	73.95	75.35
Total Fuel & Power Purchased	142.91	166.20	167.10	177.89	191.23	199.52	205.09	206.92	222.38	239.41	246.73	256.15	270.09	233.16	238.43	255.98	265.65	274.66	281.51	292.25	302.26	312.45	324.42	325.33	309.25
AVERAGE UNIT REVENUE/COST ($/MW.h))																									
Manitoba Domestic Energy Sales @ Approved Rates	$ 61.20	$ 60.94	$ 60.93	$ 61.00	$ 61.07	$ 61.04	$ 61.00	$ 61.05	$ 61.01	$ 60.98	$ 60.95	$ 60.94	$ 60.93	$ 60.92	$ 60.91	$ 60.89	$ 60.86	$ 60.84	$ 60.82	$ 60.79	$ 60.78	$ 60.73	$ 60.68	$ 60.63	$ 60.59
Additional Domestic Revenue	-	2.13	4.62	7.22	9.92	12.72	15.62	18.66	21.79	25.05	28.43	31.95	35.61	39.41	43.37	47.47	51.72	56.15	60.74	65.51	36.40	36.51	37.56	38.15	39.41
Total Manitoba Domestic Energy Sales @ meter	61.20	63.08	65.55	68.22	70.99	73.75	76.61	79.71	82.80	86.03	89.38	92.89	96.55	100.33	104.28	108.35	112.59	116.99	121.56	126.31	97.19	97.24	98.24	98.79	100.00
Total Export Sales to Canada *	$ 38.95	$ 28.32	$ 36.54	$ 41.79	$ 45.58	$ 48.11	$ 50.41	$ 53.01	$ 61.50	$ 63.93	$ 66.07	$ 69.28	$ 71.78	$ 73.73	$ 72.51	$ 74.42	$ 77.02	$ 79.88	$ 83.11	$ 85.99	$ 89.05	$ 92.34	$ 95.82	$ 99.57	$ 103.43
Total Export Sales to USA **	30.83	33.37	40.56	47.13	50.15	53.44	55.95	59.69	72.54	78.50	81.05	82.96	85.35	81.05	84.00	85.45	87.75	89.81	91.87	94.09	96.17	98.16	100.15	100.97	99.67
Total Export Sales *	31.36	32.61	40.25	46.72	49.78	53.02	55.49	59.16	72.04	77.93	80.46	82.38	84.78	80.77	83.50	84.82	87.15	89.25	91.35	93.61	95.75	97.81	99.88	100.88	99.93
MH Hydraulic Generation (Water Rentals)	$ 3.33	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34
MH Thermal Generation	79.89	67.55	51.46	56.52	61.11	64.97	68.89	76.52	89.50	92.67	95.96	99.37	102.39	108.58	112.68	116.96	120.93	125.11	129.35	133.79	138.31	143.07	147.46	152.58	157.33
Purchased Energy ***	36.01	35.90	44.91	48.15	50.29	51.32	52.16	53.37	51.31	51.21	52.77	53.53	54.36	58.06	59.78	58.88	59.98	61.02	62.26	63.46	64.84	66.15	67.67	69.15	71.25

*Excludes volumes associated with Lake St. Joseph Payback Revenue
**Includes Net Transmission Credits and Charges
*** Includes Assessments

Development Plan **K19 Sales C25 750 MW**
Development Plan Scenario: **Economics:Ref Rev:Ref Cap:Ref**

ELECTRIC OPERATIONS
AVERAGE UNIT REVENUE/COST

For the year ended March 31	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062
VOLUMES (in GW.h)																									
Demand:																									
Manitoba Domestic Energy Sales	31155	31575	31994	32413	32831	33249	33666	34083	34499	34915	35330	35330	35330	35330	35330	35330	35330	35330	35330	35330	35330	35330	35330	35330	35330
Domestic energy Losses	4047	4115	4183	4251	4296	4362	4428	4490	4543	4599	4668	4668	4668	4668	4668	4668	4668	4668	4668	4668	4668	4668	4668	4668	4668
Firm & Opportunity Export Sales to Canada	745	732	719	704	670	647	630	616	576	557	538	538	538	538	538	538	538	538	538	538	538	538	538	538	538
Firm & Opportunity Export Sales to US	8461	8100	7762	7611	7257	6974	6751	6630	6241	6027	5806	5806	5806	5806	5806	5806	5806	5806	5806	5806	5806	5806	5806	5806	5806
Export Transmission Losses	822	781	741	717	675	639	609	589	544	516	486	486	486	486	486	486	486	486	486	486	486	486	486	486	486
Total Demand Volumes:	**45231**	**45302**	**45400**	**45696**	**45728**	**45870**	**46084**	**46407**	**46403**	**46614**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**
Supply:																									
MH Hydraulic Generation	42207	42207	42213	42360	42150	42149	42220	42355	42155	42148	42216	42216	42216	42216	42216	42216	42216	42216	42216	42216	42216	42216	42216	42216	42216
MH Thermal Generation	195	192	189	178	363	397	413	479	634	763	786	786	786	786	786	786	786	786	786	786	786	786	786	786	786
Purchased Energy	2829	2904	2998	3158	3215	3323	3451	3574	3613	3703	3826	3826	3826	3826	3826	3826	3826	3826	3826	3826	3826	3826	3826	3826	3826
Total Supply Volumes:	**45231**	**45302**	**45400**	**45696**	**45728**	**45870**	**46084**	**46407**	**46403**	**46614**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**	**46828**
REVENUE/COST (in milions of dollars)																									
Manitoba Domestic Energy Sales:																									
Manitoba Domestic Energy Sales @ Approved Rates	1 886.26	1 910.46	1 934.65	1 958.83	1 983.01	2 007.21	2 031.39	2 055.58	2 079.77	2 103.95	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14	2 128.14
Additional General Consumers Revenue	1 259.56	1 275.05	1 309.84	1 344.55	1 430.18	1 526.11	1 552.68	1 608.58	1 712.34	1 844.35	1 867.73	1 852.24	1 870.52	1 967.52	2 000.91	2 026.80	2 107.71	2 131.04	2 127.81	2 165.43	2 144.33	2 169.62	2 207.15	2 227.87	2 255.80
Total Manitoba Domestic Energy Sales	3 145.82	3 185.51	3 244.49	3 303.38	3 413.19	3 533.32	3 584.07	3 664.16	3 792.11	3 948.30	3 995.87	3 980.38	3 998.66	4 095.66	4 129.05	4 154.94	4 235.85	4 259.18	4 255.95	4 293.57	4 272.47	4 297.76	4 335.29	4 356.01	4 383.94
Extraprovincial Revenue:																									
Total Export Sales to Canada	69.98	70.91	71.92	72.52	70.70	70.08	69.97	70.12	66.76	66.15	65.37	68.51	69.74	71.00	72.28	73.58	74.90	76.25	77.62	79.02	80.44	81.89	83.36	84.86	86.39
Total Export Sales to USA	899.50	877.41	856.92	867.58	855.63	848.94	847.74	857.63	834.80	831.23	823.60	860.18	875.67	891.43	907.47	923.81	940.44	957.36	974.60	992.14	1 010.00	1 028.18	1 046.69	1 065.53	1 084.71
Other Non-Energy Related Revenues	4.46	4.54	4.62	4.70	4.79	4.87	4.96	5.05	5.14	5.23	5.33	5.42	5.52	5.62	5.72	5.82	5.93	6.04	6.14	6.26	6.37	6.48	6.60	6.72	6.84
Transmission Credits	27.91	28.41	28.92	29.44	29.97	30.51	31.06	31.62	32.19	32.77	33.36	33.96	34.57	35.19	35.82	36.47	37.13	37.79	38.47	39.17	39.87	40.59	41.32	42.06	42.82
Total Extraprovincial Revenue	1 001.84	981.27	962.38	974.24	961.08	954.41	953.73	964.42	938.89	935.37	927.66	968.07	985.50	1 003.24	1 021.30	1 039.68	1 058.39	1 077.44	1 096.84	1 116.58	1 136.68	1 157.14	1 177.97	1 199.17	1 220.76
Water Rentals & Assessments:																									
MH Water Rentals	141.01	141.01	141.04	141.53	140.82	140.82	141.06	141.51	140.84	140.82	141.04	140.90	140.90	140.90	140.90	140.90	140.90	140.90	140.90	140.90	140.90	140.90	140.90	140.90	140.90
Assessments	10.12	10.32	10.51	10.71	10.91	11.12	11.33	11.54	11.76	11.98	12.21	12.42	12.64	12.87	13.10	13.33	13.57	13.82	14.07	14.32	14.58	14.84	15.11	15.38	15.66
Other Costs	3.66	3.71	3.75	3.80	3.84	3.89	3.94	3.99	4.03	4.09	4.14	9.37	12.07	14.82	17.63	20.48	23.39	26.34	29.35	32.42	35.54	38.71	41.95	45.24	48.59
Total Water Rentals & Assessments	154.80	155.03	155.29	156.03	155.58	155.83	156.32	157.03	156.63	156.88	157.39	162.68	165.61	168.59	171.63	174.71	177.86	181.06	184.32	187.64	191.01	194.45	197.95	201.52	205.14
Fuel & Power Purchased:																									
MH Thermal Generation	31.62	32.17	32.75	31.86	58.90	66.52	71.39	83.76	110.89	136.81	145.48	135.62	138.06	140.55	143.08	145.65	148.27	150.94	153.66	156.43	159.24	162.11	165.03	168.00	171.02
Purchased Energy	196.44	207.16	229.24	249.51	256.78	271.41	289.67	310.01	317.41	333.24	354.94	347.18	353.43	359.79	366.26	372.86	379.57	386.40	393.36	400.44	407.64	414.98	422.45	430.06	437.80
Other Non-Energy related Costs	12.31	12.66	13.02	13.39	13.77	14.16	14.56	14.96	15.38	15.81	16.25	16.56	16.87	17.19	17.51	17.85	18.18	18.53	18.88	19.23	19.60	19.97	20.34	20.73	21.12
Transmission Charges	76.77	78.22	79.69	81.20	82.73	84.29	85.88	87.51	89.16	90.84	92.56	94.14	95.84	97.56	99.32	101.10	102.92	104.78	106.66	108.58	110.54	112.53	114.55	116.61	118.71
Total Fuel & Power Purchased	317.13	330.21	354.70	375.96	412.18	436.39	461.50	496.24	532.83	576.70	609.23	593.50	604.19	615.09	626.17	637.46	648.95	660.65	672.56	684.68	697.02	709.58	722.38	735.40	748.65
AVERAGE UNIT REVENUE/COST ($/MW.h))																									
Manitoba Domestic Energy Sales @ Approved Rates	$ 60.54	$ 60.51	$ 60.47	$ 60.43	$ 60.40	$ 60.37	$ 60.34	$ 60.31	$ 60.29	$ 60.26	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24	$ 60.24
Additional Domestic Revenue	40.43	40.38	40.94	41.48	43.56	45.90	46.12	47.20	49.63	52.82	52.87	52.43	52.94	55.69	56.64	57.37	59.66	60.32	60.23	61.29	60.69	61.41	62.47	63.06	63.85
Total Manitoba Domestic Energy Sales @ meter	100.97	100.89	101.41	101.92	103.96	106.27	106.46	107.51	109.92	113.08	113.10	112.66	113.18	115.93	116.87	117.60	119.89	120.56	120.46	121.53	120.93	121.65	122.71	123.30	124.09
Total Export Sales to Canada *	$ 106.91	$ 110.62	$ 114.47	$ 118.23	$ 122.08	$ 126.03	$ 129.77	$ 133.48	$ 137.68	$ 142.00	$ 146.18	$ 153.20	$ 155.96	$ 158.77	$ 161.63	$ 164.54	$ 167.50	$ 170.51	$ 173.58	$ 176.71	$ 179.89	$ 183.12	$ 186.42	$ 189.78	$ 193.19
Total Export Sales to USA **	100.54	102.18	103.86	107.19	110.64	114.02	117.46	120.93	124.63	128.27	131.65	137.78	140.26	142.78	145.35	147.97	150.63	153.34	156.10	158.91	161.77	164.69	167.65	170.67	173.74
Total Export Sales *	100.99	102.80	104.65	108.01	111.48	114.91	118.37	121.85	125.57	129.26	132.69	138.88	141.38	143.93	146.52	149.15	151.84	154.57	157.35	160.19	163.07	166.00	168.99	172.03	175.13
MH Hydraulic Generation (Water Rentals)	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34	$ 3.34
MH Thermal Generation	162.51	167.89	173.35	179.36	162.30	167.40	172.66	174.86	174.83	179.30	184.99	172.45	175.55	178.71	181.93	185.20	188.54	191.93	195.38	198.90	202.48	206.13	209.84	213.61	217.46
Purchased Energy ***	73.02	74.89	79.98	82.41	83.25	85.02	87.22	89.97	91.10	93.22	95.97	93.99	95.68	97.41	99.16	100.94	102.76	104.61	106.49	108.41	110.36	112.35	114.37	116.43	118.52

*Excludes volumes associated with Lake St. Joseph Payback Revenue
**Includes Net Transmission Credits and Charges
*** Includes Assessments

REFERENCE: Elenchus report, page 25.

PREAMBLE:

a) QUESTION:
Please advise whether in your view, Manitoba Hydro's assumption of a 100 GWh/yr PLIL level is realistic.

RESPONSE:
As discussed on page 23 of the Elenchus report the assumption of 100 GWh/per year is consistent with the growth trends seen in the last 20 years or so. Elenchus is of the opinion that past growth is not necessarily a good indicator of future growth. The cyclical nature of economics for growth and recession may need to be factored in. This customer group in general is highly capitalized and has a higher potential to invest in the emerging technologies that are expected to result in grid parity. Elenchus proposes that a high-medium-low scenario approach be considered for this customer group.

b) QUESTION:
If the answer to a) is no, would a 20-GWh/yr PLIL level be a more realistic projection to 2032 and 2062? If not, what amount would you suggest?

RESPONSE:
While 100 GWh/year appears to be potentially too high, 20 GWh/year may be potentially too low in the scheme of things. That is why Elenchus recommends using a high-medium-low scenario approach.

See also the response to PUB/Elenchus-15.

c) QUESTION:
Please confirm that Manitoba Hydro's industry sector load forecasts for 2013/14, 2014/15, and 2015/16 do not use a PLIL, but rather define specific industry sector load increases.

RESPONSE:
Confirmed. This is shown in Table 16 on page 21 of the 2013 Electric Load Forecast.

REFERENCE: Elenchus report, page 18.

PREAMBLE:

a) QUESTION:
Please quantify the significance/impact on Manitoba Hydro's 20-year Mass Market load forecast of the change from using GDP to using population as the primary driving factor.

RESPONSE:
Elenchus is unable to quantify the significance/impact on Manitoba Hydro's 20-year Mass Market load forecast of the change from using GDP to using population as the primary driving factor. Elenchus does not have access to the data required to perform this calculation.

b) QUESTION:
Please confirm that Manitoba Hydro does not see Top Consumer load growth as impacting Mass Market load growth. Is that a valid assumption?

RESPONSE:
Elenchus is not aware of any way in which the Manitoba Hydro Top Consumer load growth forecast would impact the Mass Market load growth forecast.

REFERENCE: Elenchus report, pp. 30-31; 2013 Load Forecast.

PREAMBLE:
The Elenchus report states that "It is important to test the sensitivity of the load forecast to changes in the economic and demographic assumptions used to derive it, since these assumptions have a greater likelihood of changing the farther away from the present the forecast horizon is."

It further states that "Manitoba Hydro also indicated that the alternative scenarios involved lower or higher population growth, housing formation rates, economic growth, oil and natural gas price increases, electric space heat saturation rates, business formation rates, business electricity usage, shutdowns/closures of existing large customers and probabilities of large electrical-intensive industries locating in the province."

At page 44 of the 2013 Load Forecast, Manitoba Hydro provides its probabilistic points to a 99.99% confidence level.

a) QUESTION:
Please further explain how reliance on low, medium-low, medium-high, and high-growth scenarios would allow the determination of sensitivities regarding economic and demographic assumptions that cannot be captured by the probabilistic analysis.

RESPONSE:
Elenchus believes that consideration for the various scenarios allows for understanding of the quantification of economic impacts on the results and gives a broader scope of results that could drive investment decisions. In particular, Elenchus recommends that the scenarios should be based on specific assumptions related to economic and population growth as well as market factors (e.g., major move to electric vehicles in the transportation market on the high side and grid parity on the low side) as a basis for defining the most extreme scenarios considered.

b) QUESTION:
Which of the variables reflected in the alternate scenarios previously used would Elenchus like to isolate? Can they be isolated?

RESPONSE:
Elenchus would suggest using the same scenarios as determined in earlier economic outlooks as being reasonable first step for defining the alternate scenarios. However, it is noted that those scenarios were used primarily for setting rates which implies that it was the short run forecasts that were most critical. Given the purpose of the NFAT, which is considering the sustainability of significant capital investments in the long run, the range of scenarios would need to be expanded to take into account the kinds of structural changes noted in the response to PUB/Elenchus-18 a).

REFERENCE: Elenchus Report, page 40.

PREAMBLE:
Manitoba Hydro's development scenarios all assume a linear ±400 GWh growth in domestic load until 2047. After that, Manitoba Hydro assumes zero domestic load growth.

a) QUESTION:
Confirm that Manitoba Hydro's PDP and alternative scenarios all assume zero domestic load growth after 2047, with domestic load remaining at a constant 35,330 GWh from 2048 to 2062, and export sales remaining at a constant 5,806 GWh.

RESPONSE:
Elenchus would confirm that Appendix 11.3, p. 271 and 272 referenced in PUB/Elenchus 15 does assume zero domestic load growth after 2047, with domestic load remaining at a constant 35,330 GWh from 2048 to 2062, and export sales remaining at a constant 5,806 GWh.

b) QUESTION:
How would Manitoba Hydro achieve such a situation?

RESPONSE:
Elenchus is not able to advise how Manitoba Hydro would achieve such a situation.

c) QUESTION:
Did this approach result in higher export revenues for the PDP compared to all other scenarios?

RESPONSE:
Elenchus is not in the position to determine if this approach results in higher export revenues for the PDP compared to all other scenarios.

REFERENCE: Elenchus Report, page 14; Manitoba Hydro Brochures (2005-2013); Attached charts.

PREAMBLE:
Manitoba Hydro owns both electric and gas utilities in Manitoba. This may influence customer choices with respect to their source of space heating.

a) QUESTION:
Does Elenchus agree with Manitoba Hydro's statement that "the differential in fuel prices does not appear to be the primary factor influencing homebuilders to install electric or natural as heat"?

RESPONSE:
Elenchus can neither agree with Manitoba Hydro's statement that "the differential in fuel prices does not appear to be the primary factor influencing homebuilders to install electric or natural as heat."

It should be noted, however, that in other jurisdictions where the natural gas utilities compete with electric utilities for customers, any cost advantage for natural gas is aggressively exploited to attract customers and expand the natural gas infrastructure. One of the common strategies is to work closely with homebuilders and to promote gas space heating as an attractive feature for new homes. This competition for customers results in consumer benefits. It appears that Manitoba Hydro is less motivated to promote natural gas than the natural gas utilities in other jurisdictions.

b) QUESTION:
Confirm that since 2009, prices for natural gas and electricity have diverged substantially, so that in 2013 natural gas home heating costs at $600/yr compare with $1,200/yr for electric home heating costs. How reasonable is MH's electric heat growth rate assumption in these circumstances.

RESPONSE:
As discussed on page 14 of our report Elenchus believes that prices for natural gas and electricity have diverged substantially. Please reference PUB/Elenchus 9 for discussion on switch-away.

REFERENCE: Attached charts.

PREAMBLE:
Manitoba Hydro owns both electric and gas utilities in Manitoba. This may influence customer choices with respect to their source of space heating.

c) QUESTION:
Is this differential as publicly portrayed by MH's brochures likely to move more customers to natural gas? Is there response lag?

RESPONSE:
Elenchus observes that in other jurisdictions the cost advantage of natural gas does not result in significant fuel switching in the absence of marketing campaigns target at infill customers and unserved communities where system expansion is economically feasible. In addition, homebuilders find it cheaper to install electric heating than natural gas; hence, marketing of the benefits of natural gas to both

homebuilders and potential home buyers is needed to penetrate the new home market even in areas where natural gas is available.

QUESTION:

Is the projected annual space heating cost as visualized in the attached chart consistent with the continuing trend toward electrical heat portrayed in Manitoba Hydro's 2013 Load Forecast?

RESPONSE:

It is probably consistent in the absence of effective marketing efforts to encourage the adoption of natural gas for space and water heating.

REFERENCE: Executive Summary Page 1, Lines 11-14 Pages 42 & 43.

PREAMBLE:
One type of uncertainty associated with Manitoba Hydro's forecast over the long run is the possibility of significant unanticipated changes in the demographic and/or economic trends that are currently expected based on historical trends. This type of risk is addressed by Manitoba Hydro using sensitivity analysis.

a) QUESTION:
Please elaborate and explain the sensitivity analysis undertaken by Manitoba Hydro which addresses unanticipated changes in demographic or economic trends on the load forecast. Reconcile with Elenchus' concluding comments on page 42, Line 27, which state that the analysis undertaken by Manitoba Hydro in the NFAT does not test these assumptions.

RESPONSE:
To clarify, the point being made by Elenchus is that "This type of risk is addressed by Manitoba Hydro using [its generic] sensitivity analysis." These risks are not specifically quantified in determining the range of sensitivities to consider. Hence, the assumptions are not explicitly tested, although it is assumed that Manitoba Hydro's sensitivity analysis is intended to implicitly accommodate all risk factors. As noted elsewhere, Elenchus does not consider the sensitivity analysis to be an appropriate approach to testing these assumptions.

b) QUESTION:
Please file a copy of the referenced sensitivity analysis.

RESPONSE:
Elenchus was referring to the sensitivity analysis provided by Manitoba Hydro's "quilt".

c) QUESTION:
Please provide a summary table detailing each of the specific concerns with the current load forecast methodology and indicate directionally the impact on the load forecast used in the NFAT analysis. Please indicate whether any of the further analysis should be undertaken before proceeding with development plans.

RESPONSE:
See Table below.

Elenchus Suggestion	Impact on Load Forecast	Need for further analysis
1. Alternative economic and population scenarios	MH is using a simplistic residential growth model as the main driver for both residential and GS Mass Market projections. This is of concern as it has the potential to overstate sector growth.	Updating the residential survey would assist in addressing this concern.
2. Financial risk related to potential market transformation	Elenchus believes that some high level consideration should be addressed in the forecast document identifying the potential of upside and downside risks. Grid parity, impact of political interference (i.e. carbon pricing, the economics of natural gas heating), economic recession cycles, natural resource exploration activity, etc.	Should be addressed on high level.
3. Additional transparency about choice of models and model accuracy	Elenchus has noted that pre-2008 models and methods have been summarily dismissed without transparency and therefore should be discussed in the report for clarity.	Not a burning issue.
4. Updated Residential Survey	As this is the major driver for overall growth and the survey is relied both Residential and GS Mass Market, Elenchus is of the opinion that the current survey is outdated and open to contest.	More than anything else this should be completed.
5. Alternate model for projecting Residential customers	Given the weight this result carries to the final forecast this should be reviewed.	Goes in line with completing the residential survey.
6. Alternative model for GS Mass Market forecast	Elenchus believes that reliance on residential growth to project the growth in this sector appears reasonable but may over project growth potential.	As this group is of good size a complementary survey could be completed at the same time.
7. Alternative economic growth scenarios for Top consumers.	Elenchus believes 100 GWh/year as a growth value is too simplistic for this large use group.	Not a burning issue.
8. Longer time series to estimate weather sensitivity	Statistically two years does not allow for reliable results. Elenchus suggests that a longer time period would temper some volatility in the results.	Not a burning issue.

REFERENCE: Elenchus Report Page 42.

PREAMBLE:
Elenchus states that "In summary, it is our view that the NFAT process would be enhanced if Manitoba Hydro prepared a more thorough Electric Load Forecast with alternative economic and weather scenarios. A more thorough description of the forecasting methodology with full documentation of processes and any methodological changes, as well as within sample forecast accuracy would also allow for a more thorough assessment of the forecast reasonableness. A description of potential assumptions around the economic factors affecting Top Consumers and a range of scenarios would also allow stakeholders to more appropriately assess the risks around the forecast for that sector. Ideally, in addition to the five scenarios suggested above (and used until 2009 by Manitoba Hydro), scenarios that demonstrate the impact of selected market transformation scenarios, such as grid parity for small scale generation, would impact on future loads."

QUESTION:
Please indicate to what extent the limitations indicated would have an impact on the 78 year Net Present Value Analysis.

RESPONSE:
Commenting on the quantitative impact on the Net Present Value Analysis is beyond the scope of our engagement. At a non-quantitative level, Elenchus would note that to the extent that the net revenue earned on incremental exports is above, equal to, or below the domestic revenue for that power, any negative variances in the forecast (i.e., actual below forecast hence increased exports) will result in higher, equal, or below projected NPVs, all else being equal. Conversely, to the extent that the net revenue earned on incremental exports is above, equal to, or below the domestic revenue for that power, any positive variances in the forecast (i.e., actual above forecast hence reduced exports) will result in lower, equal, or higher than projected NPVs, all else being equal.

REFERENCE: Elenchus Report Page 42.

PREAMBLE:
Elenchus states that "Grid parity implies that it is only a matter of time until grid power will face price competition. Once built, high-capital-cost, low-operating-cost technologies such as large-scale hydro generation which the associated extensive transmission and distribution networks may always be able to under-price the alternatives, but that ability to compete does not ensure full recovery of sunk costs. The implication is that if forecast demand can only be realized by setting a price below fully embedded cost, Manitoba Hydro may not be able to recover all of the sunken capital costs associated with major projects such as Keeyask and Conawapa. It is our view therefore that it would be prudent to take into account the ability of Manitoba Hydro and/or the Province to absorb any resulting cost recovery shortfall in assessing the prudence of the Preferred Plan."

a) QUESTION:
Please explain the ramifications to MH and to its ratepayers under grid parity in the domestic and export markets and comment on the certainty of such an outcome over the time frames used in the economic and financial analysis.

RESPONSE:
Elenchus believes that there is a strong potential for grid parity to be realized globally in the next decade. Technology advances are discussed openly over the internet allowing consumers to keep knowledgeable of approaching opportunities. We have been witness to how new technology enters our markets. One case-in-point is flat screen television sets. When introduced it was hugely expensive and a rarity to own, today they are in most homes and retailers are practically giving them away.

The nearest example we have for electricity might be telecommunications. With the introduction of competition options and deregulated the telecomm wires business was undermined. The CRTC approved the accelerated write-off of copper to reflect the comparatively short economics of existing copper as compared to its physical life.

Globally electricity generation and distribution is gaining consumer attention. Rising fuels costs, decaying infrastructure, demand for green energy solutions, carbon emission abatement laws; etc. are adding to the consumer price at the same time as global price competition is leading to declines in the cost of off-grid solutions. Like telecommunications, the day can be envisioned when the capital investment in grid generation, transmission and distribution infrastructure may have to be recovered through accelerated deprecation (higher rates), if feasible, or through write-offs if higher rates are not feasible. The potential risk for both the remaining captive domestic customers (as long as they are captive) and for taxpayers who guarantee the debt of Manitoba Hydro merits consideration before committing capital that is economic only if its economic life is comparable to its physical life.

b) QUESTION:
Please explain how MH should incorporate in its NFAT analysis the ability of Manitoba Hydro/ and or the Province to absorb a cost recovery shortfall and indicate whether such information is required in the Economic and Financial Analysis to make recommendations on the preferred development plan.

RESPONSE:

Elenchus recommends a scenario based load forecast that explicitly recognizes the extremes of potential structural changes in the electricity market, including grid parity. Presumably, if this recommendation, which is within the scope of Elenchus' mandate were adopted, it could be complemented with consistent assumptions about export prices and any other factors that would be impacted by the changes considered in the scenarios. For example, grid parity would affect the value of grid power in export markets since the marginal cost of grid generation could be expected to be dramatically lower in a scenario with significant continental oversupply. While Manitoba Hydro, with the benefit of low marginal cost hydro generation would almost certainly be able to export its surplus at the prevailing market price, that price could be significantly below the price required for full cost recovery.

REFERENCE: Elenchus Report Page 43, recommendation 2.

PREAMBLE:
On page 41 Elenchus states "Given the time frame of the NFAT analysis, it is our view that it is more reasonable to anticipate that there will be significant structural changes that could result in dramatically different domestic demand (and presumably export prices) in the coming decades."

a) QUESTION:
Please elaborate on how the financial risks related to market transformation should be incorporated in the economic and financial analysis and whether it could materially impact the results of the 78 year NPV analysis and 50 year financial analysis.

RESPONSE:
Please see the response to PUB /Elenchus 24.

b) QUESTION:
Please comment on the appropriateness of using a 35 year linear projection of load growth in the economic (78 years) and financial (50 years) analysis.

RESPONSE:
Elenchus is of the opinion that using a 35 year linear projection of load growth in the economic (78 years) and financial (50 years) analysis is reasonably appropriate as a base case. It is the only forecast that is not dependent on assumptions about major structural changes that are inherently unpredictable (e.g., technological evolution).

It is not appropriate to ignore the potential risks since they can be assessed through scenario analysis that explicitly quantifies hypothetical scenarios such as a wholesale conversion to electric vehicles on the one hand and grid parity on the other.

REFERENCE: Elenchus Report Page 41, Line 1.

PREAMBLE:
Elenchus states that the load forecasting methodology is reasonable assuming there are no significant structural changes to the demand drivers that underpin the forecasting methodology. However, given the time frame of the NFAT analysis, it can be expected that there may be significant structural changes that could result in dramatically different domestic demand in the coming decades.

QUESTION:
In light of your observations on the load forecasting methodology not incorporating recognition of future structural market change, is the current load forecast information used in the NFAT analysis reasonable for the purposes of evaluating the economic and financial implication of the 15 Plans.
Please explain.

RESPONSE:
In light of our observations on the load forecasting methodology not incorporating recognition of future structural market change, Elenchus has stated that the current load forecast information used in the NFAT analysis is reasonable for the purposes of base case scenario for evaluating the economic and financial implication of the 15 Plans, subject to the specific identified concerns with the current load forecasting methodology. In particular, Elenchus has a strong concern with use of the 2009 Residential Survey and would recommend that it be updated as it is a major driver for load growth in the residential and GS Mass Market projections. Elenchus emphasises that the change in natural gas costs may have influenced space heating fuel choice over time since 2009 there may be undue reliance on the projection of electric heat customers.

For purposes of the NFAT, recognition of potential future structural changes in the market can best be addressed by developing alternate load forecast scenarios that are based on those potential structural changes.

REFERENCE: Elenchus report, page 6, page 14.

PREAMBLE:
Elenchus recommends that Manitoba Hydro consider the incorporation of DSM into Integrated Resource Planning (IRP).

QUESTION:
Is Elenchus aware whether any other Canadian utilities are currently considering DSM to be part of their Integrated Resource Plans?

RESPONSE:
Elenchus is aware that two Canadian utilities are conducting IRPs; BC Hydro, and Nova Scotia Power Inc. (NS Power). Elenchus makes a distinction between DSM and IRP as ways to incorporate energy efficiency into system plans. DSM programs, such as those of MH, aim to deliver certain amounts of "savings" which may then be used to defer supply. IRP is a process of evaluating energy efficiency and supply on the same basis with the choice of the future mix of supply and energy efficiency measures determined by least cost, as defined by the applicable legislation (i.e. the extent to which non-monetary costs are included). Elenchus' understanding is that BC Hydro's IRP is an IRP of this kind. The Terms of Reference are not yet available for NS Power.

REFERENCE: Elenchus report, page 18.

PREAMBLE:
Elenchus finds no meaningful correlation between DSM savings and electricity prices.

QUESTION:
If possible, please reconcile this situation with Elenchus' comments on the effects of possible future grid parity in its Load Forecasting report. Why would grid parity of self-generation result in decreased demand, but the equivalent of grid parity for DSM (i.e., increased cost-effectiveness compared to grid power) not yield a similar result?

RESPONSE:
This statement is in the specific context of evaluating the argument of the expert witness for the Consumers' Association of Canada (CAC) ("Dunsky") that as MH's rates increase there will be more uptake of DSM. As a general proposition Elenchus has no argument against the concept that DSM savings should increase as the price of electricity increases. This is straightforward economics. DSM is a substitute for electricity consumption and the demand for substitutes usually increases when relative prices change to favour the substitute. However, the empirical observation of such effects is not so straightforward. There are invariably other factors that change along with relative prices; i.e., broadly, tastes, technology and income. Both Dunsky's own evidence and Elenchus' extension of that evidence suggest that, notwithstanding the theoretical likelihood of a positive correlation of DSM savings and electricity process, this effect is not observed empirically.

This is important because the main point Elenchus makes is that not only are the uncertainties associated with how much future capacity needs may be reduced by DSM but also the range of the uncertainty is not well understood. The size as well as the direction of the induced change in load is crucial for system planning purposes.

The comparison with self-generation is also directly relevant to Elenchus' argument. As DSM measures reach parity with grid prices they may be expected to appeal more to consumers but the extent to which price effects will influence behaviour, in addition to non-price activities, is the key issue. Elenchus argues for explicit modelling of these uncertainties. In order to calculate the impacts of self-generation on needed grid capacity, estimates would be needed of the probable output levels of the self-generation. This would be based on actual experience not nameplate capacity ratings and assumptions. DSM should be treated in the same way.

REFERENCE: Elenchus report, page 18.

PREAMBLE:
Elenchus concludes that "the incorporation of explicit sensitivity analysis of how much dependable DSM may be assumed is of value." In Table 6 of its report, Elenchus illustrates DSM savings with known capacity as compared to DSM savings with known energy.

a) QUESTION:
Which current Manitoba Hydro DSM programs, if any, would Elenchus consider to result in dependable DSM?

RESPONSE:
Elenchus' point is about the statistical nature of DSM savings estimates; no individual program is more or less dependable than any other from the point of view of ensuring enough system capacity to meet future loads. It is the ensemble of all programs that determines the appropriate amount of capacity deferrals. The contribution of each individual program has an uncertainty range; the range includes positive and negative values (i.e. DSM savings could be more or less than the point estimate for each measure included in MH's projections based on its Power Smart Plan). While averaged over all measures, it may be expected that the total contribution of all DSM programs will be the sum of all of the point estimates. This is not appropriate for system planning. There is an asymmetry between over-achievement and under-achievement. Capacity not built on the expectation of DSM savings cannot be used. It is therefore important to have a good understanding of the degree of uncertainty of all programs on the downside.

b) QUESTION:
In Elenchus' view, what, if any, are the limitations of the ENERNOC DSM potential study if no distinction is drawn between dependable and non-dependable DSM? How does this affect Elenchus' recommendation to use DSM in an IRP context?

RESPONSE:
See also the previous answer. If all DSM programs are assumed to be 100% dependable, the limitations of the ENERNOC study are: (1) there is a range of uncertainty associated with the tertiary energy consumption values estimated by ENERNOC that stems from the unobservable nature of DSM savings and ENERNOC does not provide an estimate of this range (collectively these values represent technical potential); and (2) there is likewise a range of uncertainty associated with estimates of market and actual potential that arises from the extremely large set of factors that affect these values. Taken together, they result in an uncertainty in the DSM savings estimates that is not explicit.

IRP differs fundamentally from DSM. DSM puts MH in the position of selling both electricity and its substitute – DSM. IRP treats DSM as another source of supply and evaluates DSM measures on the same basis as supply. There is, therefore, no equivalent in IRP to estimating market potential: comparisons are made on the basis of least cost to the utility. For greater clarity, assessments of market potential assume that consumers behave like system planners in choosing among the energy efficiency implications of their purchases; i.e. they choose the least-cost energy option. Unlike system planners, consumers in general do not have accurate assessments of such costs and their purchases (of such items as dishwashers, TVs etc.) are subject to other considerations, which economists generally refer to as

`tastes`, e.g. the visual appeal of the dishwasher. There remains the problem of uncertain technical potential. Elenchus recommends that this be addressed in a manner analogous to intermittent generation and by carrying out retrospective studies that would provide more accurate estimates of tertiary electricity use by end-use category.

c) QUESTION:
Can Elenchus offer any examples in which DSM was backstopped by a capacity resource, e.g., an SCCT facility, to allow DSM to be used in an IRP?

RESPONSE:
Elenchus knows of no examples.

REFERENCE: Elenchus report, page 30.

PREAMBLE:
One of the advantages of Keeyask and Conawapa compared to fossil fuel generation is avoided CO2 emissions.

a) QUESTION:
Please explain your reasoning as to why Elenchus suggests that the PUB should consider making it a precondition for setting a Conawapa in-service date, but not Keeyask, to prepare a comprehensive ecological footprint analysis with respect to all options?

RESPONSE:
Elenchus' understanding is that there is no leeway to defer the Keeyask decision but there is for Conawapa. For Conawapa, there appears to be time to fill the gap in the current analysis with regard to an assessment of the life-cycle environmental impacts of MH`s Power Smart plan on a commensurable basis as the assessment of Conawapa (and other supply alternatives). This could be conducted as a case before the Manitoba Clean Environment Commission (CEC). Alternatively, MH may have the time to prepare a full IRP in advance of seeking approval for a firm Conawapa ISD before the PUB. In either case, a full and commensurable assessment of all alternatives is the only way to evaluate all alternatives on an equal basis. EF is only one way to do this; other equivalent methods are also appropriate.

b) QUESTION:
Does Elenchus' recommendation change based on the fact that each of the two projects must be subject to an environmental assessment prior to obtaining approval, with Keeyask currently undergoing the EA process before the Clean Environment Commission?

RESPONSE:
Elenchus does not recommend an EF analysis of Keeyask. However, Elenchus has reviewed the Keeyask Impact Statement and notes that there is no consideration of the life-cycle environmental impacts of MH's Power Smart plan. If the CEC's Terms of Reference for Conawapa were to include an assessment of the life-cycle environmental impacts of MH's Power Smart plan as well as of the Conawapa project, then this would be consistent with Elenchus` suggestion.

c) QUESTION:

Does Elenchus accept that a decision to proceed with both Keeyask and Conawapa, as per the preferred development plan, would likely be made prior to the above footprint analysis?

RESPONSE:
Elenchus does not recommend an EF analysis of Keeyask. With regard to Conawapa, Elenchus` suggestion stands.

REFERENCE: Elenchus report, page 2.

PREAMBLE:
Footnote 4 states that "While this report does not purport to be a thoroughgoing analysis and critique of DSM EM &V reference is made to this literature. However, no protocols or methodological guidelines can change the central theoretical issue, which is that DSM savings estimates are in principle not falsifiable. It is important to understand the logical consequences of this shortcoming and we also provide some empirical heuristics for dealing with the irreducible uncertainties of DSM in the context of system requirements for very high reliability of supply down to a few seconds (i.e. Automated Generation Control (AGC))."

QUESTION:
Please elaborate on the conclusions in Footnote 4 for greater clarity.

RESPONSE:
The central flaw of DSM is that savings are unobservable **in principle**. We cannot observe the load that would have happened, only the load that did occur. Instead, EM&V protocols have been established to estimate savings against an assumed “baseline”. I.e., what is unobservable is converted into a pseudo-observable by assumption. There are two elements to the baseline: the tertiary energy consumption of the electrical device or process, or devices or processes; and, behavioural assumptions about the use of the device, devices, process or processes, including consumer reactions to market prices and competing technologies. Without independent estimates of tertiary usage and of the relationship of behaviour and the use of devices and processes (i.e. independent of the estimates used by MH) it is not possible to test the assumption that the baseline is a reasonable proxy for the unobserved consumption that did not occur. Given this uncertainty and the need of electricity systems for the exact balance of load and generation at all times, Elenchus suggests a heuristic of assigning probabilities to different levels of actual realisable DSM at future time in a manner equivalent to the way system operators have learned in recent years to treat intermittent generation.

REFERENCE: Elenchus report, page 4.

PREAMBLE:
Some of the difficulties of integrating DSM in IRP are pointed out and the opinion given that, based only on early work on dependability of renewables integration, it may be possible to adequately incorporate DSM in IRP.

QUESTION:
What is the rationale for recommending the adoption of IRP with DSM dependability with respect to Conawapa, as opposed to the generic adoption as of right now?

RESPONSE:
Elenchus is of the view that MH should move to IRP "right now" and understands from MH staff that it is the intention to move back to IRP. The suggestion to institute IRP in advance of a commitment to an ISD for Conawapa is based on an understanding that the determination of the ISD for Conawapa is not imminent and still a matter for discussion.

REFERENCE: Elenchus report, page 10.

PREAMBLE:
Elenchus states that "The decisive consideration in this regard is the question as to whether or not Keeyask or Conawapa should be deferred on the basis of assumed capacity reductions from this program. Elenchus' understanding is that such a deferral would run counter to the intent of the program which is to obtain greater value from the additional capacity represented by Keeyask and Conawapa by making energy available for export during times of low water levels. This value presumes the existence of generating capacity. True DSM presumes the opposite; that deferred capacity adds value to MH (since the resulting total resource cost to MH's consumers is less)."

QUESTION:
Please explain the fundamental economic difference between load reduction incentives that defer the need for new supply capacity and those that extend the time existing capacity is adequate to meet needs when in both cases the incentive is based on the export price of electric energy as part of the marginal cost.

RESPONSE:
The context for this statement is a discussion of the Curtailable Rates (CR) program, not as a general economic proposition, fundamental or otherwise. If solely as a result of the CR program Keeyask were deferred for a year, then for a year MH could not use Keeyask to generate export revenues. Since the CR program is designed to increase export revenues this would run counter to the intent of that program. The "load reduction" incentive in the CR program is a lower cost to the consumer, not the export price. MH has an incentive to offer the CR program because it can reduce overall costs to its domestic consumers by earning more in extra export revenues than it expects to give up in reduced revenues from participating CR customers.

REFERENCE: Elenchus report, page 15.

PREAMBLE:
Elenchus states that "Where the relevant data is kept by a government department or agency (e.g. housing stock characteristics) MH would not likely confront data confidentiality issues that may apply to private companies."

QUESTION:
What is the basis for stating that MH would have less difficulty with accessing government data protected by privacy laws than would a private company?

RESPONSE:
This is best answered by a specific example. In the 1980s an Elenchus Associate was a principal investigator in an Ontario Ministry of Energy study of natural gas consumption in Toronto homes. In order to carry out the study, street address data on natural gas consumption was obtained from Consumers Gas (now Enbridge) and on housing characteristics from the City of Toronto. While this was prior to the current privacy regime in Ontario, privacy was respected because the identity of the occupants of the street addresses was unknown to the investigators. The City of Toronto provided the necessary data on the direction of the Ministry of Municipal Affairs and Housing. Perhaps the City would have provided the data to a private company; we cannot know. If this scenario is not a likely one for present-day Manitoba then this would not be an advantage of having MH carry out a similar study. Neither would it represent a disadvantage.

REFERENCE: Elenchus report, page 17.

PREAMBLE:
Elenchus states that, "As an illustration of this economic controversy, consider Canada. Between 1999 and 2012 the average annual decline in the real electricity intensity (kWh per $GDP) of the Canadian economy was 1.4%.The average increase in energy efficiency savings, in terms of avoided capacity, for DSM participants for the period 2002 to 2012 estimated by MH is 9.8%. If Manitoba DSM capacity reductions had occurred at the average Canadian rate of decrease in electricity use intensity the contribution of DSM would be about 30MW by 2012 (not including the Curtailable Rates program). If this amount increased at the annual average DSM savings rate of 1.8% projected by MH to 2028 (from 2012) there would be a 300MW less DSM capacity reduction (i.e. 300MW would have to be made up by supply) in 2028."

QUESTION:
Please clarify whether this discussion is intended to indicate the difference between alternative approaches to estimating DSM potential or that in MH's application over-estimates DSM potential by 300 MW in 2028.

RESPONSE:
The discussion is intended to indicate the former.

REFERENCE: Elenchus report, pages 20-21.

PREAMBLE:
Elenchus states that "In the forecast period (from 2013) the DSM LF is less than the system LF by an average of 16%. This is an indication that DSM estimates are not fully consistent with projected load. The difference 11 between system and DSM load factors leads to an ambiguity; we may either assume that the capacity reduction is accurate or that the energy reduction is accurate."

a) QUESTION:
Could the lower LF for DSM compared to system be due to some DSM programs that time-shift load (and therefore might be more consistent with load forecast and not result from different LF of participating and non-participating customers)?

RESPONSE:
Yes, the lower LF for DSM must, in fact, be due to the aggregate DSM programs time-shifting more load to peak hours. This is somewhat counterintuitive in and of itself. As a general rule, DSM programs in aggregate seek to shift load from peak to off-peak hours, as well as reduce consumption in some cases. Elenchus puts forward the LF comparison as a diagnostic indicator that the bottom-up DSM savings forecasts do not mesh coherently with the top-down stress testing carried out by MH. This does not purport to be a quantitative method but points to the possibility that there are internal inconsistencies in the DSM savings forecasts. This is why Elenchus conducted a different stress test which explores the possibility that all of the error in estimating DSM savings derives from an error in capacity, i.e. that the savings occur more off-peak than on-peak leading to smaller dependable capacity deferrals.

b) QUESTION:
Is the effect of the Load Curtailment *(sic*) and Surplus Energy (SE) programs included in the calculation of system LF (to which the DSM LF is being compared)?

RESPONSE:
Elenchus' understanding is that MH includes the Curtailable Rates in its projections for DSM savings, but the SE is not. Elenchus' stress-testing includes neither.

REFERENCE: Elenchus report, page 16, page 32.

PREAMBLE:
Elenchus states that "In systems that have significant levels of intermittent generating capacity (which is not the case for MH), operators may make provision for backing up such generation. In Elenchus' view this would be a prudent practice with regard to DSM resources.
The overall coherence and robustness of MH's Resource Plan may be improved by a return to IRP. Elenchus further suggests that an IRP approach to which is added an explicit recognition of the statistical nature of expected DSM contributions would be an optimal way of addressing the uncertainties of DSM. The main way in which this recognition may be incorporated into planning is by the treatment of DSM as akin to dispatchable intermittent generation.

QUESTION:
Please indicate any known studies or analysis showing that DSM intermittency is similar in character (predictability, correlation to daily load curve, ramping rate etc.) to the intermittency of wind or solar generators.

RESPONSE:
The point is not that DSM is intermittent but that its results follow a statistical distribution like intermittent generation. Elenchus is not aware of any studies of DSM intermittency.

REFERENCE: Elenchus report, page 30.

PREAMBLE:
Elenchus states that "Elenchus suggests that PUB consider making it a precondition for the future assessment of the ISD for Conawapa that a comprehensive ecological footprint analysis be carried out for all options."

QUESTION:
The recommendation to use a comprehensive analysis of environmental footprint of all alternatives (before approving an ISD for Conawapa) appears not to be supported by the reasoning given, which deals only with the value of including the CO2 impacts of DSM in future plans. Please provide the evidence to support the recommendation.

RESPONSE:
Elenchus is suggesting that the ecological footprint concept, advanced in the SOW for CO2 emissions be extended to other environmental issues. This is a logical extension of the SOW issue applied to the existing evidence. Specifically, the inclusion in the SOW of a question on ecological footprint suggests that there is some interest in the EF. Given this interest, Elenchus infers that an extension to environmental impacts (EI) other the CO2 emissions may be of interest. Further, Elenchus points out a gap in the current filed evidence with regard to an equal comparison of DSM options and the supply options. The DSM programs are not evaluated at all for their adverse environmental impacts. If this gap were to be addressed, it may be worthwhile to conduct the analysis in terms of the EF. Relative to other EI methodologies EF has two advantages: it includes lifecycle impacts; and, the use of a common metric for all impacts (area of land) makes the results more comprehensible than methodologies that use different metrics for different impacts (such as the multiple accounts approach used by MH). EF's main drawback is the large number of assumptions that are required. See also MH/Elenchus 6d.