



# NFAT Manitoba Hydro's Development Plan A Review of Manitoba Hydro's Load Forecast

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April 2, 2014



## Overview

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1. Purpose of Elenchus Load Forecast Evidence
2. Setting the Stage
3. Rebuttal Evidence of Manitoba Hydro
4. Key Messages: Concluding Remarks
5. Scope of Work (SOW) Responses



## Purpose of evidence

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- To address the issues in the MPUB Scope of Work (SOW) on Load Forecasting
- Within the context of the Terms of Reference

## Setting the Stage (1)

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Load forecasting in the context of a GRA

vs.

Load forecasting for assessing a development plan

In the long run, structural change is a risk that is a “known unknown”.  
Relevant for NFAT; not for GRA.

## Setting the Stage (2)

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Manitoba Hydro's load forecasting methodology:

- Incorporates known knowns reasonably well
- But ignores known unknowns (i.e., price elasticity and structural change)

At its core the NFAT is an analysis of the long term risks associated with the Preferred Development as compared to the alternatives.

## Setting the Stage (3)

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Two missing “worst case” structural change scenarios:

1. **High demand** that result in supply inadequacy
2. **Low demand** that creates stranded assets

How tolerable are the extreme high-impact, low-probability (HILP) events?

## Setting the Stage (4)

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1. The **high demand** structural change scenario:
  - Perhaps, a “tipping point” for electric vehicles

Can MH respond to a worst case increase in demand?

## Setting the Stage (5)

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2. The **low demand** structural change scenario:
  - Disruptive innovation (e.g., grid parity/competitive options)
    - Declining cost of renewables + storage
    - Fuel cell technology
    - Result: low marginal cost and market price for power

The known unknown:  
The market price for grid power in  
the long run (2+ decades).  
Is stranded costs acceptable?

## Rebuttal Evidence of Manitoba Hydro

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- Sect. 2.1, Overview of Forecast Growth
- Sect. 2.4, Price Elasticity
- Sect. 2.5, Adjusting for Weather
- Sect. 2.6, Forecast Variability and Accuracy
- Sect. 2.7, Scenarios and Probability
- Sect. 3.6, Solar and Grid Parity

## Key Messages: Concluding Remark #1

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1. At the current time, the load forecast does not provide any alternative economic or population scenarios to test the sensitivity of the load forecast to changes in these assumptions. Elenchus believes that as an input for effective long-term resource planning, Manitoba Hydro should provide alternative economic and population growth scenarios and their associated effects. While Manitoba Hydro provides a simplified probabilistic confidence interval analysis, this does not test the sensitivity of load forecast parameters to changes in input assumptions on economic and population growth.

## Concluding Remark #2

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2. Consideration should be given to the financial risks related to potential market transformation, such as grid parity, that could result in a disconnect between Manitoba Hydro's projection of (total domestic) demand and the future demand for grid power.

## Concluding Remark #3

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3. Additional transparency about the choice of model and model accuracy needs to be provided. For example, methodological changes in the specification of econometric models have been made from one year to another without adequate explanation about why the changes were made and the effect of the changes. Model performance including within sample error and alternatives considered and rejected would also help increase transparency.

## Concluding Remark #4

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4. An updated Residential Survey to reflect current conditions within the Residential market should be undertaken and integrated into the load forecast to verify assumptions about electric heat market share and the end-use model parameters.

## Concluding Remark #5

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5. Alternate models for projecting the number of Residential customers should be explored and reported on. Alternate population scenarios and the effect on the Residential and GS Mass Market forecasts should to be included.

## Concluding Remark #6

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6. Manitoba Hydro should explain the alternative models considered for the GS Mass market forecast.

## Concluding Remark #7

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7. Alternative economic growth scenarios and additional transparency and analysis on the Top Consumers forecast would improve transparency.



## Concluding Remark #8

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8. Elenchus believes the weather adjustment process applied by Manitoba Hydro should be treated with caution and may result in potentially spurious outcomes. Manitoba Hydro should investigate using time series longer than 2 years to estimate the weather sensitivity of its weather sensitive consumption sectors. A more thorough explanation of the weather adjustment process needs to be developed to allow stakeholders to understand the process more clearly.



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## Scope of Work, #1

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**From an energy demand perspective, comment on the extent to which Manitoba's Preferred Development Plan addresses the reliability and security requirements of Manitoba's electricity supply.**

- The Preferred Development Plan (and all alternatives) is designed to address the reliability and security requirements of Manitoba's electricity supply. While actual demand could exceed the forecast, the adequacy of supply would only be compromised in the most extreme circumstances.

SOW 1; Elenchus Load Forecast Report sections 3.1 and 3.2



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## Scope of Work, #2

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**Review Manitoba Hydro's Load Forecast factors and comment on whether they are complete, reasonable and accurate.**

- 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.

SOW 2; Elenchus Load Forecast Report sections 2.1



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## Scope of Work, #3

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**Comment on the use of an econometric and end-use forecasting methodology.**

- The methodology is generally reasonable although some refinements are suggested.

SOW 3; Elenchus Load Forecast Report sections 2.1.1 and 2.1.2



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## Scope of Work, #4

**Assess the reliability of Manitoba Hydro's short- and long-term domestic Load Forecast modelling.**

- Manitoba Hydro's methodology is generally appropriate for short term forecasting (no structural changes). There is limited consideration of factors that could dramatically impact on demand in the long run (over the next decade and beyond).

SOW 4; Elenchus Load Forecast Report sections 3.1 and 3.2



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## Scope of Work, #5

**Review the extent to which Manitoba Hydro has used appropriate scenario planning to examine the potential impact of changes in the industry, the Manitoba and Canadian economies, available technology (generation and loads) and energy efficiency measures (costs and cost effectiveness).**

- Rather than a specific point forecast associated only with a reference forecast, Elenchus believes an approach with a range of outcomes based on Low, Medium-Low, Reference, Medium-High and High economic scenarios should be paired with load forecast outcomes. Manitoba Hydro used this approach until 2009.

SOW 5; Elenchus Load Forecast Report sections 3.2



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## Scope of Work, #6

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**Comment on the appropriate use of probability analysis in projected Load Forecasts.**

- The probability approach used by Manitoba Hydro is less transparent and provides less insight than the multiple scenario approach used until 2009. See item 5 above.

SOW 6; Elenchus Load Forecast Report sections 2.1.1 and 2.1.2



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## Scope of Work, #7

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**Comment on the extent to which retrospective load analysis provides confidence in the Load Forecast.**

- Retrospective load analysis indicates that confidence in the load forecast is justified except for the Top Users. Top User loads can change significantly in unanticipated ways since their demands are driven by many idiosyncratic factors that cannot be known to Manitoba Hydro.

SOW 7; Elenchus Load Forecast Report sections 2.1 and 3.2



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## Scope of Work, #8

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**Review Manitoba Hydro's 2012 in 2013 load forecasts.**

- The review is captured by the other SOW items.

SOW 8; Elenchus Load Forecast Report section 2



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## Scope of Work, #9 a)

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**Compare Manitoba Hydro's 2012 and 2013 Load Forecasts with Manitoba Hydro's historical load forecasts back to 2008 with specific reference to:**

**a) Population growth (birthrates/immigration)**

Historical trends in population growth are reflected in the load forecast. Possible future changes in the historic trends are not specifically considered. See item 5 above.

SOW 9 a); Elenchus Load Forecast Report section 2.1.1



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## Scope of Work, #9 b)

**Compare Manitoba Hydro's 2012 and 2013 Load Forecasts with Manitoba Hydro's historical load forecasts back to 2008 with specific reference to:**

- b) Changes in number, size and occupancy of residential dwellings**

Historical trends are reflected in the load forecast. Possible future changes in the historic trends are not specifically considered. See item 5 above.

SOW 9 b); Elenchus Load Forecast Report section 2.1.1



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## Scope of Work, #9 c)

**Compare Manitoba Hydro's 2012 and 2013 Load Forecasts with Manitoba Hydro's historical load forecasts back to 2008 with specific reference to:**

- c) A comparison of the Load Forecast with similar markets (i.e., are Manitoba Hydro's assumptions consistent with neighbouring jurisdictions)**
- Manitoba Hydro's load forecasting methodology and accuracy are broadly consistent with load forecasting in other jurisdictions. For long term planning, however, increasing consideration is being given to the possibility of "game changers".

SOW 9 c); Elenchus Load Forecast Report section 3.2



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## Scope of Work, #9 d)

**Compare Manitoba Hydro's 2012 and 2013 Load Forecasts with Manitoba Hydro's historical load forecasts back to 2008 with specific reference to:**

**d) Peak demand and energy trends including seasonal variations in load forecasting**

- Manitoba Hydro's methodology is based on the questionable assumption that past trends will continue for the full planning period.
- The load forecast does not address seasonal variations.

SOW 9 d); Elenchus Load Forecast Report section 3.1



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## Scope of Work, #10

**Review Manitoba Hydro's weather adjustment methodology, with specific reference to:**

- a) Non-heating load
- b) Electric heating loads
- c) Commercial or mass-market consumption
- d) Distribution Losses
- e) Transmission Losses

- Manitoba Hydro gives explicit and appropriate consideration to each factor identified in its weather adjustment methodology, subject to caveats noted elsewhere.

SOW 10; Elenchus Load Forecast Report section 2.1.4



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## Scope of Work, #11

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**Assess the consistency of transmission and distribution losses under various loads and weather occurrences and the assignment of such losses to customer classes.**

- The load forecast does not include this level of detail.

SOW 11; Elenchus Load Forecast Report – n.a.



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## Scope of Work, #12

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**Assess the impacts on Load Forecasts resulting from potential fuel switching, particularly in light of recent trends in the cost of natural gas.**

- Potential fuel switching is treated for load forecasting purposes as an independent customer decision. Since Manitoba Hydro controls both the electric and natural gas utilities, its decisions and marketing policies are likely to have significant influence on both the decisions made by developers for new buildings and fuel switching decisions (driven in part by the availability of natural gas as a result of system expansions). Over the longer term, the market penetration of natural gas for space heating could be significantly influenced by Manitoba Hydro.

SOW 12; Elenchus Load Forecast Report section 2.1.1



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## Scope of Work, #13

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**Comment on the price elasticity and the impact of electricity rate changes in demand.**

- Manitoba Hydro has not been able to quantify the price elasticity of demand for electricity empirically and it consequently excludes price elasticity from its load forecasting methodology. This result may be a reflection of the historically low price of electricity in Manitoba. It is not consistent with the experience of other jurisdictions to assume there will be no price response in the event of more significant electricity rate increases in the future.

SOW 13; Elenchus Load Forecast Report section 2.1.3



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## Scope of Work, #14

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**Review and comment on Manitoba Hydro's historical and forecast growth in electric heating relative to natural gas heating in the context of electricity and natural gas pricing.**

- See Slide 31 (SOW #12) above.

SOW 14; Elenchus Load Forecast Report section 2.1.1



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## Scope of Work, #15

**Review and comment on the extent to which Demand-Side Management and energy efficiency measures have been relied on as an alternative to generation.**

- Manitoba Hydro has not utilized integrated resource planning as a basis for establishing the cost effective level of DSM in Manitoba. It has conducted sensitivity analysis with respect to the currently planned level of DSM.

SOW 15; Elenchus Load Forecast Report – n.a., See the Elenchus DSM Report



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## Scope of Work, #16

**Review and comment on the appropriateness of and uncertainty related to the timelines for future generation assets to meet domestic load requirements and export commitments.**

- From a load forecasting perspective, the timelines appear adequate for meeting domestic load requirements and export commitments. The greatest risk relates to the ability to adjust to lower growth in demand in the event of market transformations such as grid parity in Manitoba and/or export jurisdictions.

SOW 16; Elenchus Load Forecast Report section 4



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## Scope of Work, #17

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### **Comment on the impact of global warming on the Load Forecast.**

- The impact of climate change on the climate in specific areas is proving very difficult to predict. The primary impact appears to be increased uncertainty and more frequent extreme weather conditions. It is therefore difficult to build the impact of climate change into the Manitoba Hydro load forecast. The primary consideration is that longer term trends are more uncertain than ever, which suggests that flexibility in development plans may be of increased importance.

SOW 17; Elenchus Load Forecast Report section 3.2



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## Scope of Work, #18

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### **Comment on the Load Forecast for industrial and commercial consumers.**

- The forecast for Top Consumers is the only component of the load forecast that has shown large variances. In recent years, there has been a tendency to over-forecast Top Consumer demand.
- There is a risk that Top Consumers could opt for self-generation in the future resulting in declining rather than decreasing demand. There is also a risk that closure in the coming decades could have a significant impact on Top Consumer demand given the small number of customers in this class.

SOW 18; Elenchus Load Forecast Report section 2.1.3



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## Scope of Work, #19

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Upon prior approval by the NFAT Panel, address any other issues that may be identified in reviewing Manitoba Hydro's evidence or are requested by the NFAT Panel.

- Not applicable.

SOW 19; Elenchus Load Forecast Report – section ?



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# Thank You!



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