

ELECTRIC LOAD FORECAST

2010/11 to 2030/31

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MARKET FORECAST

August, 2010



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EXECUTIVE SUMMARY

Overview

Total Weather Adjusted Sales in fiscal year 2009/10 amounted to 20,794 GW.h (gigawatt-hours). This is the total of all services billed by Manitoba Hydro that are treated as part of General Consumers Sales. They are analyzed by rate groups. Basic services make up the almost 99% of sales. Basic services are broken into Residential Standard (16%), Residential All-Electric (18%), General Service Mass Market (39%), and Top Consumers (26%). The remaining 1% is made up of Diesel, Seasonal and Flat Rate services in both the Residential and General Service sectors, General Service Surplus Energy Program customers, and Area and Roadway Lighting.

Sales data is totaled on a cyclic billing basis and Common Bus is measured on a calendar month basis. In fiscal year 2009/10, Common Bus amounted to a weather adjusted value of 21,749 GW.h. Use at the customers' meter lags the delivery of power to Common Bus. The difference between Sales and Common Bus includes diesel (which is part of sales but is not supplied by the integrated system), Construction power (which is not part of sales) and Distribution Losses.

Total electric domestic load for Manitoba is referred to as Net Firm Energy. In fiscal year 2009/10, this amounted to a weather adjusted value of 23,690 GW.h. This is based on Common Bus plus 1,962 GW.h of estimated transmission losses to deliver the power from generation to Common Bus, less the load that can be interrupted if needed which amounted to 20 GW.h in 2009/10.

The maximum domestic load for Manitoba for a single hour is referred to as Net Total Peak. It is expressed as an average MW (megawatts) for that hour. The weather adjusted peak for 2009/10 was 4,462 MW and took place on December 14, 2009 during the hour ending at 5:00 p.m. when the temperature in Winnipeg was about -20 degrees Celsius. The word "Total" means that any load curtailments that may have occurred are added back into the Peak value. This year, there were no curtailments at the time of peak.

FORECAST SUMMARY (GW.h)						
Sector	2009/10 History		2010/11 Forecast		2029/30 Forecast	
	W/A Actuals	W/A Act - 09 Fcst	2010 Fcst	Change in Fcst	2010 Fcst	Change in Fcst
Res Basic Standard	3353	104	3391	120	4338	446
Res Basic All-Electric	3608	103	3661	98	4667	-77
GS Mass Market	8118	58	8165	-18	10470	-131
GS Top Consumers	5461	-496	5610	-586	8063	-450
Misc Sales	254	1	258	10	319	47
Total Sales	20794	-229	21085	-377	27857	-165
Less Diesel	13	0	13	0	18	0
Construction	75	-3	88	0	46	-2
Distribution Losses	893	-144	877	-182	1248	-134
Common Bus	21749	-376	22036	-559	29133	-301
Transmission Losses	1962	-16	1947	-73	2575	-56
Less Interruptible	20	-2	21	6	0	0
Net Firm Energy	23690	-390	23962	-638	31708	-357
Net Total Peak (MW)	4462	129	4476	69	5846	171

Forecast Summary

Total Sales are forecast to grow from 20,794 GW.h in 2009/10 to 27,857 GW.h in 2029/30. That is a growth of 7,063 GW.h which is 353 GW.h or 1.5% per year. The Top Consumers are expected to grow somewhat faster than the other sales sectors, growing 2,602 GW.h in 20 years or 2.0% per year.

Net Firm Energy growth is closely related to Sales growth. Net Firm Energy is forecast to grow from 23,690 GW.h in 2009/10 to 31,708 GW.h in 2029/30. That is a growth of 8,018 GW.h which is 401 GW.h or 1.5% per year.

Net Total Peak is forecast to grow at a slightly slower rate than Net Firm Energy. Net Total Peak will grow from 4,462 MW in 2009/10 to 5,846 MW in 2029/30. That is a growth of 1,384 MW which is 69 MW or 1.4% per year.

2009/10 Weather Adjusted Actual compared to May 2009 Forecast

Overall, the actual weather adjusted Total Sales for 2009/10 was 229 GW.h or 1.1% lower than what was forecast in the May 2009 Electric Load Forecast. However the residential sector was 3.0% higher than forecast due to higher than expected electricity use per customer. The Mass Market sector was 0.7% higher than forecast. The Residential and General Service Mass Market Sectors improved from what was forecast in 2009. The Top Consumers were still suffering from the economic recession and used 496 GW.h or 9.1% less than forecast due to customer specific events.

Net Firm Energy was 390 GW.h or 1.6% lower than forecast. The Net Total Peak was 129 MW or 2.9% higher than forecast. This shift is due to the higher than expected residential and Mass Market loads that contribute more to peak than do the Top Consumers.

Change in Forecast

The Total Sales forecast for 2010/11 has been reduced by 377 GW.h from the May 2009 Electric Load Forecast. Residential has been increased by 218 GW.h but the Top Consumers have been reduced by 586 GW.h. These reflect changes in the energy use of these sectors during 2009/10. By 2029/30, the Total Sales forecast will still be 165 GW.h lower than the May 2009 forecast.

The Net Firm Energy forecast for 2029/30 has been lowered 357 GW.h from last year's forecast. This amounts to the equivalent of 0.9 years of load growth.

The Net Total Peak forecast for 2029/30 has been raised 171 MW from the 2009 forecast. This amounts to the equivalent of 2.5 years of peak load growth.

Demand Side Management in the Forecast

This forecast includes future DSM savings associated with the Basic Customer Information and Service. This DSM level is the minimum amount of DSM services and activity that Manitoba Hydro will provide to customers in the future.

All other DSM options are analyzed on an incremental basis to this level. Beyond 2009/10, the incremental savings associated with other DSM options are treated as supply-side resources and therefore are not included in this forecast.

By 2030/31, the Basic Customer Option is estimated to result in a total of 196 MW and 1119 GW.h of savings at the customers' meter. These savings are expected to occur in the Residential sector (165 MW and 1027 GW.h) and in the Commercial sector (31 MW and 92 GW.h). Adding another 14% savings due to reduced T & D losses, the total savings at generation will be 223 MW and 1276 GW.h.

Weather Adjustment

This forecast adjusts historical load to remove the weather effect for the comparison of the history to the forecast. Normal weather is based on 25 years of Winnipeg temperatures from April 1985 to March 2010.

Cold weather is expressed in Degree Days Heating (DDH), which is the number of degrees colder than 14 degrees Celsius each day, based on the average of the high and low temperature of the day. Hot weather is expressed in Degree Days Cooling (DDC), which is the number of degrees warmer than 18 degrees Celsius each day is, based again on the average of the high and low.

The 25 year weather normals used for this forecast are 4547.1 DDH and 180.4 DDC. This is an increase 29.0 from last year's normal of 4518.1 DDH, and an increase of 3.7 from last year's normal of 176.7 DDC.

Important Methodology Changes

The following methodological changes were implemented with the May 2010 Forecast.

Residential

- The 2009 Residential Energy Use survey was sent out in November 2009. Analysis of 4,500 returns gave new end use saturation estimates for the Residential End Use Model. Using these estimates, historical saturations since the 2003 survey were re-estimated, and forecast saturations were developed.
- Forecast residential load was adjusted to reflect consumers becoming more informed on the lower cost of space heating using natural gas relative to electricity.

Hourly Load Estimates

- Hourly data from Load Research were used to analyze Residential All-Electric, Residential Standard, General Service Mass Market, Top Consumers, Distribution Losses and Transmission Losses. The analysis produced improved models of Distribution and Transmission Losses.
- The hourly data was also used to develop an improved peak forecast model. The previous peak model only took into account the system load shape. The new model takes into account the load shape of each of the six above mentioned sectors and applies their own sector growths to determine the future load shape. This future load shape is then used to estimate the peak. This model will be used for estimating all loads from Common Bus to Generation.

Cases and Probability

- The “Scenarios” section of last year’s forecast was renamed “Potential Loads” reflecting that these are estimates to provide an indication of the potential magnitude of the load impact. Server Farms were added this year to the Potential Loads.
- In the Load Forecast Variability section, the various probability points were replaced by just the 90% and 10% points designed to represent the “High” and “Low” load probability point for sensitivity or risk analysis studies. The weather component of this variation that was included last year was removed to allow the power planners to use their own weather variation.

Table 1

NET MANITOBA HYDRO ELECTRIC LOAD FORECAST 2010/11 - 2030/31					
Fiscal Year	Net Firm Energy		Net Total Peak		Load Factor (%)
	(GW.h)	Change (%)	(MW)	Change (%)	
2009/10 Actual	23275		4359		61.0%
Weather	416		103		
2009/10 Adjusted	23690		4462		60.6%
2010/11	23962	1.1%	4476	0.3%	61.1%
2011/12	24579	2.6%	4574	2.2%	61.3%
2012/13	24981	1.6%	4646	1.6%	61.4%
2013/14	25647	2.7%	4745	2.1%	61.7%
2014/15	26020	1.5%	4811	1.4%	61.7%
2015/16	26438	1.6%	4882	1.5%	61.8%
2016/17	26895	1.7%	4959	1.6%	61.9%
2017/18	27202	1.1%	5017	1.2%	61.9%
2018/19	27496	1.1%	5075	1.1%	61.8%
2019/20	27856	1.3%	5140	1.3%	61.9%
10 Year Avg.		1.6%		1.4%	
2020/21	28220	1.3%	5207	1.3%	61.9%
2021/22	28588	1.3%	5274	1.3%	61.9%
2022/23	28960	1.3%	5342	1.3%	61.9%
2023/24	29336	1.3%	5411	1.3%	61.9%
2024/25	29718	1.3%	5480	1.3%	61.9%
2025/26	30109	1.3%	5552	1.3%	61.9%
2026/27	30502	1.3%	5624	1.3%	61.9%
2027/28	30901	1.3%	5697	1.3%	61.9%
2028/29	31303	1.3%	5771	1.3%	61.9%
2029/30	31708	1.3%	5846	1.3%	61.9%
2030/31	32117	1.3%	5921	1.3%	61.9%
21 Year Avg.		1.5%		1.4%	

- Net Firm Energy excludes station service (Net) and excludes Interruptible Energy (Firm)

- Net Total Peak excludes station service (Net) and adds back in estimates of Curtailable Loads (Total)

Table 2

GROSS MANITOBA HYDRO ELECTRIC LOAD FORECAST					
2010/11 - 2030/31					
Fiscal Year	Gross Firm Energy		Gross Total Peak		Load Factor (%)
	(GW.h)	Change (%)	(MW)	Change (%)	
2009/10 Actual	23412		4393		60.8%
Weather	416		103		
2009/10 Adjusted	23828		4496		60.5%
2010/11	24117	1.2%	4506	0.2%	61.1%
2011/12	24739	2.6%	4604	2.2%	61.3%
2012/13	25142	1.6%	4677	1.6%	61.4%
2013/14	25807	2.6%	4776	2.1%	61.7%
2014/15	26180	1.4%	4842	1.4%	61.7%
2015/16	26599	1.6%	4913	1.5%	61.8%
2016/17	27055	1.7%	4990	1.5%	61.9%
2017/18	27362	1.1%	5048	1.2%	61.9%
2018/19	27657	1.1%	5106	1.1%	61.8%
2019/20	28016	1.3%	5171	1.3%	61.8%
10 Year Avg.		1.6%		1.4%	
2020/21	28381	1.3%	5238	1.3%	61.9%
2021/22	28748	1.3%	5305	1.3%	61.9%
2022/23	29120	1.3%	5373	1.3%	61.9%
2023/24	29496	1.3%	5442	1.3%	61.9%
2024/25	29878	1.3%	5511	1.3%	61.9%
2025/26	30269	1.3%	5583	1.3%	61.9%
2026/27	30663	1.3%	5655	1.3%	61.9%
2027/28	31062	1.3%	5728	1.3%	61.9%
2028/29	31464	1.3%	5802	1.3%	61.9%
2029/30	31869	1.3%	5877	1.3%	61.9%
2030/31	32277	1.3%	5952	1.3%	61.9%
21 Year Avg.		1.5%		1.3%	

- Gross Firm Energy includes station service (Gross) and excludes Interruptible Energy (Firm)
- Gross Total Peak includes station service (Gross) and adds back in estimates of Curtailable Loads (Total)

Table 3

ENERGY SALES TO MANITOBA HYDRO CUSTOMERS (GW.h)							
Base Forecast							
2010/11 - 2030/31							
Fiscal Year	Residential	General Service	Area & Roadway Lighting	Manitoba Hydro Sales Incl Diesel		Total Diesel	Manitoba Hydro Sales Excl Diesel
2009/10 Actual	6899	13485	102	20486	-3.4%	13	20473
2010/11	7168	13814	103	21085	2.9%	13	21072
2011/12	7268	14253	104	21625	2.6%	13	21611
2012/13	7362	14511	106	21978	1.6%	14	21965
2013/14	7454	14962	107	22522	2.5%	14	22508
2014/15	7546	15197	108	22850	1.5%	14	22836
2015/16	7640	15469	109	23218	1.6%	14	23203
2016/17	7736	15772	110	23619	1.7%	14	23604
2017/18	7835	15944	111	23890	1.1%	15	23875
2018/19	7936	16102	112	24150	1.1%	15	24135
2019/20	8038	16315	113	24466	1.3%	15	24451
2020/21	8143	16530	114	24787	1.3%	15	24772
2021/22	8251	16746	115	25112	1.3%	15	25096
2022/23	8360	16964	116	25439	1.3%	16	25424
2023/24	8472	17182	117	25771	1.3%	16	25755
2024/25	8587	17403	118	26107	1.3%	16	26091
2025/26	8704	17629	119	26452	1.3%	16	26436
2026/27	8823	17856	120	26799	1.3%	16	26783
2027/28	8944	18085	121	27150	1.3%	17	27134
2028/29	9067	18316	122	27505	1.3%	17	27488
2029/30	9187	18548	122	27857	1.3%	17	27840
2030/31	9313	18782	123	28217	1.3%	17	28200

Table 4

NET FIRM ENERGY (G W.h)								
Base Forecast								
2010/11 - 2030/31								
Fiscal Year	Dist. Losses	Const. Power	Manitoba Load at Common Bus	Trans. Losses	Net Firm Energy	Non Firm Energy	Station Service	Gross Total Energy
2009/10 Actual	813	75	21361	1934	23275	20	137	23432
2010/11	876	88	22036	1947	23962	21	155	24138
2011/12	920	71	22602	1997	24579	21	161	24760
2012/13	946	61	22972	2030	24981	21	161	25163
2013/14	1000	56	23564	2083	25647	0	161	25807
2014/15	1025	46	23907	2113	26020	0	161	26180
2015/16	1042	46	24291	2147	26438	0	161	26599
2016/17	1060	46	24711	2184	26895	0	161	27055
2017/18	1072	46	24993	2209	27202	0	161	27362
2018/19	1082	46	25264	2233	27496	0	161	27657
2019/20	1096	46	25593	2262	27856	0	161	28016
2020/21	1110	46	25928	2292	28220	0	161	28381
2021/22	1124	46	26266	2322	28588	0	161	28748
2022/23	1138	46	26608	2352	28960	0	161	29120
2023/24	1152	46	26954	2382	29336	0	161	29496
2024/25	1167	46	27304	2413	29718	0	161	29878
2025/26	1182	46	27663	2445	30109	0	161	30269
2026/27	1196	46	28025	2477	30502	0	161	30663
2027/28	1212	46	28392	2509	30901	0	161	31062
2028/29	1227	46	28761	2542	31303	0	161	31464
2029/30	1247	46	29133	2575	31708	0	161	31869
2030/31	1262	46	29509	2608	32117	0	161	32277

- See the Glossary of Terms for a definition of Gross Total Energy, Non Firm Energy, Station Service and Net Firm Energy

Table 5

NET FIRM ENERGY AND NET TOTAL PEAK CHANGE FROM PREVIOUS FORECAST						
Fiscal Year	NET FIRM ENERGY			NET TOTAL PEAK		
	Forecast Aug 2010 (GW.h)	Forecast May 2009 (GW.h)	Difference (GW.h)	Forecast Aug 2010 (MW)	Forecast May 2009 (MW)	Difference (MW)
2010/11	23962	24600	-638	4476	4407	69
2011/12	24579	25159	-580	4574	4499	75
2012/13	24981	25599	-618	4646	4570	76
2013/14	25647	26012	-365	4745	4633	112
2014/15	26020	26618	-598	4811	4733	78
2015/16	26438	26973	-535	4882	4789	93
2016/17	26895	27331	-436	4959	4845	114
2017/18	27202	27644	-442	5017	4893	124
2018/19	27496	27923	-427	5075	4942	133
2019/20	27856	28288	-432	5140	5007	133
2020/21	28220	28654	-434	5207	5071	136
2021/22	28588	29021	-433	5274	5136	138
2022/23	28960	29391	-431	5342	5202	140
2023/24	29336	29762	-427	5411	5268	143
2024/25	29718	30136	-418	5480	5334	146
2025/26	30109	30516	-408	5552	5401	151
2026/27	30502	30899	-396	5624	5469	155
2027/28	30901	31285	-384	5697	5537	160
2028/29	31303	31674	-370	5771	5606	165
2029/30	31708	32066	-357	5846	5675	171

- Net Firm Energy excludes station service (Net) and excludes Interruptible Energy (Firm)
 - Net Total Peak excludes station service (Net) and adds back in estimates of Curtailable Loads (Total)

ECONOMIC ASSUMPTIONS

Economic forecast assumptions are taken from the 2010 Economic Outlook and the 2010 Energy Price Outlook. These documents contain Manitoba Hydro's forecasts of economic variables including prices of electricity, natural gas and oil, Gross Domestic Product (GDP), Manitoba population and housing.

The following are the economic variables used for this Electric Load Forecast:

Manitoba Housing - The number of homes in Manitoba is forecast to increase by 1.2% (5249 units) in 2010/11 and averages 0.9% per year over the forecast period. This compares to a historical average increase of 0.8% per year over the last ten years. This is used in the Residential All-Electric and Standard customer forecast.

Electricity Prices - The electricity price forecast is based on CPI and rate increase projections contained in the Integrated Financial Forecast. The real electricity price is forecast to increase 1.2% in 2010/11, 1.0% in 2011/12 and 1.4% per year throughout the rest of the forecast period. This is used in the Residential All-Electric customer forecast and in the GS Mass Market average use forecast.

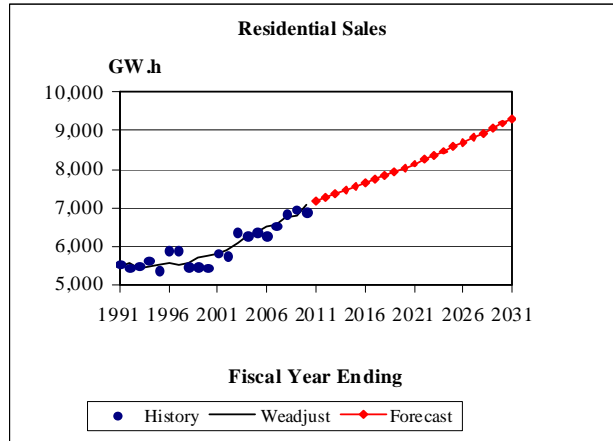
Natural Gas Prices – Manitoba Hydro views the natural gas price forecast as commercially sensitive information. Consistent with the Clean Environment Commission and Electric General Rate Application, this information will not be publicly disclosed. This is used in the Residential All-Electric customer forecast and in the GS Mass Market average use forecast.

Gross Domestic Product (GDP) - The forecast for real economic growth in Manitoba is 2.6% in 2010/11, 3.1% in 2011/12, 2.8% in 2012/13 and then declines to 1.7% in 2013/14 and remains at that level for the remainder of the forecast period. This is used in the GS Mass Market customer forecast and in the GS Mass Market average use forecast.

RESIDENTIAL

The Residential sector represents 33.5% of the weather adjusted electricity sales in Manitoba. It includes sales to Residential customers for non-business operations. The Residential sector is comprised of four rate groups (Basic, Seasonal, Flat Rate Water Heating and Diesel.) The adjacent graph shows that load growth was minimal in the early to mid 1990's. Since 1998, Residential consumption has been growing at a steady rate.

Figure 1



The Residential sector is forecast to increase from a weather adjusted base of 7,074 GW.h in 2009/10 to 9,313 GW.h by 2030/31. This represents an average growth of 107 GW.h or 1.3% per year.

RESIDENTIAL (GW.h)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Weather Adjust	Adjusted Sales	Fiscal Year	Forecast Sales
1989/90	5543	-81	5462	2010/11	7168
1990/91	5545	-71	5474	2011/12	7268
1991/92	5458	101	5560	2012/13	7362
1992/93	5489	-64	5425	2013/14	7454
1993/94	5632	-158	5474	2014/15	7546
1994/95	5388	121	5509	2015/16	7640
1995/96	5907	-311	5597	2016/17	7736
1996/97	5910	-384	5526	2017/18	7835
1997/98	5473	111	5584	2018/19	7936
1998/99	5482	226	5708	2019/20	8038
1999/00	5455	311	5765	2020/21	8143
2000/01	5830	-32	5798	2021/22	8251
2001/02	5765	135	5900	2022/23	8360
2002/03	6361	-271	6090	2023/24	8472
2003/04	6266	7	6274	2024/25	8587
2004/05	6370	14	6384	2025/26	8704
2005/06	6266	259	6525	2026/27	8823
2006/07	6539	1	6540	2027/28	8944
2007/08	6838	-77	6761	2028/29	9067
2008/09	6954	-151	6803	2029/30	9187
2009/10	6899	175	7074	2030/31	9313

Residential Basic

The Residential Basic rate group represents 98.4% of the total Residential sales. This category is separated into two distinct groups, All-Electric and Standard. All-Electric customers are classified as being capable of heating their premises with electricity. All others customers are classified as Standard. During 2009/10, the average All-Electric customer used 25,210 kW.h, whereas the average Standard customer used 10,767 kW.h per year, the difference mostly being electric heat and electric water heat.

There currently are 441,760 Residential Basic customers, and this number is forecast to increase to 528,861 by 2030/31. Currently 31.8% of these are All-Electric and the rest are Standard. The All-Electric percentage is forecast to grow to 34.3% by 2030/31.

Figures 3 and 4 show the Standard and All-Electric Residential Basic energy use history and forecast.

Figure 2

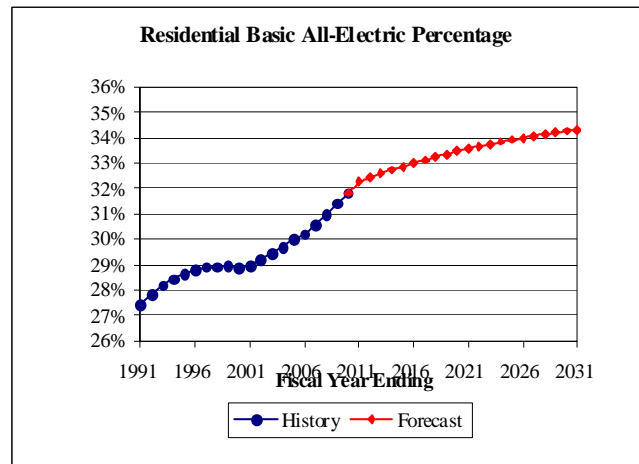


Figure 3

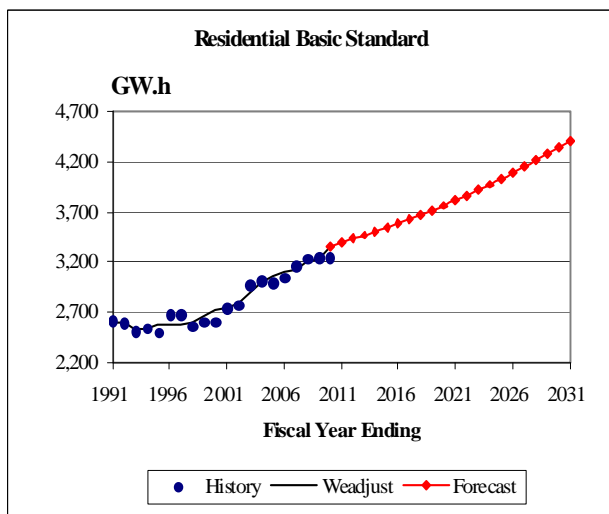
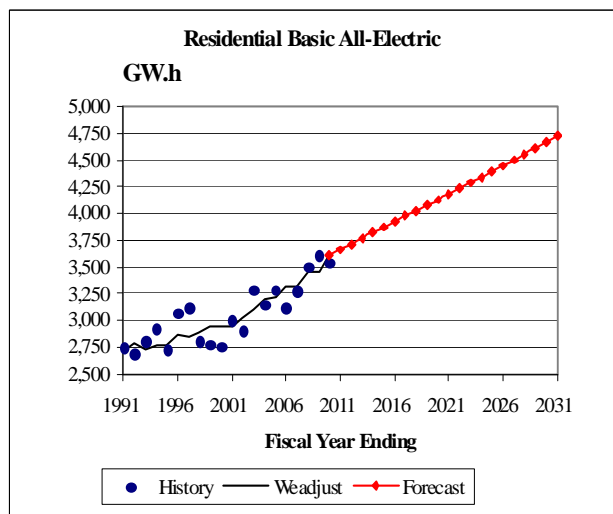


Figure 4



Residential Seasonal

There were 20,891 Residential Seasonal customers as of March 2010. The number of customers is expected increase 80 per year throughout the forecast period. Sales are forecast to increase from 81 GW.h in 2009/10 to 168 GW.h in 2030/31. Customers are expected to continue the trend of increasing their usage at their seasonal residence.

Residential Water Heating

Residential Water Heating is a flat rate unmetered service. This service has not been available to new customers since November 12, 1969. There were 4,688 remaining customers as of March, 2010. The number of customers is expected to decrease 5% per year throughout the forecast period. Sales were 24 GW.h in 2009/10 and that will decrease by 5% per year throughout the forecast period.

Residential Diesel

There are 4 diesel sites in Manitoba: - Brochet, Lac Brochet, Tadoule Lake and Shamattawa. Diesel sales are included in General Consumer's sales, but are not part of the integrated system. In March 2010, there were 542 Residential Diesel customers that used 7.5 GW.h in 2009/10 at an average of 13,868 kW.h per customer. They have 60 amp service that does not allow for electric heating. Consumption is expected to increase to 10.1 GW.h by 2029/30 under the assumption that they will remain Diesel sites.

Residential Basic Methodology

The forecast of the total number of Residential Customers is from Manitoba Hydro's 2010 Economic Outlook. Econometric analysis was used to forecast the customers in the All-Electric (capable of heating with electricity) and Standard (incapable) groups. The customer forecasts then became the primary input in the End Use Model.

The Residential energy forecast was calculated using a detailed end use approach. The most recent Residential Energy Use Survey provided current end use saturation rates, end use age distributions and end use lifetimes. This information was combined with previous survey results to prepare a forecast of future end use saturation rates. Conditional Demand Analysis was performed on the survey data to derive unit energy consumptions (UECs) for each end use type. Future unit energy consumption of each end use was estimated based on market trends. The expected savings from Manitoba Hydro's efforts to introduce or change codes and standards were identified and quantified. The information was then used to calculate an energy forecast for each end use.

Customer Forecast

For the 2010/11 to 2030/31 period, the Economic Analysis Department provides forecasts for:

1. Total Number of Residential Customers,
2. Price of Electricity,
3. Price of Natural Gas.

These forecasts are used as inputs to the model for the forecast period.

The number of customers at fiscal year-end is forecast using the following calculations for each year (t).

Number of All-Electric Customers (t)

$$\begin{aligned} &= \text{Number of All-Electric Customers (t-1)} \\ &+ \text{Change in Number of All-Electric Customers (t)} \end{aligned}$$

Number of Standard Customers (t)

$$\begin{aligned} &= \text{Total Number of Residential Customers (t)} \quad [\text{from 2010 Economic Outlook}] \\ &- \text{Number of All-Electric Customers (t)} \end{aligned}$$

The change in the number of All-Electric Customers is modeled using year-end historical customer data from 1995/96 through 2009/10. The resulting model and parameters are as follows:

Change in Number of All-Electric Customers (t)

$$= -32.32 + 1.1163 \times \text{CTNRC} - 0.3417 \times \text{CTNRC} \times \text{PE} / \text{PNG}$$

CTNRC - Change in Total Number of Residential Customers

PE - Price of Electricity

PNG - Price of Natural Gas

R-squared: 74.6%

T-stats:

Constant : -0.06

CTNRC : 5.30

CTNRC x PE / PNG : -2.00

Residential End Use Model

This model uses the Standard and All-Electric customer forecasts from the Market Share Model and incorporates end use assumptions. The end use assumptions include a saturation forecast, age distributions, current usage information and efficiency improvement information. This information is combined to prepare the Residential End Use Forecast.

a) Saturations and Age Distributions - Historical saturation data was collected from previous Manitoba Hydro Residential Surveys. For some end uses, the Survey also supplied detailed age distributions. Saturations were forecast using an end use vintaging model where detailed age distributions are available and using a birth/death/replacement model where there was no age information. The number of replacements was calculated using a modified Weibull distribution with estimated end use lifetimes.

b) Annual Usage - The current estimates of annual usage or unit energy consumption (UEC) were calculated using Residential Survey information and Conditional Demand Analysis techniques. The survey results were screened for consumption records and

survey completeness. Missing values for the size of home, people per household and income questions were imputed. Degree days heating/cooling and demographic factors such as income and people per household were added to help explain usage variations. They were then normalized for the average customer.

c) Efficiency Improvements - New end uses are typically more efficient than existing stock. The average use will change due to the amount of efficiency improvement and the rate that older inefficient stock is replaced. The future consumption levels of each end use were analyzed and forecast independently based on literature, contact with other utilities and professional judgment.

d) Classifying End Uses - The Residential Basic End Use Forecast is divided into Basic Standard and Basic All-Electric groups. Some end uses are only for electric space heating and apply only to All-Electric customers. The electric space heating end uses are added to the All-Electric classification. The other end uses are proportioned into the Standard and All-Electric classifications.

All-Electric Usage (GW.h)

$$\begin{aligned} &= \text{Total Electric Space Heating End Use Usage} \\ &+ (\text{All-Electric Usage for Non Space Heating End Uses in 2009/10}) \\ &\quad / \text{Total Residential Usage for Non Space End Uses in 2009/10}) \\ &\quad \times \text{Forecast Total Residential Usage for Non Space Heating End Uses} \end{aligned}$$

Standard Usage (GW.h)

$$\begin{aligned} &= (\text{Standard Usage for Non Space Heating End Uses in 2009/10}) \\ &\quad / \text{Total Residential Usage for Non Space End Uses in 2009/10}) \\ &\quad \times \text{Forecast Total Residential Usage for Non Space Heating End Uses} \end{aligned}$$

Total Residential Usage (GW.h)

$$= \text{All-Electric Customer Usage} + \text{Standard Customer Usage}$$

Table 6

BASIC RESIDENTIAL SALES										
Base Forecast										
1999/00 - 2030/31										
Fiscal Year	Basic Standard			Basic All-Electric			Total Basic			% All-Electric
	(Custs.)	(GW.h)	(Avg.)	(Custs.)	(GW.h)	(Avg.)	(Custs.)	(GW.h)	(Avg.)	
1999/00	289419	2607	9008	117506	2757	23460	406925	5364	13181	28.9%
2000/01	290679	2736	9413	118411	3001	25346	409090	5737	14025	28.9%
2001/02	291371	2771	9512	120285	2902	24128	411656	5674	13783	29.2%
2002/03	292032	2977	10193	121780	3289	27011	413812	6266	15142	29.4%
2003/04	293020	3019	10304	123671	3151	25481	416691	6170	14808	29.7%
2004/05	294108	2991	10171	126027	3283	26053	420135	6275	14935	30.0%
2005/06	295733	3045	10295	128009	3126	24419	423742	6171	14562	30.2%
2006/07	297137	3167	10660	130749	3275	25050	427886	6443	15057	30.6%
2007/08	298287	3237	10852	133858	3499	26139	432145	6736	15587	31.0%
2008/09	299852	3243	10815	137410	3604	26231	437262	6847	15659	31.4%
2009/10	301147	3243	10767	140563	3544	25210	441710	6786	15363	31.8%
2010/11	302510	3391	11209	144017	3661	25421	446527	7052	15793	32.3%
2011/12	305233	3432	11245	146431	3717	25383	451664	7149	15828	32.4%
2012/13	307736	3468	11269	148722	3773	25367	456458	7241	15862	32.6%
2013/14	310034	3504	11303	150834	3824	25355	460868	7329	15902	32.7%
2014/15	312262	3543	11347	152860	3874	25347	465122	7418	15948	32.9%
2015/16	314483	3584	11396	154867	3925	25342	469350	7509	15998	33.0%
2016/17	316701	3627	11451	156847	3975	25345	473548	7602	16053	33.1%
2017/18	318918	3671	11510	158799	4026	25354	477717	7697	16112	33.2%
2018/19	321131	3717	11573	160725	4078	25370	481856	7794	16175	33.4%
2019/20	323344	3764	11640	162621	4129	25392	485965	7893	16242	33.5%
2020/21	325553	3813	11713	164485	4181	25419	490038	7994	16314	33.6%
2021/22	327759	3864	11790	166321	4233	25453	494080	8098	16389	33.7%
2022/23	329960	3917	11871	168126	4286	25492	498086	8203	16469	33.8%
2023/24	332154	3972	11958	169902	4339	25538	502056	8311	16554	33.8%
2024/25	334343	4029	12051	171647	4392	25590	505990	8422	16644	33.9%
2025/26	336526	4088	12149	173364	4447	25649	509890	8535	16739	34.0%
2026/27	338703	4149	12248	175049	4501	25715	513752	8650	16837	34.1%
2027/28	340873	4211	12352	176706	4556	25785	517579	8767	16938	34.1%
2028/29	343037	4274	12459	178333	4612	25859	521370	8885	17042	34.2%
2029/30	345197	4338	12566	179932	4667	25938	525129	9005	17148	34.3%
2030/31	347356	4404	12678	181505	4723	26019	528861	9126	17256	34.3%

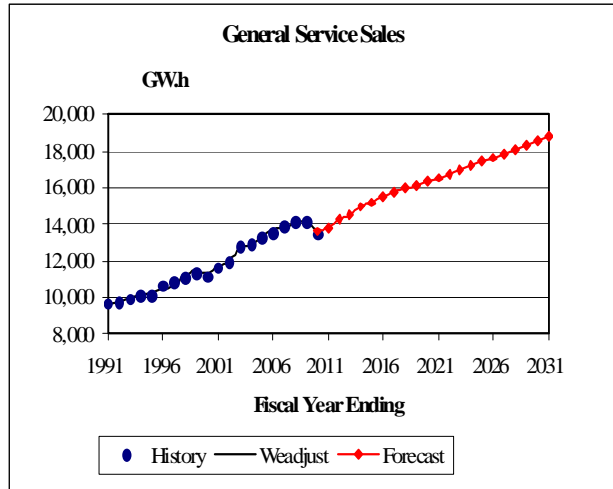
Table 7

TOTAL RESIDENTIAL SALES						
Base Forecast						
1999/00 - 2030/31						
Fiscal Year	Basic (GW.h)	Diesel (GW.h)	Seasonal (GW.h)	FRWH (GW.h)	Total Residential (GW.h)	Change (%)
1999/00	5364	5	46	40	5455	-0.5%
2000/01	5737	5	49	39	5830	6.9%
2001/02	5674	6	49	37	5765	-1.1%
2002/03	6266	6	54	35	6361	10.3%
2003/04	6170	6	56	34	6266	-1.5%
2004/05	6275	7	58	31	6370	1.7%
2005/06	6171	7	59	30	6266	-1.6%
2006/07	6443	7	60	29	6539	4.3%
2007/08	6736	7	68	27	6838	4.6%
2008/09	6847	7	74	25	6954	1.7%
2009/10	6786	7	81	24	6899	-0.8%
2010/11	7052	8	85	23	7168	3.9%
2011/12	7149	8	89	22	7268	1.4%
2012/13	7241	8	93	21	7362	1.3%
2013/14	7329	8	97	20	7454	1.2%
2014/15	7418	8	101	19	7546	1.2%
2015/16	7509	8	105	18	7640	1.2%
2016/17	7602	8	109	17	7736	1.3%
2017/18	7697	8	114	16	7835	1.3%
2018/19	7794	9	118	15	7936	1.3%
2019/20	7893	9	122	15	8038	1.3%
2020/21	7994	9	127	14	8143	1.3%
2021/22	8098	9	131	13	8251	1.3%
2022/23	8203	9	135	12	8360	1.3%
2023/24	8311	9	140	12	8472	1.3%
2024/25	8422	9	144	11	8587	1.4%
2025/26	8535	9	149	11	8704	1.4%
2026/27	8650	10	153	10	8823	1.4%
2027/28	8767	10	158	10	8944	1.4%
2028/29	8885	10	163	9	9067	1.4%
2029/30	9005	10	164	9	9187	1.3%
2030/31	9126	10	168	8	9313	1.4%

GENERAL SERVICE

The General Service sector represents 66% of all sales in Manitoba. This classification includes sales to all Commercial and Industrial businesses in Manitoba. This sector consists of five rate groups (Basic, Diesel, Seasonal, Water Heating and Surplus Energy Program). Basic represent 99.7% of all General Service sales and is divided into Mass Market and Top Consumers. The adjacent graph shows continuous load growth over the last twenty years, with reversals in 1999/00 and 2009/10 because of the economic recessions of those years.

Figure 5



The General Service sector is forecast to increase from a weather adjusted base of 13,617 GW.h in 2009/10 to 18,783 GW.h by 2030/31. This represents an average growth of 246 GW.h or 1.5% per year.

GENERAL SERVICE (GW.h)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Weather Adjust	Adjusted Sales	Fiscal Year	Forecast Sales
1989/90	9574	-70	9503	2010/11	13814
1990/91	9689	-45	9644	2011/12	14253
1991/92	9772	31	9802	2012/13	14511
1992/93	9954	-5	9949	2013/14	14962
1993/94	10126	-27	10099	2014/15	15197
1994/95	10120	139	10259	2015/16	15469
1995/96	10659	-206	10453	2016/17	15772
1996/97	10855	-207	10648	2017/18	15944
1997/98	11121	56	11177	2018/19	16102
1998/99	11360	114	11474	2019/20	16315
1999/00	11152	188	11340	2020/21	16530
2000/01	11673	6	11679	2021/22	16746
2001/02	11951	54	12004	2022/23	16964
2002/03	12796	-134	12662	2023/24	17182
2003/04	12923	-15	12907	2024/25	17403
2004/05	13274	50	13324	2025/26	17629
2005/06	13577	117	13694	2026/27	17856
2006/07	13870	-35	13834	2027/28	18085
2007/08	14123	-48	14075	2028/29	18316
2008/09	14154	-42	14112	2029/30	18548
2009/10	13485	133	13617	2030/31	18782

General Service Mass Market

This category includes all other Commercial and Industrial businesses located in Manitoba, excluding the Top Consumers group.

The Mass Market load has grown steadily throughout the last twenty years. This load generally does not fluctuate dramatically since the commercial and small industrial infrastructure is established and continues to grow slowly.

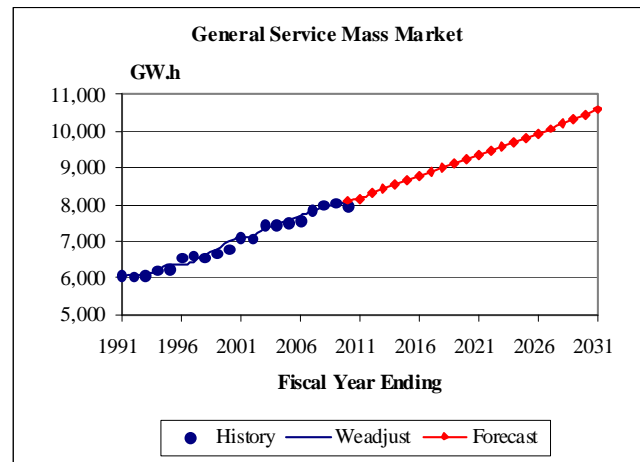
The Mass Market category is forecast to increase from 7,985 GW.h in 2009/10 to 10,604 GW.h by 2030/31. This represents an average growth of 118 GW.h or 1.3% per year. The Mass Market forecast is based on expectations of steady economic growth in future years and moderate increases in real electricity and natural gas prices.

Methodology

Econometric analysis of sales data is used to develop models for the number of customers and the average use per customer. Forecasts of Manitoba GDP and energy prices by the Economic Analysis Department are then input into the models, which generate forecasts for the number of customers and average use for each year of the forecast period. The forecasts for customers and average use are multiplied together to generate total GW.h. This forecast includes expected savings from Manitoba Hydro's efforts to introduce or change codes and standards.

Total use is allocated to the Small, Medium and Large rate classes according to each group's proportion of the total Mass Market sector (as recorded for the most recent fiscal year).

Figure 6



Customer Forecast

The number of customers at fiscal year-end is forecast using the following calculations for each year (t):

$$\begin{aligned} \text{Number of Customers (t)} &= \text{Number of Customers (t-1)} \\ &+ \text{Change in the Number of Customers (t)} \end{aligned}$$

$$\begin{aligned} \text{Change in the Number of Customers (t)} &= \text{Number of Customers (t-1)} \\ &\times \text{Percentage Change in Number of Customers (t)} \end{aligned}$$

The percentage change in number of customers is modeled using year-end historical customer data from 1991/92 to 2009/10. The resulting model and parameters are as follows:

$$\begin{aligned} \text{Percentage Change in Number of Customers (t)} &= 0.0035 + 0.08757 \times \text{CGDP} \end{aligned}$$

CGDP - Annual Percentage Change in Manitoba Gross Domestic Product

R-squared: 13.6%

T-stats:

Constant	: 2.72
CGDP	: 1.64

Average Use Forecast

The average monthly use per customer is forecast using the following model:

Change in Monthly Average Use

$$= 56.2 - 142.00 \times \text{CPENG} + 1,851.7 \times \text{CGDP} + 2.824 \times \text{CDDH} + 7.656 \times \text{CDDC}$$

CPENG - Annual % Change in (Price of Electricity / Price of Natural Gas)

CGDP - Annual % Change in Manitoba Gross Domestic Product

CDDH - Year over Year Change in Degree Days Heating by Month

CDDC - Year over Year Change in Degree Days Cooling by Month

R-squared: 57.2%

T-stats:

Constant : 1.59

CPENG : -0.77

CGDP : 1.18

CDDH : 16.21

CDDC : 6.33

The monthly change model is aggregated to be an annual change model for forecasting purposes of the following form:

Annual Average Use (t)

$$= \text{Annual Average Use (t-1)}$$

$$+ \text{Change in Annual Average Use (t)}$$

Total Use Forecast

Total Use (t)

$$= \text{Number of Customers (t)}$$

$$\times \text{Average Annual Use (t)}$$

General Service Top Consumers

This category includes the top energy consuming businesses in Manitoba and represents 40% of all electricity consumed in the General Service sector and 26% of all electricity Sales. The Top Consumers group includes 17 companies that account for 25 customers in Primary Metals, Chemicals, Petrol/Oil/Natural Gas, Pulp/Paper, Food/Beverage, Mining and Colleges/Universities. The Top Consumers category includes all future energy requirements for these customers. Some customers are planning major expansions, some customers are expected to remain at current operating levels and some customers are planning to reduce their levels of consumption in the future.

Each company in the Top Consumers group is forecast individually. Information on individual company operating plans is collected from industry news, Manitoba Hydro's economic experts and Manitoba Hydro's Key & Major Account representatives. This information is used to prepare company specific forecasts.

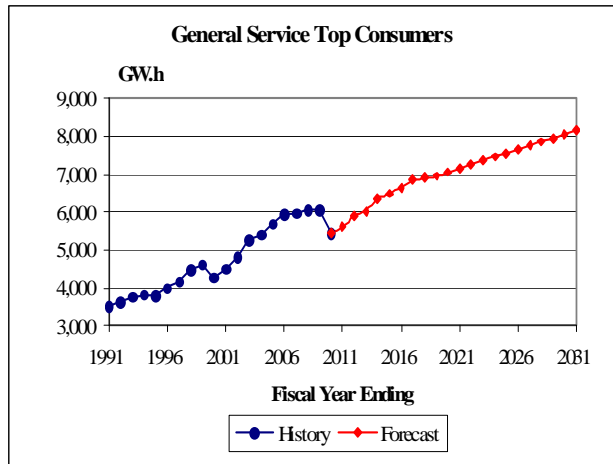
The Top Consumers are forecast individually because their usage does not grow in a slow, steady, predictable pattern. These types of load changes are not conducive to econometric forecasting models and must be examined on an individual basis. The forecast for each company includes their short term committed plans and expectations over the next several years.

This category contains some speculative load growth because new, large, Industrial customers could begin operating in the future. This classification is called Potential Large Industrial Loads (PLIL). At this time, the specifics of these loads are unknown. PLIL also include any long term load growth of the existing Top Consumers.

Since 1980/81, seven new major Industrial loads have been energized in Manitoba. Patterns of past unexpected load growth have been used to forecast future potential loads. The forecast is that PLIL will be zero through 2012/13. It will be 100 GW.h in 2013/14 and will increase 100 GW.h each year throughout the forecast. This will bring it to 1,800 GW.h by 2030/31.

The adjacent graph shows that the Top Consumers category has grown consistently over the last twenty years. This group is very sensitive to economic conditions, especially apparent by their drop in consumption during the economic downturns of 1999/00 and 2009/10. In general, the Top Consumer recovery is expected in over the next two years and then return to near normal growth.

Figure 7



The Top Consumer category is forecast to increase from a base of 5,461 GW.h in 2009/10 to 8,163 GW.h by 2030/31. This represents an average growth of 129 GW.h or 1.9% per year. This is a higher growth rate than any other sector in Manitoba. But this is still less than the growth rate from 3,545 GW.h in 1990/91 to 5,461 GW.h in 2009/10 during which time the growth averaged 2.2% per year.

General Service Diesel

In March 2010, there were 179 General Service Diesel Full Cost customers. They used 5.5 GW.h in 2009/10. Consumption is expected to increase to 8.4 GW.h by 2030/31.

General Service Seasonal

There were 836 General Service Seasonal customers as of March, 2010. The number of customers is expected to increase by five customers per year throughout the forecast period. Consumption was 4.8 GW.h in 2009/10 and is expected to grow to 5.3 GW.h by 2030/31.

General Service Water Heating

General Service Water Heating is a flat rate unmetered service that has not been available since November 12, 1969. There were 460 remaining customers as of March, 2010. The number of customers is expected to decrease 5% per year throughout the forecast period. Sales were 8.2 GW.h in 2009/10 and that will decrease to 2.7 GW.h by 2030/31.

Surplus Energy Program

Participants in the Surplus Energy Program (SEP) are expected to consume 21 GW.h per year during the 2010/11 to 2012/13 period, as the program has only been approved until March 2013. This energy is considered to be “interruptible” and thus “non-firm”. The load by these customers is included in Sales and is included in the Net Total Energy and Gross Total Energy forecasts. After March 2013, this load becomes part of the firm load and is added into General Service Sales forecast.

Table 8

BASIC GENERAL SERVICE SALES									
Base Forecast									
1999/00 - 2030/31									
Fiscal Year	Mass Market			Top Consumers			Total Basic		
	(Custs.)	(GW.h)	(Avg.)	(Custs.)	(GW.h)	(Avg.)	(Custs.)	(GW.h)	(Avg.)
1999/00	59494	6796	114232	35	4299	122833677	59529	11095	186385
2000/01	59759	7110	118970	31	4515	145639850	59790	11624	194420
2001/02	60086	7084	117902	25	4818	192739001	60111	11903	198013
2002/03	60265	7467	123900	26	5282	203139444	60291	12748	211449
2003/04	60672	7460	122955	27	5423	200857671	60699	12883	212245
2004/05	60924	7516	123362	26	5714	219774330	60950	13230	217060
2005/06	61491	7587	123380	26	5948	228753323	61517	13534	220009
2006/07	63596	7839	123269	26	5989	230346465	63622	13828	217353
2007/08	63855	8006	125382	26	6075	233643398	63881	14081	220425
2008/09	64140	8049	125485	26	6065	233277664	64166	14114	219958
2009/10	64758	7985	123304	26	5461	210031369	64784	13446	207547
2010/11	65246	8165	125142	25	5610	224400000	65271	13775	211043
2011/12	65639	8305	126520	25	5909	236360000	65664	14214	216461
2012/13	66039	8439	127788	25	6033	241320000	66064	14472	219060
2013/14	66425	8569	129005	25	6375	255000000	66450	14944	224893
2014/15	66764	8681	130020	26	6499	249961538	66790	15180	227275
2015/16	67090	8786	130962	26	6666	256384615	67116	15452	230232
2016/17	67432	8899	131964	26	6857	263730769	67458	15756	233562
2017/18	67770	9010	132952	26	6917	266038462	67796	15927	234928
2018/19	68112	9123	133938	26	6963	267807692	68138	16086	236076
2019/20	68453	9236	134924	26	7063	271653846	68479	16299	238014
2020/21	68798	9351	135920	26	7163	275500000	68824	16514	239946
2021/22	69144	9467	136921	26	7263	279346154	69170	16730	241872
2022/23	69492	9585	137926	26	7363	283192308	69518	16948	243789
2023/24	69842	9704	138938	26	7463	287038462	69868	17167	245702
2024/25	70192	9824	139966	26	7563	290884615	70218	17387	247621
2025/26	70546	9951	141050	26	7663	294730769	70572	17614	249582
2026/27	70901	10078	142137	26	7763	298576923	70927	17841	251536
2027/28	71257	10207	143244	26	7863	302423077	71283	18070	253499
2028/29	71616	10338	144351	26	7963	306269231	71642	18301	255449
2029/30	71976	10470	145466	26	8063	310115385	72002	18533	257396
2030/31	72338	10604	146583	26	8163	313961538	72364	18767	259335

Table 9

TOTAL GENERAL SERVICE SALES								
Base Forecast								
1999/00 - 2030/31								
Fiscal Year	Mass Market (GW.h)	Top Consumers (GW.h)	Diesel (GW.h)	Seasonal (GW.h)	FRWH (GW.h)	SEP/DFH (GW.h)	Total General Service (GW.h) Change (%)	
1999/00	6796	4299	4	5	15	33	11152	-1.8%
2000/01	7110	4515	4	4	15	26	11673	4.7%
2001/02	7084	4818	5	4	14	24	11951	2.4%
2002/03	7467	5282	4	4	14	25	12796	7.1%
2003/04	7460	5423	5	5	13	17	12923	1.0%
2004/05	7516	5714	5	5	10	25	13274	2.7%
2005/06	7587	5948	5	5	9	23	13577	2.3%
2006/07	7839	5989	5	4	9	23	13870	2.2%
2007/08	8006	6075	5	4	9	24	14123	1.8%
2008/09	8049	6065	5	5	8	22	14154	0.2%
2009/10	7985	5461	6	5	8	20	13485	-4.7%
2010/11	8165	5610	6	5	8	21	13814	2.4%
2011/12	8305	5909	6	5	7	21	14253	3.2%
2012/13	8439	6033	6	5	7	21	14511	1.8%
2013/14	8569	6375	6	5	7	0	14962	3.1%
2014/15	8681	6499	6	5	6	0	15197	1.6%
2015/16	8786	6666	6	5	6	0	15469	1.8%
2016/17	8899	6857	6	5	6	0	15772	2.0%
2017/18	9010	6917	6	5	5	0	15944	1.1%
2018/19	9123	6963	6	5	5	0	16102	1.0%
2019/20	9236	7063	6	5	5	0	16315	1.3%
2020/21	9351	7163	6	5	5	0	16530	1.3%
2021/22	9467	7263	6	5	4	0	16746	1.3%
2022/23	9585	7363	6	5	4	0	16964	1.3%
2023/24	9704	7463	7	5	4	0	17182	1.3%
2024/25	9824	7563	7	5	4	0	17403	1.3%
2025/26	9951	7663	7	5	4	0	17629	1.3%
2026/27	10078	7763	7	5	3	0	17856	1.3%
2027/28	10207	7863	7	5	3	0	18085	1.3%
2028/29	10338	7963	7	5	3	0	18316	1.3%
2029/30	10470	8063	7	5	3	0	18548	1.3%
2030/31	10604	8163	7	5	3	0	18782	1.3%

ELECTRIC VEHICLES

This forecast includes an estimate of the future conversion of vehicles to electricity. This combines both plug-in hybrid electric vehicles (PHEV) which have an electric battery as its primary source of power and a gasoline combustion engine as a secondary source and battery-electric Vehicles (BEV) that are 100% electrically powered.

Due to environmental and economic concerns, many efforts are now being

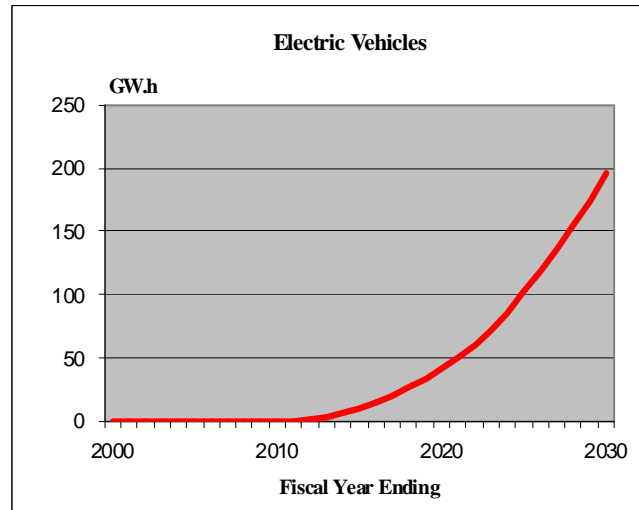
taken to have the automotive industry develop electric car technology as a practical mode of transportation. Adoption is dependant upon the development and cost of the lithium-ion battery technology which determines the range of operation, recharging capabilities, and operating features included in the vehicle.

This forecast assumes the adoption rate specified in the EPRI PRISM Base Case Projected Capacity Growth that is taken from the 2008 EPRI Report 1016853: *Impact of Plug-in Electric Vehicle Technology Diffusion on Electricity Infrastructure*. The adoption rate was adjusted by two years reflecting the effects of the recent recession on the car industry. An average use of 2,477 kW.h per year is assumed, based on 12,000 miles (19,300 km) per vehicle per year, from the same EPRI report.

The forecast is for about 600 electric vehicles (one GW.h) in 2012/13 growing to 17,000 vehicles (42 GW.h) in 2020/21 and reaching 79,000 vehicles (195 GW.h) in 2030/31.

This estimate for electric vehicles is included in the forecast. Two thirds of the forecast load is assumed to be residential and is included in the Residential forecast. The remaining third is assumed to be commercial and is included in the General Service Mass Market forecast as a non-demand load.

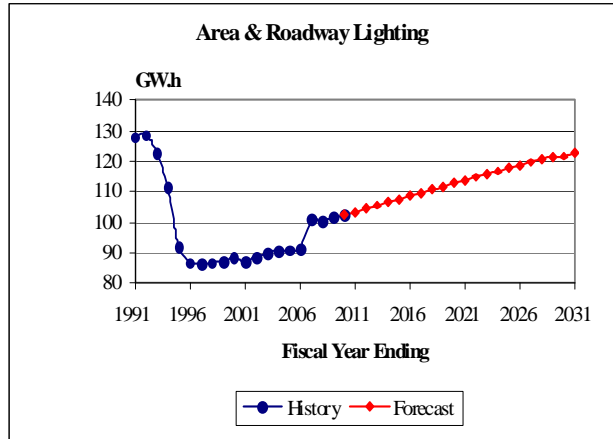
Figure 8



AREA & ROADWAY LIGHTING

The Area and Roadway Lighting sector represents 0.5% of all sales within Manitoba. This sector includes electricity sales for the Sentinel Lighting and Street Lighting rate classes. The Sentinel Lighting classification is an outdoor lighting service where units are available either as rentals to an existing metered service or on an unmetered, flat rate basis. Street Lighting includes all roadway lighting in Manitoba. Energy-efficient street lighting initiatives caused the significant drop in usage in the mid 1990's. In 2006, a readjustment of the rate classes moved some flat rate General Service meters into the Lighting sector.

Figure 9



The Area and Roadway Lighting sector is forecast to increase from 102 GW.h in 2009/10 to 123 GW.h by 2030/31. Total Lighting is forecast to increase by about one GW.h per year.

AREA & ROADWAY LIGHTING (GW.h)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Weather Adjust	Adjusted Sales	Fiscal Year	Forecast Sales
1989/90	128	0	128	2010/11	103
1990/91	128	0	128	2011/12	104
1991/92	129	0	129	2012/13	106
1992/93	123	0	123	2013/14	107
1993/94	111	0	111	2014/15	108
1994/95	92	0	92	2015/16	109
1995/96	87	0	87	2016/17	110
1996/97	86	0	86	2017/18	111
1997/98	87	0	87	2018/19	112
1998/99	87	0	87	2019/20	113
1999/00	89	0	89	2020/21	114
2000/01	87	0	87	2021/22	115
2001/02	89	0	89	2022/23	116
2002/03	90	0	90	2023/24	117
2003/04	91	0	91	2024/25	118
2004/05	91	0	91	2025/26	119
2005/06	91	0	91	2026/27	120
2006/07	101	0	101	2027/28	121
2007/08	101	0	101	2028/29	122
2008/09	102	0	102	2029/30	122
2009/10	102	0	102	2030/31	123

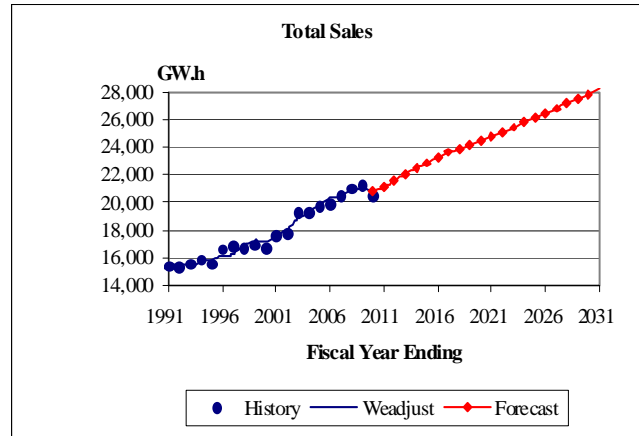
Table 10

AREA AND ROADWAY LIGHTING								
Base Forecast								
1999/00 - 2030/31								
Fiscal Year	Sentinal Flat Rates		Sentinal Rentals		Street Lighting		Total Lighting	
	(Services)	(GW.h)	(Services)	(GW.h)	(Services)	(GW.h)	(Services)	(GW.h)
1999/00	18546	10	5473	0	754	79	24773	89
2000/01	18968	10	5475	0	751	77	25194	87
2001/02	19166	10	5468	0	756	79	25390	89
2002/03	19446	10	5477	0	755	80	25678	90
2003/04	19527	10	5505	0	757	81	25789	91
2004/05	19648	10	5519	0	759	81	25926	91
2005/06	19652	10	7826	0	1014	81	28492	91
2006/07	18669	11	23994	0	2896	90	45559	101
2007/08	18947	11	24272	0	2946	90	46165	101
2008/09	19228	11	24542	0	2988	91	46758	102
2009/10	19539	11	24886	0	3014	91	47439	102
2010/11	19869	11	25246	0	3053	92	48168	103
2011/12	20159	11	25546	0	3093	93	48798	104
2012/13	20449	12	25846	0	3133	94	49428	106
2013/14	20739	12	26146	0	3173	95	50058	107
2014/15	21029	12	26446	0	3213	96	50688	108
2015/16	21319	12	26746	0	3253	97	51318	109
2016/17	21609	12	27046	0	3293	97	51948	110
2017/18	21899	12	27346	0	3333	98	52578	111
2018/19	22189	13	27646	0	3373	99	53208	112
2019/20	22479	13	27946	0	3413	100	53838	113
2020/21	22769	13	28247	0	3453	101	54469	114
2021/22	23059	13	28547	0	3493	102	55099	115
2022/23	23349	13	28847	0	3533	102	55729	116
2023/24	23639	13	29147	0	3573	103	56359	117
2024/25	23929	14	29447	0	3613	104	56989	118
2025/26	24219	14	29747	0	3653	105	57619	119
2026/27	24509	14	30047	0	3693	106	58249	120
2027/28	24799	14	30347	0	3733	106	58879	121
2028/29	25089	14	30647	0	3773	107	59509	122
2029/30	25379	14	30947	0	3791	107	60117	122
2030/31	25669	15	31247	0	3813	108	60729	123

TOTAL SALES (GENERAL CONSUMERS)

The Total Sales category consists of all sales delivered to customers in Manitoba. This category includes the total of all sales from the Residential, General Service and Lighting sectors. The General Service sector makes up about two-thirds, the Residential sector makes up about one-third and the Lighting group is only 0.5% of all sales. The adjacent graph shows that Total Sales have grown steadily over the last twenty years.

Figure 10



The Total Sales category is forecast to increase from a weather adjusted base of 20,794 GW.h in 2009/10 to 28,219 GW.h by 2030/31. This represents an average growth of 353 GW.h or 1.5% per year.

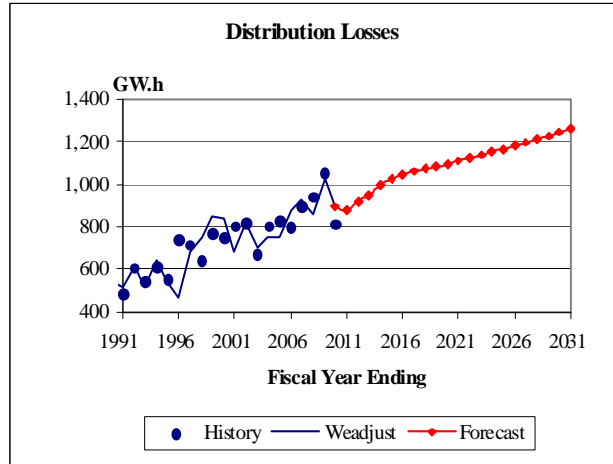
General Consumer Sales is used as the basis for estimating Domestic revenue.

TOTAL SALES (GW.h)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Weather Adjust	Adjusted Sales	Fiscal Year	Forecast Sales
1989/90	15337	-152	15186	2010/11	21085
1990/91	15447	-115	15331	2011/12	21625
1991/92	15397	132	15529	2012/13	21978
1992/93	15577	-70	15507	2013/14	22522
1993/94	15870	-185	15685	2014/15	22850
1994/95	15600	260	15860	2015/16	23218
1995/96	16654	-517	16137	2016/17	23619
1996/97	16851	-591	16260	2017/18	23890
1997/98	16681	167	16848	2018/19	24150
1998/99	16929	341	17269	2019/20	24466
1999/00	16696	498	17194	2020/21	24787
2000/01	17590	-26	17564	2021/22	25112
2001/02	17805	189	17993	2022/23	25439
2002/03	19246	-405	18842	2023/24	25771
2003/04	19280	-8	19272	2024/25	26107
2004/05	19735	63	19799	2025/26	26452
2005/06	19935	376	20311	2026/27	26799
2006/07	20510	-34	20475	2027/28	27150
2007/08	21061	-125	20936	2028/29	27505
2008/09	21210	-194	21017	2029/30	27857
2009/10	20486	308	20794	2030/31	28219

DISTRIBUTION LOSSES

Distribution Losses is made up of the power loss between the distribution substation and the customer’s meter, and also all other differences between what was billed and what was metered.

Figure 11



These losses are the difference between Manitoba Load at Common Bus less Construction and Total Sales less Diesel. Diesel sales are excluded because they are not part of the Integrated System. The losses may vary because Total Sales are

measured on a cycle billing basis. Common Bus is measured on a calendar month basis. Distribution Losses inherently include the error associated with estimated billing (including flat rate estimates), Customer Accounting adjustments, the unbilled consumption of Manitoba Hydro offices, and energy lost through theft.

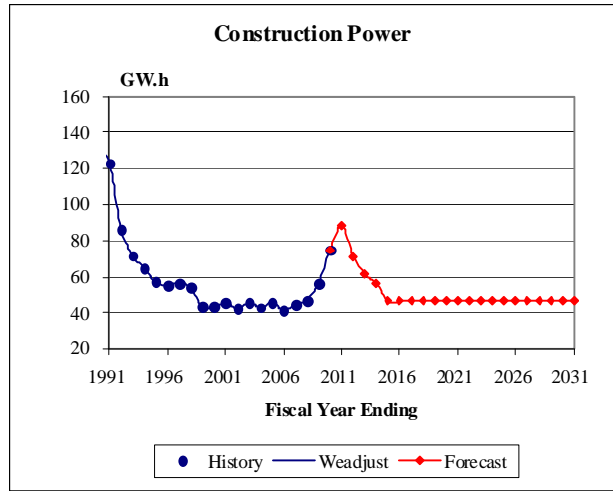
Distribution losses are forecast in 2010/11 to be about 4.2% of the General Consumers less Diesel Sales, growing to about 4.5% by 2030/31.

DISTRIBUTION LOSSES (GW.h)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Losses	Weather Adjust	Adjusted Losses	Fiscal Year	Forecast Losses
1989/90	515	29	544	2010/11	876
1990/91	483	29	512	2011/12	920
1991/92	606	10	616	2012/13	946
1992/93	541	-30	511	2013/14	1000
1993/94	614	32	646	2014/15	1025
1994/95	556	-10	545	2015/16	1042
1995/96	740	-277	463	2016/17	1060
1996/97	715	-38	678	2017/18	1072
1997/98	641	110	751	2018/19	1082
1998/99	771	73	844	2019/20	1096
1999/00	749	93	841	2020/21	1110
2000/01	802	-116	686	2021/22	1124
2001/02	819	4	823	2022/23	1138
2002/03	671	29	700	2023/24	1152
2003/04	804	-51	753	2024/25	1167
2004/05	830	-77	753	2025/26	1182
2005/06	797	84	881	2026/27	1196
2006/07	900	29	930	2027/28	1212
2007/08	940	-79	861	2028/29	1227
2008/09	1052	-27	1024	2029/30	1247
2009/10	813	80	893	2030/31	1262

CONSTRUCTION POWER

The Construction Power category represents the energy used by Manitoba Hydro and its contractors in the construction of major capital works such as generating stations, converter stations and major transmission lines. This category also includes station service until a plant is commissioned. The adjacent graph shows consumption falling after the Limestone development completed in the 90's. The Construction figures include about 40 to 50 GW.h of heating load at the Gillam, Limestone and Kettle town sites.

Figure 12



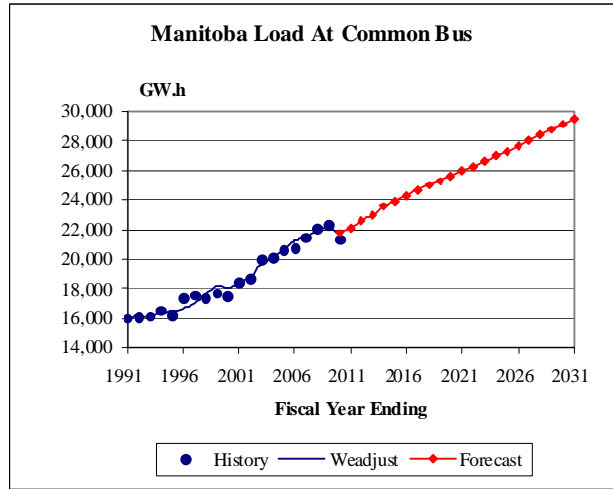
The Construction Power category is forecast to be 48 GW.h per year for the Gillam, Limestone and Kettle town sites. The forecast includes energy consumption estimates for construction of Wuskwatim that is now underway. It does not include construction power estimates for any non-committed sites (e.g. Point Du Bois, Conawapa and Keeyask).

CONSTRUCTION POWER (GW.h)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Usage	Weather Adjust	Adjusted Usage	Fiscal Year	Forecast Usage
1989/90	131	0	131	2010/11	88
1990/91	123	0	123	2011/12	71
1991/92	86	0	86	2012/13	61
1992/93	72	0	72	2013/14	56
1993/94	65	0	65	2014/15	46
1994/95	57	0	57	2015/16	46
1995/96	55	0	55	2016/17	46
1996/97	56	0	56	2017/18	46
1997/98	54	0	54	2018/19	46
1998/99	43	0	43	2019/20	46
1999/00	43	0	43	2020/21	46
2000/01	46	0	46	2021/22	46
2001/02	42	0	42	2022/23	46
2002/03	46	0	46	2023/24	46
2003/04	43	0	43	2024/25	46
2004/05	46	0	46	2025/26	46
2005/06	42	0	42	2026/27	46
2006/07	45	0	45	2027/28	46
2007/08	47	0	47	2028/29	46
2008/09	56	0	56	2029/30	46
2009/10	75	0	75	2030/31	46

MANITOBA LOAD AT COMMON BUS

Manitoba Load at Common Bus represents the total load measured from all the distribution points within Manitoba. This classification includes all sales to Manitoba customers plus associated distribution losses, but excludes diesel customers, transmission losses and station service.

Figure 13



The Manitoba Load at Common Bus category is forecast to increase from a weather adjusted base of 21,749 GW.h in 2009/10 to 29,509 GW.h by 2030/31.

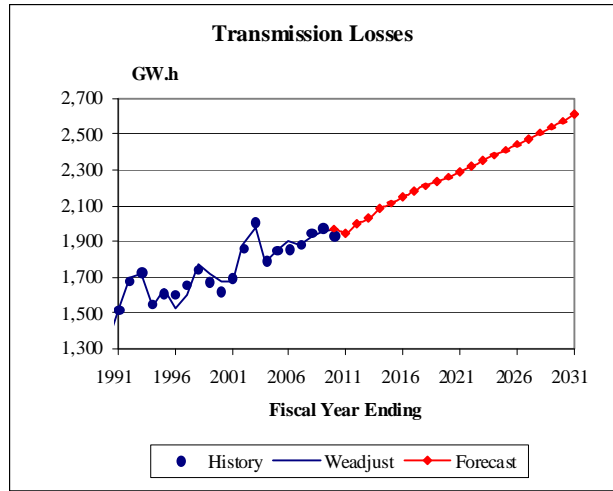
This represents an average growth of 370 GW.h or 1.5% per year.

MANITOBA HYDRO AT COMMON BUS (GW.h)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Energy	Weather Adjust	Adjusted Energy	Fiscal Year	Forecast Energy
1989/90	15964	-123	15841	2010/11	22036
1990/91	16031	-87	15944	2011/12	22602
1991/92	16067	142	16209	2012/13	22972
1992/93	16166	-100	16066	2013/14	23564
1993/94	16523	-153	16370	2014/15	23907
1994/95	16185	250	16435	2015/16	24291
1995/96	17418	-794	16624	2016/17	24711
1996/97	17590	-629	16961	2017/18	24993
1997/98	17350	277	17627	2018/19	25264
1998/99	17722	414	18136	2019/20	25593
1999/00	17479	591	18070	2020/21	25928
2000/01	18428	-142	18286	2021/22	26266
2001/02	18655	192	18847	2022/23	26608
2002/03	19953	-375	19577	2023/24	26954
2003/04	20116	-59	20056	2024/25	27304
2004/05	20600	-14	20586	2025/26	27663
2005/06	20761	460	21221	2026/27	28025
2006/07	21442	-5	21437	2027/28	28392
2007/08	22036	-204	21832	2028/29	28761
2008/09	22305	-221	22084	2029/30	29133
2009/10	21361	388	21749	2030/31	29509

TRANSMISSION LOSSES

Transmission Losses are the amount of energy lost while delivering power from the generation stations to all of the distribution substations that make up Common Bus. This category only contains losses associated with supplying Manitoba customers. Losses attributable to exports and the gains attributable to imports are excluded. Transmission losses are substantial because most of the northern generation is transmitted to southern distribution points 900 kilometers away. Transmission losses vary significantly depending on water conditions, system configuration, outages and the magnitude of the load. Losses were up significantly in 2002/03 due to two High Voltage Direct Current (HVDC) transformer failures.

Figure 14



Transmission Losses are forecast to be about 9.2% of the Manitoba Load at Common Bus on an annual basis.

TRANSMISSION LOSSES (GW.h) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Losses	Weather Adjust	Adjusted Losses	Fiscal Year	Forecast Losses
1989/90	1334	-12	1322	2010/11	1947
1990/91	1522	-9	1513	2011/12	1997
1991/92	1680	14	1695	2012/13	2030
1992/93	1728	-10	1718	2013/14	2083
1993/94	1552	-15	1537	2014/15	2113
1994/95	1609	25	1634	2015/16	2147
1995/96	1606	-79	1527	2016/17	2184
1996/97	1660	-63	1597	2017/18	2209
1997/98	1745	28	1773	2018/19	2233
1998/99	1675	41	1717	2019/20	2262
1999/00	1623	59	1682	2020/21	2292
2000/01	1696	-14	1681	2021/22	2322
2001/02	1864	19	1884	2022/23	2352
2002/03	2012	-38	1974	2023/24	2382
2003/04	1792	-6	1786	2024/25	2413
2004/05	1852	-1	1850	2025/26	2445
2005/06	1860	46	1906	2026/27	2477
2006/07	1885	0	1884	2027/28	2509
2007/08	1949	-20	1928	2028/29	2542
2008/09	1979	-22	1957	2029/30	2575
2009/10	1934	39	1973	2030/31	2608

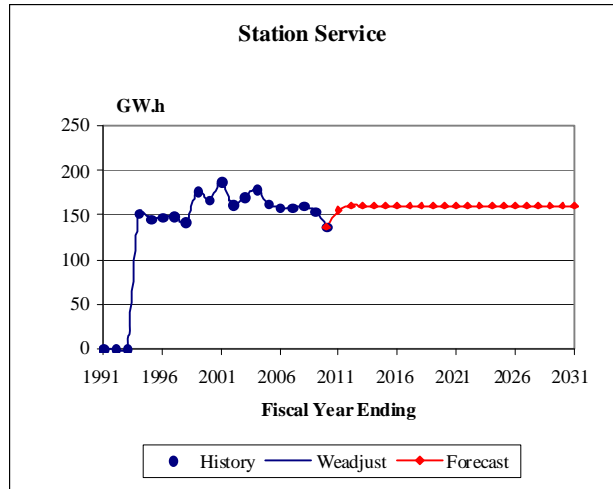
Table 11

MONTHLY TRANSMISSION LOSSES (GW.h)													
Base Forecast													
2010/11 - 2030/31													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2009/10 Actual	146	148	147	152	152	143	161	158	200	200	173	155	1934
2010/11	152	152	143	156	157	147	164	173	182	189	162	169	1947
2011/12	156	156	147	160	162	151	168	177	187	194	166	174	1997
2012/13	158	158	149	163	164	154	171	180	190	197	169	176	2030
2013/14	162	163	153	168	169	158	175	185	194	202	173	181	2083
2014/15	165	165	156	170	172	160	178	188	197	204	175	183	2113
2015/16	167	168	158	173	174	163	181	190	200	208	178	186	2147
2016/17	170	171	161	176	178	166	184	194	203	211	181	189	2184
2017/18	172	173	163	178	180	168	186	196	206	213	183	192	2209
2018/19	174	175	165	180	181	169	188	198	208	216	185	194	2233
2019/20	176	177	167	182	184	172	191	201	211	219	188	196	2262
2020/21	179	179	169	185	186	174	193	203	213	221	190	199	2292
2021/22	181	181	171	187	189	176	196	206	216	224	193	201	2322
2022/23	183	184	173	189	191	178	198	209	219	227	195	204	2352
2023/24	186	186	176	192	194	181	201	211	222	230	198	207	2382
2024/25	188	189	178	194	196	183	204	214	225	233	200	209	2413
2025/26	191	191	180	197	199	186	206	217	228	236	203	212	2445
2026/27	193	194	183	200	201	188	209	220	231	239	205	215	2477
2027/28	196	196	185	202	204	190	212	223	234	242	208	218	2509
2028/29	198	199	187	205	207	193	214	225	237	246	211	220	2542
2029/30	201	201	190	207	209	195	217	228	240	249	213	223	2575
2030/31	203	204	192	210	212	198	220	231	243	252	216	226	2608

STATION SERVICE

The Station Service category measures the energy used by power plants to generate power and service their own load. Energy and peak estimates can either include or exclude station service, depending on the purpose for which they are to be used. In this document, “Net” numbers exclude station service and “Gross” numbers include station service. This is explained in the Glossary of Terms. Station Service energy was not measured prior to 1993/94 but was then included in the Transmission Losses category.

Figure 15



Station Service energy is forecast to be 155 GW.h in 2010/11 and 161 GW.h from 2011/12 and on, when the Wuskwatim generating station has its full contribution. Station Service for non-committed sites (e.g. Point Du Bois, Conawapa and Keeyask) are not included in the forecast.

STATION SERVICE (GW.h)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Usage	Weather Adjust	Adjusted Usage	Fiscal Year	Forecast Usage
1989/90	0	0	0	2010/11	155
1990/91	0	0	0	2011/12	161
1991/92	0	0	0	2012/13	161
1992/93	0	0	0	2013/14	161
1993/94	152	0	152	2014/15	161
1994/95	146	0	146	2015/16	161
1995/96	148	0	148	2016/17	161
1996/97	148	0	148	2017/18	161
1997/98	142	0	142	2018/19	161
1998/99	177	0	177	2019/20	161
1999/00	167	0	167	2020/21	161
2000/01	187	0	187	2021/22	161
2001/02	162	0	162	2022/23	161
2002/03	170	0	170	2023/24	161
2003/04	179	0	179	2024/25	161
2004/05	163	0	163	2025/26	161
2005/06	158	0	158	2026/27	161
2006/07	159	0	159	2027/28	161
2007/08	161	0	161	2028/29	161
2008/09	154	0	154	2029/30	161
2009/10	137	0	137	2030/31	161

Table 12

MONTHLY STATION SERVICE ENERGY (GW.h)													
Base Forecast													
2010/11 - 2030/31													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2009/10 Actual	11.8	10.3	7.9	7.2	7.4	7.2	10.8	14.2	18.8	15.5	13.3	12.7	137.1
2009/10 - 2010/11	13.3	10.1	8.6	9.2	9.3	8.0	11.3	15.7	18.5	18.5	16.0	16.3	154.8
2011/12 - 2029/30	13.8	10.5	8.9	9.5	9.6	8.3	11.7	16.3	19.2	19.2	16.6	16.9	160.5

Table 13

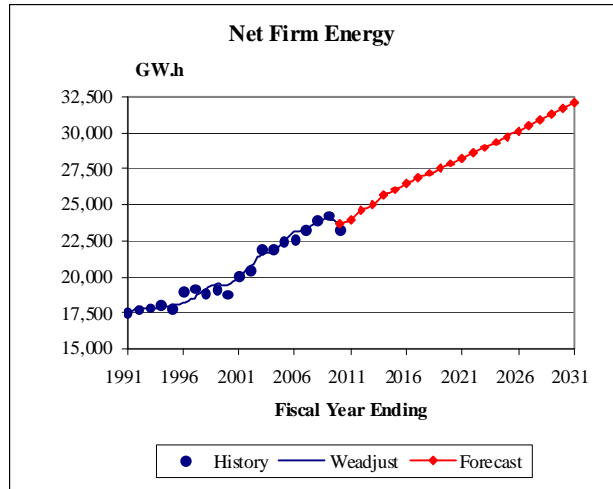
MONTHLY STATION SERVICE PEAK (MW)													
Base Forecast													
2010/11 - 2030/31													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
2009/10 Actual	22	15	10	12	11	10	16	28	34	25	23	23	34
2010/11 - 2011/12	22	15	13	17	14	12	17	26	30	27	30	26	30
2012/13 - 2030/31	23	16	13	18	15	12	18	27	31	28	31	27	31

NET FIRM ENERGY

The Net Firm Energy category includes all electricity that is generated to meet the firm energy requirements of all customers within Manitoba except for station service. It excludes interruptible (non-firm) loads. It is sometimes referred to as Manitoba Load or Domestic Load and is the value quoted in Manitoba Hydro's Annual Report.

Net Firm Energy has grown steadily during the past twenty years, except for the economic slowdown in the early 1990's and more recently in 2009.

Figure 16



The Net Firm Energy category is forecast to increase from a weather adjusted base of 23,690 GW.h in 2009/10 to 32,117 GW.h by 2030/31. This represents an average growth of 401 GW.h or 1.5% per year.

NET FIRM ENERGY (GW.h)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Energy	Weather Adjust	Adjusted Energy	Fiscal Year	Forecast Energy
1989/90	17298	-131	17167	2010/11	23962
1990/91	17553	-92	17461	2011/12	24579
1991/92	17748	153	17901	2012/13	24981
1992/93	17894	-115	17779	2013/14	25647
1993/94	18048	-197	17852	2014/15	26020
1994/95	17784	261	18044	2015/16	26438
1995/96	19000	-834	18166	2016/17	26895
1996/97	19173	-654	18518	2017/18	27202
1997/98	18872	285	19157	2018/19	27496
1998/99	19095	426	19521	2019/20	27856
1999/00	18804	629	19433	2020/21	28220
2000/01	20075	-149	19925	2021/22	28588
2001/02	20494	203	20697	2022/23	28960
2002/03	21940	-400	21540	2023/24	29336
2003/04	21890	-72	21818	2024/25	29718
2004/05	22426	6	22432	2025/26	30109
2005/06	22598	485	23084	2026/27	30502
2006/07	23305	-14	23291	2027/28	30901
2007/08	23961	-214	23747	2028/29	31303
2008/09	24262	-226	24036	2029/30	31708
2009/10	23275	416	23690	2030/31	32117

Table 14

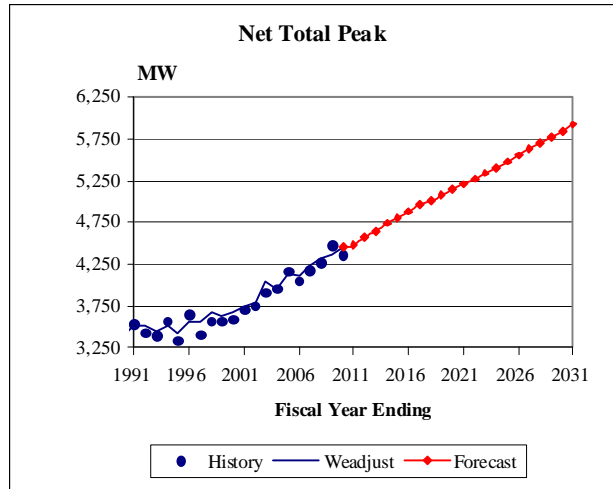
MONTHLY NET FIRM ENERGY (GW.h)													
Base Forecast													
2010/11 - 2030/31													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2009/10 Actual	1849	1733	1663	1660	1637	1665	1877	1921	2541	2509	2200	2020	23275
2010/11	1891	1793	1672	1749	1733	1680	1889	2138	2431	2537	2219	2230	23962
2011/12	1941	1842	1718	1797	1781	1726	1940	2192	2489	2597	2272	2285	24579
2012/13	1973	1872	1747	1826	1810	1755	1972	2227	2528	2638	2309	2322	24981
2013/14	2027	1925	1796	1877	1861	1804	2027	2285	2591	2703	2366	2382	25647
2014/15	2057	1954	1823	1905	1889	1831	2057	2318	2628	2742	2400	2417	26020
2015/16	2090	1986	1853	1937	1920	1862	2091	2355	2668	2784	2437	2455	26438
2016/17	2127	2022	1886	1971	1955	1895	2128	2395	2712	2830	2477	2496	26895
2017/18	2151	2044	1907	1994	1977	1917	2152	2422	2744	2863	2506	2525	27202
2018/19	2174	2066	1928	2015	1997	1937	2175	2449	2775	2895	2534	2553	27496
2019/20	2203	2093	1953	2041	2024	1962	2203	2481	2811	2932	2567	2586	27856
2020/21	2232	2121	1979	2068	2050	1988	2232	2513	2847	2970	2600	2620	28220
2021/22	2261	2148	2004	2095	2077	2014	2261	2546	2884	3009	2634	2654	28588
2022/23	2290	2176	2031	2122	2104	2040	2291	2579	2921	3048	2668	2688	28960
2023/24	2320	2205	2057	2150	2132	2067	2321	2612	2959	3087	2703	2723	29336
2024/25	2350	2234	2084	2178	2160	2094	2351	2646	2998	3127	2738	2758	29718
2025/26	2381	2263	2111	2207	2188	2122	2382	2681	3037	3168	2774	2795	30109
2026/27	2412	2293	2139	2236	2217	2149	2413	2716	3077	3210	2810	2831	30502
2027/28	2444	2323	2167	2265	2246	2177	2444	2752	3117	3252	2847	2868	30901
2028/29	2475	2353	2196	2295	2275	2206	2476	2787	3157	3294	2884	2905	31303
2029/30	2507	2383	2224	2325	2305	2234	2508	2823	3198	3336	2921	2943	31708
2030/31	2540	2414	2253	2355	2335	2263	2540	2860	3239	3379	2959	2981	32117

- Net Firm Energy excludes station service (Net) and excludes Interruptible Energy (Firm)

NET TOTAL PEAK

The Net Total Peak is defined to be the maximum integrated hourly load at generation adjusted for losses associated with exports or imports, less station service, but with curtailed loads added back in. The term "integrated" indicates the average load during that peak hour is used.

Figure 17



Typically, the peak occurs on a weekday that is one of the coldest days of the year, either in the morning, often from 8 a.m. to 9 a.m., or in the afternoon, often from 5 p.m. to 6 p.m. Electric space heating contributes by placing the peak on one of the coldest days, whereas the operation or lack thereof of large industrials often makes the difference as to the specific day of the peak.

The Net Total Peak is forecast to increase from a weather adjusted base of 4,462 MW in 2009/10 to 5,921 MW by 2030/31. This is a growth of 69 MW or 1.4% per year.

NET TOTAL PEAK (MW)					
HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Peak	Weather Adjust	Adjusted Peak	Fiscal Year	Forecast Peak
1989/90	3611	-218	3393	2010/11	4476
1990/91	3542	-30	3512	2011/12	4574
1991/92	3435	78	3513	2012/13	4646
1992/93	3404	50	3454	2013/14	4745
1993/94	3567	-51	3516	2014/15	4811
1994/95	3342	85	3427	2015/16	4882
1995/96	3649	-81	3568	2016/17	4959
1996/97	3408	145	3553	2017/18	5017
1997/98	3573	101	3674	2018/19	5075
1998/99	3572	58	3630	2019/20	5140
1999/00	3588	94	3682	2020/21	5207
2000/01	3706	49	3755	2021/22	5274
2001/02	3759	40	3799	2022/23	5342
2002/03	3915	124	4039	2023/24	5411
2003/04	3958	2	3960	2024/25	5480
2004/05	4169	-40	4129	2025/26	5552
2005/06	4054	64	4118	2026/27	5624
2006/07	4183	41	4224	2027/28	5697
2007/08	4273	39	4312	2028/29	5771
2008/09	4477	-101	4376	2029/30	5846
2009/10	4359	103	4462	2030/31	5921

Table 15

MONTHLY NET TOTAL PEAK (MW)													
Base Forecast													
2010/11 - 2030/31													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2009/10	3174	2919	2990	2747	2922	2972	3038	3269	4359	4231	4069	4212	4359
Actual													
2010/11	3382	3066	2969	2980	3012	2808	2970	3855	4277	4434	4242	3915	4476
2011/12	3464	3143	3042	3055	3089	2880	3045	3942	4371	4531	4336	4004	4574
2012/13	3520	3195	3091	3103	3139	2927	3095	4004	4438	4603	4405	4068	4646
2013/14	3604	3275	3167	3181	3219	3002	3174	4093	4533	4701	4500	4159	4745
2014/15	3655	3322	3212	3226	3266	3045	3220	4150	4595	4766	4563	4218	4811
2015/16	3712	3375	3263	3277	3318	3093	3272	4213	4663	4837	4631	4282	4882
2016/17	3773	3433	3318	3333	3375	3147	3328	4280	4736	4912	4704	4350	4959
2017/18	3817	3472	3356	3371	3413	3182	3366	4330	4792	4970	4760	4401	5017
2018/19	3860	3510	3393	3408	3450	3217	3402	4379	4847	5028	4814	4451	5075
2019/20	3910	3556	3437	3452	3495	3259	3447	4436	4910	5092	4876	4509	5140
2020/21	3961	3602	3482	3497	3541	3301	3492	4494	4973	5158	4939	4567	5207
2021/22	4012	3649	3527	3543	3587	3345	3537	4552	5038	5225	5003	4626	5274
2022/23	4064	3696	3573	3589	3634	3388	3583	4611	5103	5292	5067	4686	5342
2023/24	4116	3744	3620	3636	3681	3433	3629	4671	5169	5360	5133	4746	5411
2024/25	4170	3793	3668	3684	3730	3478	3676	4731	5236	5429	5199	4808	5480
2025/26	4224	3842	3717	3733	3779	3524	3725	4794	5305	5500	5267	4870	5552
2026/27	4279	3892	3766	3783	3829	3570	3773	4856	5374	5572	5335	4934	5624
2027/28	4335	3943	3816	3833	3880	3618	3822	4920	5445	5644	5405	4998	5697
2028/29	4391	3994	3867	3884	3931	3665	3872	4984	5516	5717	5475	5063	5771
2029/30	4448	4046	3918	3935	3983	3713	3922	5049	5588	5791	5545	5128	5846
2030/31	4505	4098	3969	3987	4035	3762	3972	5115	5660	5865	5616	5194	5921

- Net Total Peak excludes station service (Net) and adds back in estimates of Curtailable Loads (Total)

Table 16

HISTORICAL NET FIRM ENERGY, NET TOTAL PEAK AND LOAD FACTOR							
Fiscal Year	Net Firm Energy (GW.h)			Net Total Peak (MW)			W.A. Load Factor
	Actual	Weather Adjust	W.A. Actual	Actual	Weather Adjust	W.A. Actual	
1975/76	11432	0	11432	2202	0	2202	59.3%
1976/77	11768	0	11768	2350	0	2350	57.2%
1977/78	11962	0	11962	2446	0	2446	55.8%
1978/79	12483	-423	12060	2405	0	2405	57.2%
1979/80	12797	-253	12544	2465	0	2465	58.1%
1980/81	12529	226	12755	2536	0	2536	57.4%
1981/82	13527	-70	13457	2713	48	2761	55.6%
1982/83	13260	212	13471	2494	134	2628	58.5%
1983/84	14387	-176	14211	2875	28	2903	55.9%
1984/85	15014	-104	14909	2974	8	2982	57.1%
1985/86	15366	-130	15236	2945	116	3061	56.8%
1986/87	15495	345	15840	3003	117	3120	58.0%
1987/88	16260	319	16579	3326	-16	3310	57.2%
1988/89	17108	-314	16793	3403	-16	3387	56.6%
1989/90	17298	-131	17167	3611	-218	3393	57.8%
1990/91	17553	-92	17461	3542	-30	3512	56.8%
1991/92	17748	153	17901	3435	78	3513	58.2%
1992/93	17894	-115	17779	3404	50	3454	58.8%
1993/94	18048	-197	17852	3567	-51	3516	58.0%
1994/95	17784	261	18044	3342	85	3427	60.1%
1995/96	19000	-834	18166	3649	-81	3568	58.1%
1996/97	19173	-654	18518	3408	145	3553	59.5%
1997/98	18872	285	19157	3573	101	3674	59.5%
1998/99	19095	426	19521	3572	58	3630	61.4%
1999/00	18804	629	19433	3588	94	3682	60.2%
2000/01	20075	-149	19925	3706	49	3755	60.6%
2001/02	20494	203	20697	3759	40	3799	62.2%
2002/03	21940	-400	21540	3915	124	4039	60.9%
2003/04	21890	-72	21818	3958	2	3960	62.9%
2004/05	22426	6	22432	4169	-40	4129	62.0%
2005/06	22598	485	23084	4054	64	4118	64.0%
2006/07	23305	-14	23291	4183	41	4224	62.9%
2007/08	23961	-214	23747	4273	39	4312	62.9%
2008/09	24262	-226	24036	4477	-101	4376	62.7%
2009/10	23275	416	23690	4359	103	4462	60.6%

- Net Firm Energy excludes station service (Net) and excludes Interruptible Energy (Firm)
- Net Total Peak excludes station service (Net) and adds back in estimates of Curtailable Loads (Total)

POTENTIAL LOADS

This section outlines specific situations that if realized may cause a significant impact to Manitoba Hydro's load forecast. This section is not intended to be comprehensive, but simply demonstrate the potential magnitude and severity of these cases.

Four potential loads are presented in order of severity, from lowest to highest:

1. Influx of Server Farms
2. High Adoption of Electric Vehicle Technology
3. Confidence of Low Rates by Industrial Customers
4. Cost of Heating Electrically Less than Gas

Influx of Server Farms

A server farm, also called a data center or web farm, is a collection of computer servers which provide data services for a network of computers or a supercomputer. Server farms are typically co-located with network switches or routers which enable communication between the different parts of the cluster. The computers, routers, power supplies, and related electronics are typically mounted on 19-inch racks located in an air conditioned server room.

The size of server farms can be immense. In 2006, Google constructed a two-building complex on 30 acres of land next to the John Day Dam on the Columbia River in Oregon. These large server farms can consume significant amounts of energy exceeding 100 MW.

To date, there are no server farms operating in Manitoba. However, if a modest size server farm consisting of 50,000 servers was built, a load of 15 MW would be anticipated. This would make it about the size of our 12th largest customer. Typical server farms consume 20 to 30 MW of power and employ 50 to 200 staff to maintain their operation.

Manitoba is an unlikely place for server farms due to its relative distance from network hubs. Should server farms situate here, they will most likely be gas heated and thus be a summer peaking facility due to air-conditioning load.

High Adoption of Electric Vehicle Technology

This forecast already assumes there will be a noticeable impact due to adoption of electric vehicles within Manitoba over the next twenty years. The specifics have been detailed in the Electric Vehicles section of this document.

But there is a possibility that the current technological challenges will be solved. The U.S. Government is committed to fund and support the technology as a means to help reduce the nation's dependence on oil. Should breakthroughs and advances in battery technology happen in the next few years, it is possible that electric vehicles may grow to be the dominant vehicle. Under this assumption, electric vehicles may grow to be 70% of the market share in 40 years.

The Emerging Energy Systems section at Manitoba Hydro has studied electric vehicle potential. Shown here is the difference from their potential load with a high adoption rate to the electric vehicle load already included in the forecast.

Additional Load	10 years	20 years	30 years	40 years
Energy	50 GW.h	600 GW.h	1100 GW.h	1200 GW.h
System Peak	6 MW	72 MW	132 MW	144 MW

Confidence of Low Rates by Industrial Customers

In recent years, the prices offered to our large industrial customers have been among the lowest in North America. This has attracted energy intensive companies to Manitoba, especially where electricity is a large part of their operating costs.

Manitoba Hydro has proposed an Energy Intensive Industrial Rate and submitted the application to the Public Utilities Board. The proposal of such a rate has shown Manitoba Hydro's intention to increase marginal industrial rates, and has changed the confidence level of future rates. As long as Manitoba Hydro is taking measures to charge marginal costs for new and expanding loads, large energy intensive customers may be more cautious with their expansion plans. The Base Load Forecast assumes that Manitoba Hydro will continue to take these measures.

If these measures stop, and large industrial customers regain their confidence that Manitoba Hydro would be offering them lower than market rates for the long term, it is likely that they will expand and that new customers will arrive. This scenario could result in the equivalent of a major chemical company every ten years.

Shown below are the additional load implications if this scenario should occur:

Additional Load	10 years	20 years	30 years	40 years
Energy	1500 GW.h	3000 GW.h	4500 GW.h	6000 GW.h
System Peak	200 MW	400 MW	600 MW	800 MW

Most Top Consumers have a very high load factor, and their system peak contribution will be somewhat less significant than their energy, as shown.

Cost of Heating Electrically Less than Gas

Manitoba Hydro's Energy Price Outlook forecasts that natural gas will maintain its price advantage over the forecast period. As long as that happens, Manitoba Hydro does not anticipate a major shift from gas heat to electric heat and the forecast in this document remains valid.

However, due to the nature of natural gas being a commodity whose prices are market-driven, there is a possibility that natural gas prices could rise above the cost of electricity prices. Should this happen, and should the market perceive that this will continue for the long term, it is reasonable to assume that the majority of gas heated homes would replace their gas furnaces with electric furnaces over time.

Shown below are the estimated additional load implications if this potential load should occur:

Additional Load	10 years	20 years	30 years	40 years
Energy	3000 GW.h	6000 GW.h	8000 GW.h	9000 GW.h
System Peak	1000 MW	2000 MW	2667 MW	3000 MW

Electric heat has a very low load factor, and will peak on the coldest day when the Manitoba system peak occurs. Thus the peak contribution would be extreme.

However, should natural gas prices start to rise to make gas heat more expensive than electric in Manitoba, it would be expected that some intervention would take place. Also, the price of electricity in the United States is closely tied to natural gas prices since so much of their electric power is generated from gas turbines. So a rise in natural gas prices would likely be accompanied by a rise in electric prices which would help natural gas maintain its price advantage for space heating.

LOAD FORECAST VARIABILITY

The forecast given in this document is assumed to be the best guess of what is likely to happen. It was produced with the expectation that there is a 50% chance that the actuals will be higher than forecast, and a 50% chance that the actuals will be lower than forecast.

Manitoba Hydro has in the past studied various scenarios, and often looks to High and Low load growth as part of those scenarios. This section presents a probability-based estimate of how much the future actual loads might vary from the forecast loads.

The historical annual variation in weather adjusted load was analyzed to produce an estimate of the standard deviation and correlation coefficient of past load growth. These were then applied to the base 50% forecast to give a probability-based estimate of the width of the energy and peak confidence bands.

90% and 10% confidence bands were selected to be a proxy for the High and Low Load Forecast Scenarios for use in risk analysis studies.

If probability points other than 90% or 10% are required, they can be easily calculated as follows:

$$\text{Load} = \text{Base Fcst} + Z(\text{probability}) \times \text{Standard Deviation}$$

Where $Z(\text{probability})$ = the number of standard deviations for that probability on a normal distribution. Here are some example points:

Prob	0.1%	2.5%	10%	20%	50%	80%	90%	97.5%	99.9%
Z(Prob)	-3.09	-1.96	-1.28	-0.84	0.00	0.84	1.28	1.96	3.09

Additional points can be found from a standard Normal distribution table, or by using the Excel NORMINV function with a mean of 0 and standard deviation of 1.

Note that weather variation has been removed during the analysis by using weather adjusted numbers. So these calculations do not include additional variation due to weather. The standard deviation of annual energy or annual peak due to weather is approximately 2% of the load, and is independent of the economic-based variability.

Figure 18

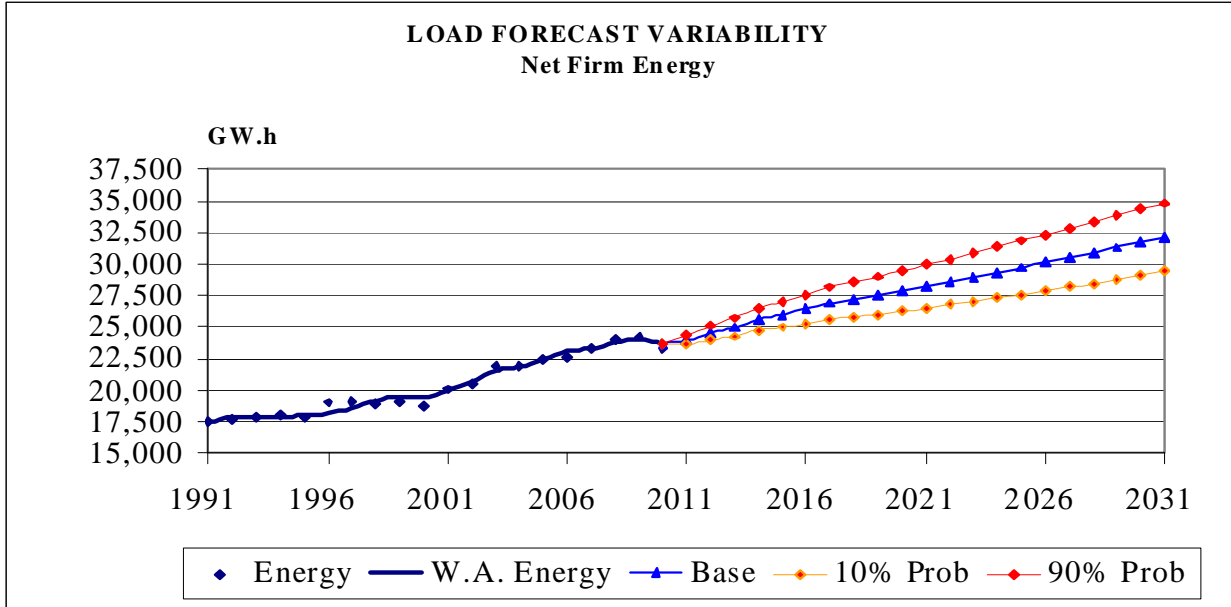


Table 17

Fiscal Year	Net Total Firm Base Fcst	Econ and Model Std Dev	10.0% Prob Point	90.0% Prob Point
2010/11	23962	287	23594	24330
2011/12	24579	443	24011	25146
2012/13	24981	571	24249	25713
2013/14	25647	686	24768	26526
2014/15	26020	792	25005	27035
2015/16	26438	892	25295	27581
2016/17	26895	987	25629	28160
2017/18	27202	1079	25819	28585
2018/19	27496	1168	26000	28993
2019/20	27856	1254	26248	29463
2020/21	28220	1338	26505	29935
2021/22	28588	1421	26767	30409
2022/23	28960	1502	27035	30884
2023/24	29336	1581	27309	31362
2024/25	29718	1660	27591	31845
2025/26	30109	1737	27883	32334
2026/27	30502	1813	28179	32826
2027/28	30901	1889	28481	33321
2028/29	31303	1963	28787	33819
2029/30	31708	2037	29098	34319
2030/31	32117	2110	29413	34821

Figure 19

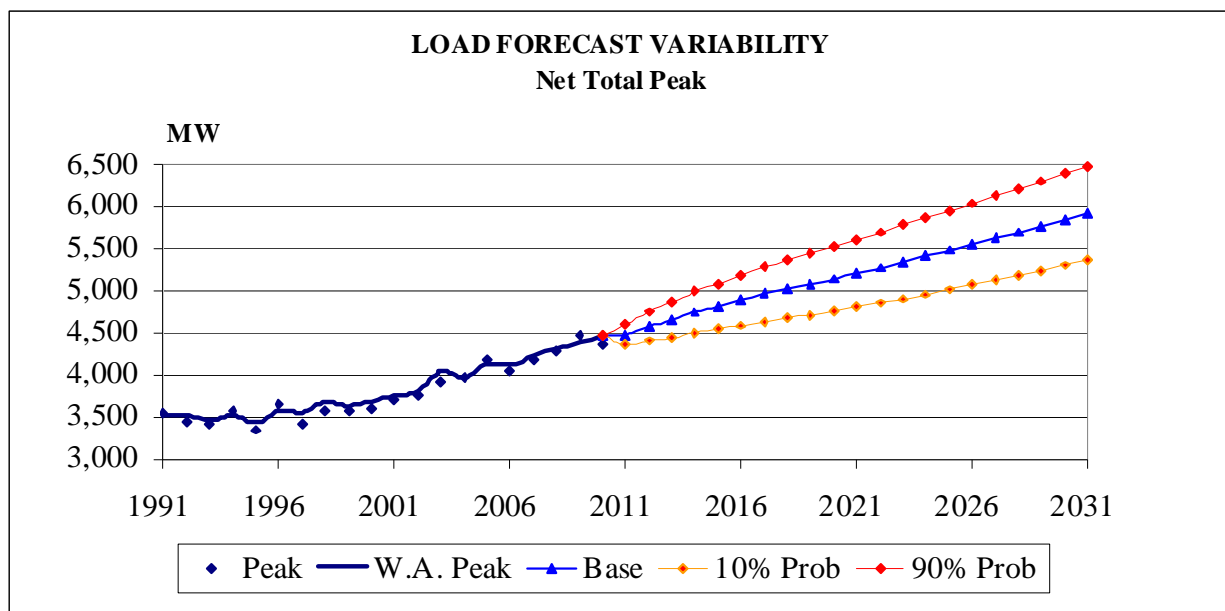


Table 18

Fiscal Year	Net Total Peak Base Fcst	Econ and Model Std Dev	10.0% Prob Point	90.0% Prob Point
2010/11	4476	95	4355	4597
2011/12	4574	134	4402	4746
2012/13	4646	164	4436	4856
2013/14	4745	189	4502	4988
2014/15	4811	212	4540	5082
2015/16	4882	232	4585	5180
2016/17	4959	251	4637	5280
2017/18	5017	268	4674	5361
2018/19	5075	284	4711	5439
2019/20	5140	300	4757	5524
2020/21	5207	314	4804	5609
2021/22	5274	328	4853	5694
2022/23	5342	342	4904	5779
2023/24	5411	354	4956	5865
2024/25	5480	367	5010	5951
2025/26	5552	379	5066	6038
2026/27	5624	391	5124	6125
2027/28	5697	402	5182	6212
2028/29	5771	413	5242	6300
2029/30	5846	424	5303	6388
2030/31	5921	434	5364	6477

FORECAST ACCURACY

Comparing previous load forecast to actual results has been complicated by changes in utility operations and reporting. Five major changes have occurred since 1990. Each of these changes will be discussed briefly.

1) Interruptible (Non-Firm) Sales - Since 1991/92, Manitoba Hydro has offered interruptible rates to its customers. These rates have created a distinction between firm and non-firm sales, which affect the calculation of Net Firm Energy because non-firm sales are excluded.

2) Demand Side Management - Since 1992/93, Manitoba Hydro has included Demand Side Management (DSM) as a supply side resource in the determination of System Capability and Energy Requirement. The load forecast contains DSM associated with the Basic Customer Information and Service option. The forecast includes savings from end use efficiency improvements and other base DSM programs. It does not include incentive-based DSM programs. These are reviewed as a supply-side resource that can be ramped up or down dependant on future need.

3) Curtailable Rates - Since 1993/94, Manitoba Hydro has offered a curtailable rate program to its customers. These rates affect the actual peak load experienced because customers are usually curtailed at the time of peak. When calculating the Net Total Peak for this report, the curtailments are added back to create a consistent hourly integrated load profile.

4) Station Service - Since 1993/94, transmission losses and station service have been metered separately at the generation stations. Previously, transmission losses and station service were indistinguishable and recorded under transmission losses. The separation of transmission losses and station service affect the calculation of Net Firm Energy because station service losses are excluded.

5) Peak Definition - Since 1993/94, Manitoba Hydro has defined the system peak as an hourly integrated value. Previously, the peak was recorded as an instantaneous or one minute peak.

Depending on when the forecast was created, adjustments have been made to the forecast energy and peak values to account for these variances. This will present a more meaningful analysis of the long-term forecast accuracy.

Figure 20

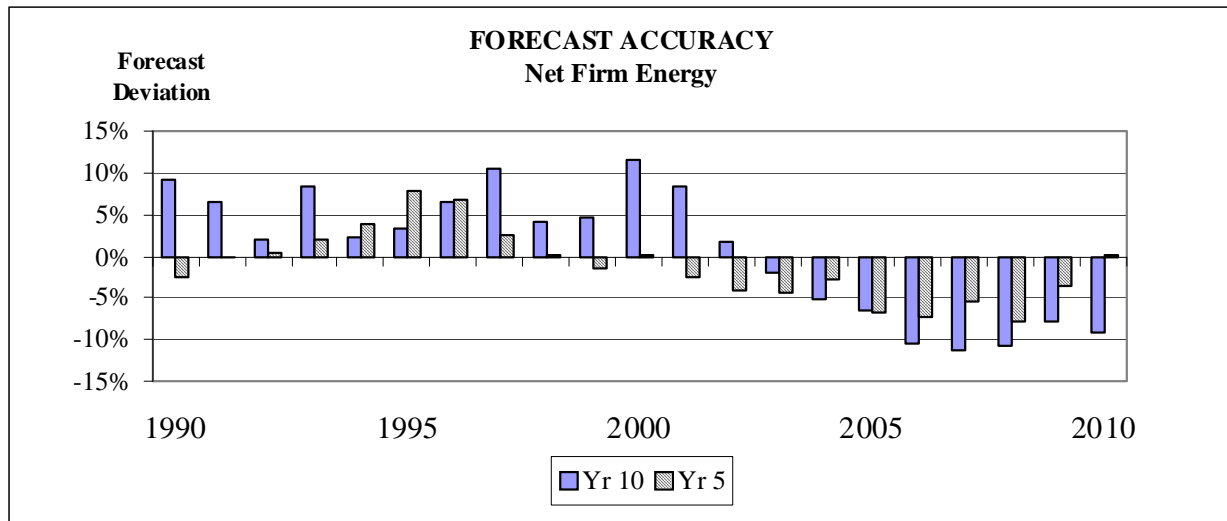


Table 19

Fiscal Year	Forecast Prepared 10 Years Previous	Forecast Prepared 5 Years Previous	Actual Net Firm Energy	Weather Adjustment	W.A. Net Firm Energy	10 Year Percent Deviation	5 Year Percent Deviation
1989/90	18751	16753	17298	-131	17167	9.2%	-2.4%
1990/91	18585	17451	17553	-92	17461	6.4%	-0.1%
1991/92	18254	17994	17748	153	17901	2.0%	0.5%
1992/93	19280	18135	17894	-115	17779	8.4%	2.0%
1993/94	18253	18533	18048	-197	17852	2.2%	3.8%
1994/95	18674	19440	17784	261	18044	3.5%	7.7%
1995/96	19357	19400	19000	-834	18166	6.6%	6.8%
1996/97	20450	18985	19173	-654	18518	10.4%	2.5%
1997/98	19970	19199	18872	285	19157	4.2%	0.2%
1998/99	20452	19258	19095	426	19521	4.8%	-1.3%
1999/00	21696	19476	18804	629	19433	11.6%	0.2%
2000/01	21611	19453	20075	-149	19925	8.5%	-2.4%
2001/02	21083	19858	20494	203	20697	1.9%	-4.1%
2002/03	21146	20622	21940	-400	21540	-1.8%	-4.3%
2003/04	20702	21231	21890	-72	21818	-5.1%	-2.7%
2004/05	20975	20919	22426	6	22432	-6.5%	-6.7%
2005/06	20694	21384	22598	485	23084	-10.4%	-7.4%
2006/07	20644	22015	23305	-14	23291	-11.4%	-5.5%
2007/08	21227	21918	23961	-214	23747	-10.6%	-7.7%
2008/09	22154	23169	24262	-226	24036	-7.8%	-3.6%
2009/10	21532	23727	23275	416	23690	-9.1%	0.2%

Figure 21

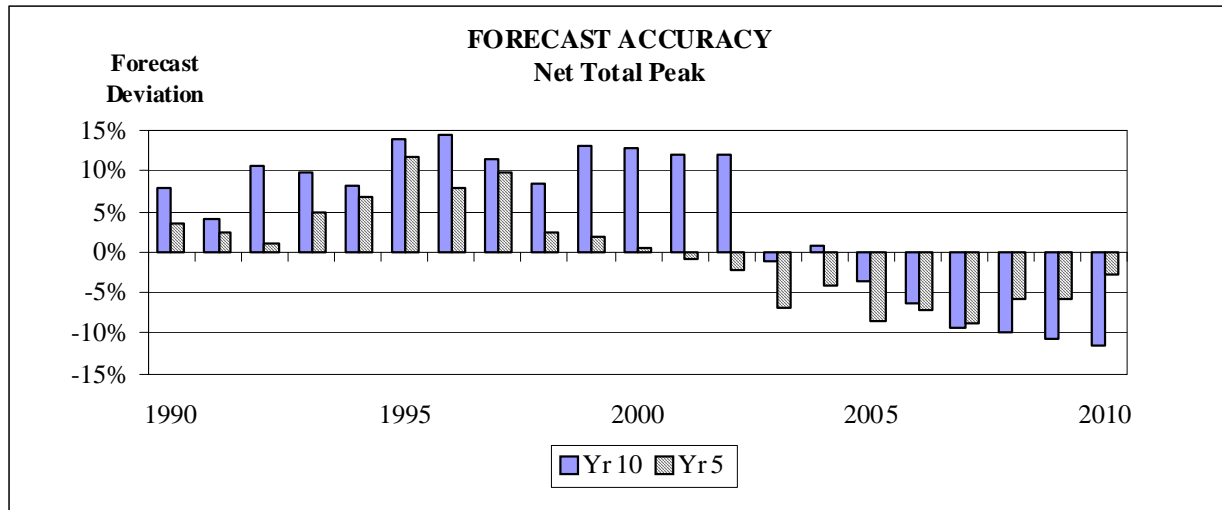


Table 20

Fiscal Year	Forecast Prepared 10 Years Previous	Forecast Prepared 5 Years Previous	Actual Net Total Peak	Weather Adjustment	W.A. Net Total Peak	10 Year Percent Deviation	5 Year Percent Deviation
1989/90	3659	3515	3611	-218	3393	7.8%	3.6%
1990/91	3652	3603	3542	-30	3512	4.0%	2.6%
1991/92	3892	3553	3435	78	3513	10.8%	1.1%
1992/93	3799	3621	3404	50	3454	10.0%	4.8%
1993/94	3799	3754	3567	-51	3516	8.1%	6.8%
1994/95	3904	3829	3342	85	3427	13.9%	11.7%
1995/96	4081	3850	3649	-81	3568	14.4%	7.9%
1996/97	3962	3906	3408	145	3553	11.5%	9.9%
1997/98	3990	3768	3573	101	3674	8.6%	2.5%
1998/99	4108	3703	3572	58	3630	13.2%	2.0%
1999/00	4152	3703	3588	94	3682	12.8%	0.6%
2000/01	4210	3719	3706	49	3755	12.1%	-1.0%
2001/02	4251	3719	3759	40	3799	11.9%	-2.1%
2002/03	3989	3762	3915	124	4039	-1.2%	-6.9%
2003/04	3990	3794	3958	2	3960	0.7%	-4.2%
2004/05	3984	3778	4169	-40	4129	-3.5%	-8.5%
2005/06	3858	3825	4054	64	4118	-6.3%	-7.1%
2006/07	3826	3858	4183	41	4224	-9.4%	-8.7%
2007/08	3886	4060	4273	39	4312	-9.9%	-5.8%
2008/09	3907	4125	4477	-101	4376	-10.7%	-5.7%
2009/10	3951	4334	4359	103	4462	-11.4%	-2.9%

CALENDAR YEAR RESULTS

Table 21

ENERGY SALES TO MANITOBA HYDRO CUSTOMERS (GW.h)							
Base Forecast							
2010 - 2030							
Calendar Year	Residential	General Service	Area & Roadway Lighting	Manitoba Hydro Sales Incl Diesel		Total Diesel	Manitoba Hydro Sales Excl Diesel
2009 Actual	7092	13700	102	20894	-0.1%	13	20881
2010	7007	13673	103	20784	-0.5%	13	20771
2011	7232	14135	104	21471	3.3%	13	21458
2012	7328	14440	105	21873	1.9%	14	21860
2013	7421	14846	106	22373	2.3%	14	22359
2014	7513	15133	107	22753	1.7%	14	22739
2015	7607	15396	108	23111	1.6%	14	23097
2016	7703	15691	109	23503	1.7%	14	23489
2017	7801	15896	110	23807	1.3%	15	23792
2018	7901	16057	111	24069	1.1%	15	24055
2019	8003	16257	112	24372	1.3%	15	24357
2020	8107	16471	113	24691	1.3%	15	24676
2021	8213	16687	114	25015	1.3%	15	24999
2022	8322	16904	115	25341	1.3%	15	25326
2023	8433	17122	116	25671	1.3%	16	25656
2024	8547	17342	117	26006	1.3%	16	25991
2025	8664	17567	118	26348	1.3%	16	26332
2026	8782	17793	119	26695	1.3%	16	26679
2027	8903	18022	120	27045	1.3%	16	27028
2028	9025	18252	121	27398	1.3%	17	27382
2029	9145	18484	122	27750	1.3%	17	27733
2030	9270	18717	122	28109	1.3%	17	28092

Table 22

NET FIRM ENERGY (GW.h)								
Base Forecast								
2010 - 2030								
Calendar Year	Dist. Losses	Const. Power	Manitoba Load @ Common Bus	Trans. Losses	Net Firm Energy	Non Firm Energy	Station Service	Gross Total Energy
2009	879	67	21827	1950	23754	23	146	23923
Actual								
2010	916	84	21771	1954	23705	20	146	23870
2011	911	78	22447	1985	24410	21	159	24590
2012	941	65	22866	2021	24866	21	161	25048
2013	986	58	23403	2070	25464	8	161	25633
2014	1019	50	23809	2105	25914	0	161	26074
2015	1039	46	24182	2138	26321	0	161	26481
2016	1057	46	24593	2175	26767	0	161	26928
2017	1070	46	24909	2202	27111	0	161	27272
2018	1081	46	25182	2226	27409	0	161	27569
2019	1094	46	25498	2254	27752	0	161	27912
2020	1108	46	25831	2284	28115	0	161	28275
2021	1122	46	26168	2314	28482	0	161	28642
2022	1136	46	26508	2344	28852	0	161	29013
2023	1151	46	26853	2374	29227	0	161	29388
2024	1165	46	27202	2405	29607	0	161	29768
2025	1180	46	27559	2437	29995	0	161	30156
2026	1195	46	27920	2469	30388	0	161	30549
2027	1210	46	28285	2501	30786	0	161	30946
2028	1225	46	28653	2533	31187	0	161	31347
2029	1245	46	29025	2566	31591	0	161	31751
2030	1261	46	29399	2599	31998	0	161	32159

- See the Glossary of Terms for a definition of Gross Total Energy, Non Firm Energy, Station Service and Net Firm Energy

GLOSSARY OF TERMS

The two key differences in terminology used throughout this report are:

- 1) **GROSS vs NET** - for both energy and peak, gross figures include station service loads; whereas net figures exclude station service loads.
- 2) **TOTAL vs FIRM** - total energy includes non-firm energy and firm energy excludes non-firm energy. Total peak adds back curtailed loads and firm peak excludes curtailed loads.

Gross Firm Energy - includes all energy needed to meet the requirements of Manitoba customers on the integrated system. This figure includes station service but excludes non-firm energy. This figure does not include diesel generation, Industrial self-generation, exports, imports, exports losses or import gains.

Gross Total Peak - is the maximum hourly demand in a given year, required to meet the needs of Manitoba customers on the integrated system. This figure includes station service loads and also includes (adds back in) curtailable loads. This figure does not include diesel generation, Industrial self-generation, exports, imports, export losses or import gains.

Net Firm Energy and **Net Total Peak** - are the same as Gross Firm Energy/Peak except they omit station service.

Station Service - is electricity consumed by generating stations to produce electric power.

Interruptible (Non-Firm) Energy - includes all energy sold to Manitoba customers on a non-firm basis. This category includes all sales from the Surplus Energy Program (SEP).

Curtailable - is load that can be curtailed on short notice. A discount is given for subscribing to this program. Curtailable loads can affect peak demand because some periods of curtailment may be at or near the system peak.

