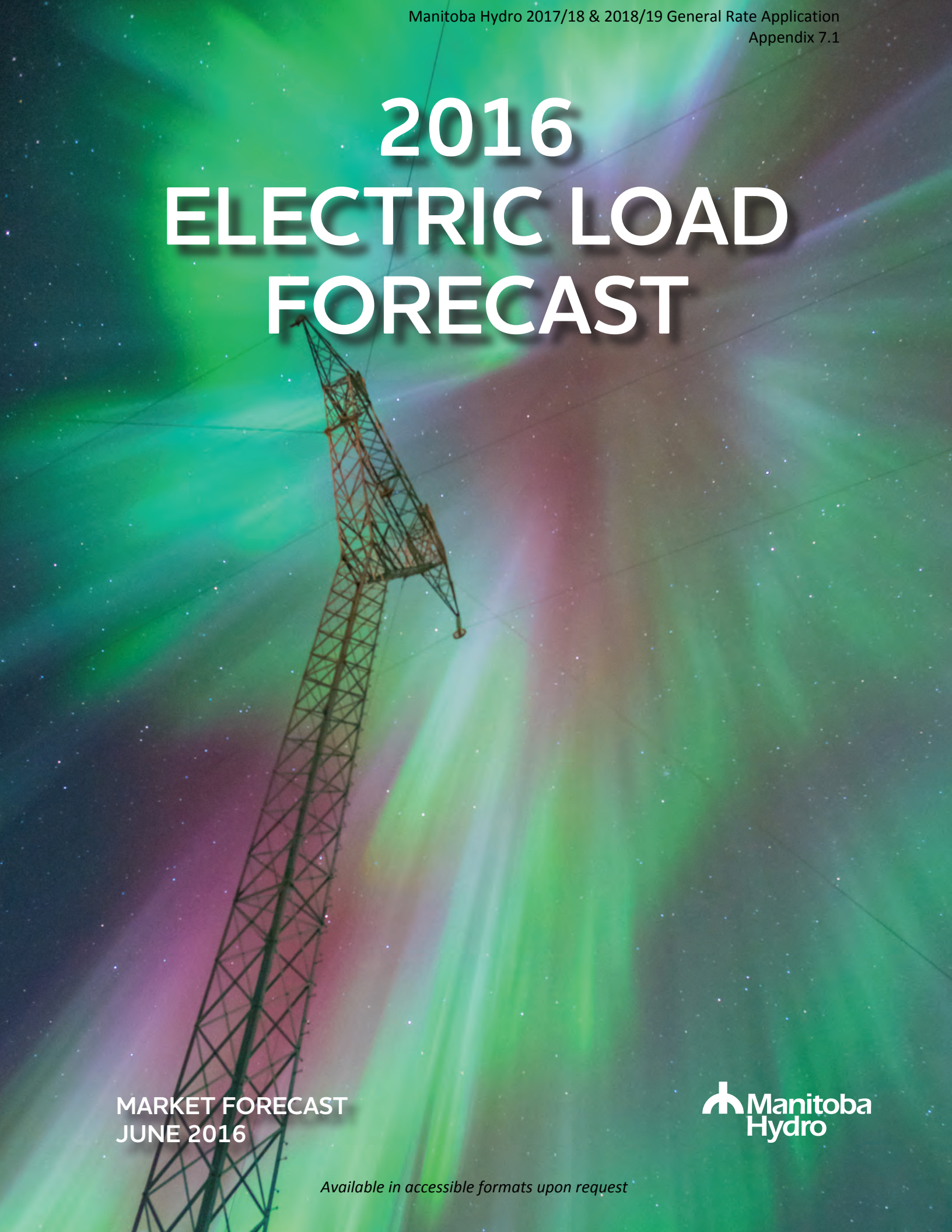
2016 ELECTRIC LOAD FORECAST



MARKET FORECAST
JUNE 2016

Manitoba Hydro

Available in accessible formats upon request

Cover: Gillam Northern Lights (Photo courtesy of Tony Loewen, Operating / Electrical Technician Trainee, Lower Nelson River Maintenance Department)

EXECUTIVE SUMMARY

Overview

The Gross Firm Energy in Manitoba is forecast to grow from a weather adjusted value of 25,355 GWh in 2015/16 to 29,110 GWh in 2025/26. This average growth is 375 GWh or 1.4% per year for 10 years. By 2035/36, Gross Firm Energy is forecast to be 34,193 GWh, a twenty-year growth rate of 442 GWh or 1.5% per year.

Gross Total Peak is forecast to grow at about the same pace, from an adjusted value of 4,634 MW in 2015/16, growing 71 MW or 1.4% a year for the next 10 years, and 81 MW or 1.5% a year for the next 20 years. By 2035/36, the peak is forecast to be 6,250 MW.

Growth is expected in all sectors. The 20 year growth rates in the Residential Basic, General Service Mass Market and General Service Top Consumers sectors are forecast to be 1.2%, 2.1% and 1.1% respectively. During the last 10 years, Gross Firm Energy has grown 215 GWh or 0.9% per year. This ten year period includes the 2009 economic downturn that slowed growth and also reflects the influence of Manitoba Hydro's Demand Side Management activities.

The primary driver of growth in Manitoba is the population, with the secondary driver being the economy. The population of Manitoba has grown from 1,180,000 people in 2005/06 to 1,297,000 people in 2015/16, averaging 1.0% growth per year. Manitoba's population is forecast to grow to 1,562,000 by 2035/36, averaging 0.9% per year. Real Manitoba Gross Domestic Product (GDP) is expected to grow 2.1% in 2016/17 and average 1.8% annually for the next 20 years. Combined Canada and US GDP is forecast to grow 2.0% in 2016/17 and average 2.1% annually for the next 20 years.

Three main components represent the majority of Manitoba's electricity use:

1. **Residential Basic** customer growth is expected to mimic population growth, growing 0.9% per year over the next 20 years. An increase in average use per customer adds 0.3% to the growth and is primarily due to increased use of electric space and electric water heating in dwellings.

2. **General Service Mass Market** is forecast to grow at an average 2.1% per year, which is higher than the historic growth of 1.1% per year over the past ten years. The growth is

primarily due to expected continued growth in GDP and the transfer of seven Top Consumers into the Mass Market sector starting in 2016/17.

3. **General Service Top Consumers** is forecast to grow at 1.1% per year. This is higher than the 0.1% reduction per year during the past ten years which included the loss of a customer and an economic downturn. But it is less than the 4.0% growth per year during the prior ten years. The 20 year historical growth of the Top Consumers has been 1.8% per year.

Change Between the 2015 and 2016 Forecast

The Gross Firm Energy forecast starts 406 GWh (1.5%) lower in 2016/17 and by 2034/35 is 1,479 GWh (4.2%) lower than the 2015 forecast. This is a reduction of just over 3 years of load growth by 2034/35. (1 year = approximately 442 GWh). The difference in 2016/17 is mainly attributable to a lower starting point in the Residential and General Service Mass Market sector, along with changes in the Top Consumers short term plans. By 2034/35, the difference is primarily attributable to the Top Consumers sector (-1,065 GWh) and a lower population forecast lowering the Residential and General Service Mass Market sectors.

Consistent with the reduction in Gross Firm Energy, the Gross Total Peak is 210 MW lower in 2034/35 than presented under the 2015 Forecast, which is a reduction of 2½ years of load growth. (1 year = approximately 80 MW).

Forecast Variability

By 2035/36, the Load Forecast has an 80% probability of being accurate to within ±1,737 GWh or ±5.1%. Due to the inherent variability of the load, this is the best level of accuracy possible.

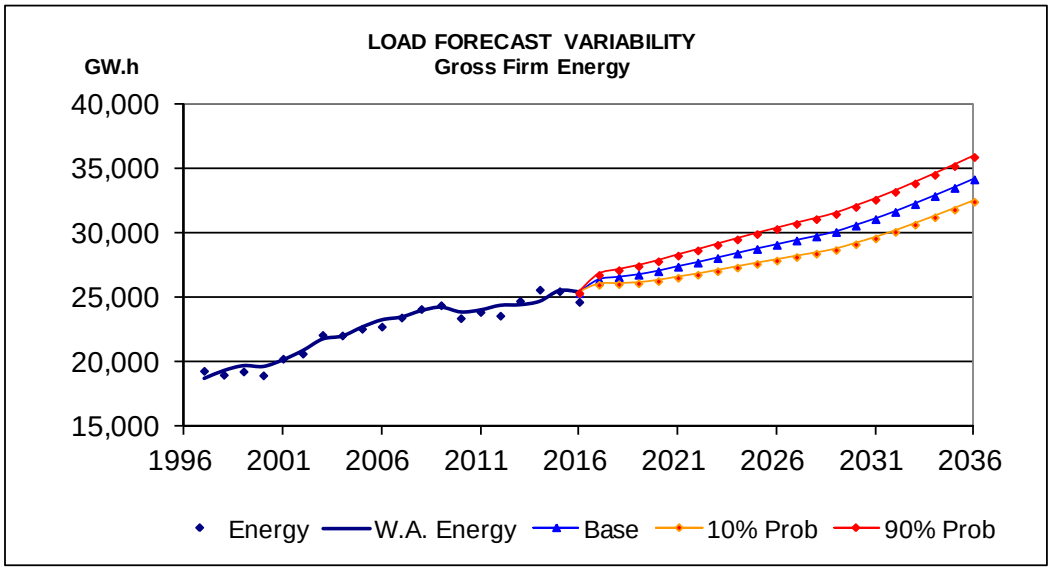


Table 1 - Gross Energy and Peak

GROSS FIRM ENERGY AND GROSS TOTAL PEAK
History and Forecast
2005/06 - 2035/36

Fiscal Year	Gross Firm Energy (GWh)	Growth (%)	Gross Total Peak (MW)	Growth (%)	Load Factor (%)
2005/06	22,757		4,085		63.6%
2006/07	23,464	3.1%	4,208	3.0%	63.7%
2007/08	24,122	2.8%	4,304	2.3%	64.0%
2008/09	24,417	1.2%	4,509	4.8%	61.8%
2009/10	23,412	-4.1%	4,393	-2.6%	60.8%
2010/11	23,892	2.1%	4,286	-2.4%	63.6%
2011/12	23,605	-1.2%	4,367	1.9%	61.7%
2012/13	24,750	4.9%	4,559	4.4%	62.0%
2013/14	25,625	3.5%	4,743	4.0%	61.7%
2014/15	25,505	-0.5%	4,713	-0.6%	61.8%
2015/16	24,673	-3.3%	4,479	-5.0%	62.9%
2015/16 Wadj	25,355	2.8%	4,634	3.5%	62.5%
10 Year Avg Gr.	215	0.9%	47	1.1%	
2016/17	26,385	4.1%	4,850	4.7%	62.1%
2017/18	26,596	0.8%	4,885	0.7%	62.1%
2018/19	26,785	0.7%	4,928	0.9%	62.0%
2019/20	27,060	1.0%	4,971	0.9%	62.1%
2020/21	27,410	1.3%	5,033	1.2%	62.2%
2021/22	27,729	1.2%	5,089	1.1%	62.2%
2022/23	28,082	1.3%	5,154	1.3%	62.2%
2023/24	28,435	1.3%	5,218	1.3%	62.2%
2024/25	28,785	1.2%	5,282	1.2%	62.2%
2025/26	29,110	1.1%	5,341	1.1%	62.2%
10 Year Avg Gr.	375	1.4%	71	1.4%	
2026/27	29,447	1.2%	5,402	1.1%	62.2%
2027/28	29,762	1.1%	5,458	1.0%	62.2%
2028/29	30,106	1.2%	5,520	1.1%	62.3%
2029/30	30,602	1.6%	5,608	1.6%	62.3%
2030/31	31,108	1.7%	5,696	1.6%	62.3%
2031/32	31,666	1.8%	5,796	1.7%	62.4%
2032/33	32,273	1.9%	5,905	1.9%	62.4%
2033/34	32,896	1.9%	6,017	1.9%	62.4%
2034/35	33,532	1.9%	6,131	1.9%	62.4%
2035/36	34,193	2.0%	6,250	1.9%	62.5%
20 Year Avg Gr.	442	1.5%	81	1.5%	

***Note: History and historic growth rates include program-based DSM initiatives.**
Forecast and forecasted growth rates exclude program-based DSM initiatives.

Table 2 - Change in Energy and Peak

GROSS FIRM ENERGY AND GROSS TOTAL PEAK
Change from Previous Forecast
2016/17 - 2035/36

Fiscal Year	Gross Firm Energy			Gross Total Peak		
	2016 Forecast (GWh)	2015 Forecast (GWh)	Change (GWh)	2016 Forecast (MW)	2015 Forecast (MW)	Change (MW)
2015/16 Act	24,673			4,479		
Weather Adj.	682			155		
2015/16 Wadj	25,355	26,145	(790)	4,634	4,829	(195)
2016/17	26,385	26,792	(406)	4,850	4,936	(86)
2017/18	26,596	27,126	(530)	4,885	5,000	(115)
2018/19	26,785	27,486	(701)	4,928	5,063	(135)
2019/20	27,060	27,600	(539)	4,971	5,086	(115)
2020/21	27,410	28,449	(1,039)	5,033	5,210	(178)
2021/22	27,729	28,786	(1,057)	5,089	5,267	(179)
2022/23	28,082	29,197	(1,115)	5,154	5,337	(184)
2023/24	28,435	29,590	(1,155)	5,218	5,406	(187)
2024/25	28,785	29,999	(1,214)	5,282	5,476	(194)
2025/26	29,110	30,408	(1,299)	5,341	5,547	(206)
10 Year	375	426		71	72	
Avg Gr.	1.4%	1.5%		1.4%	1.4%	
2026/27	29,447	30,823	(1,376)	5,402	5,619	(217)
2027/28	29,762	31,243	(1,481)	5,458	5,692	(234)
2028/29	30,106	31,664	(1,559)	5,520	5,765	(245)
2029/30	30,602	32,094	(1,492)	5,608	5,840	(232)
2030/31	31,108	32,531	(1,423)	5,696	5,915	(219)
2031/32	31,666	33,101	(1,435)	5,796	6,012	(217)
2032/33	32,273	33,684	(1,411)	5,905	6,112	(207)
2033/34	32,896	34,317	(1,421)	6,017	6,220	(204)
2034/35	33,532	35,011	(1,479)	6,131	6,341	(210)
19 Year	430	467	(36)	79	80	-1
Avg Gr.	1.5%	1.5%	-0.1%	1.5%	1.4%	0.0%

*Note: History includes program-based DSM initiatives.
Forecast and forecasted growth rates exclude program-based DSM initiatives.

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INTRODUCTION

This document is prepared annually as Manitoba Hydro's forecast of its future load requirements for its service area. The service area consists of all of Manitoba (99.85% of sales), as well as two resale customers that supply energy to Creighton, Sask. (0.12% of sales) and the Northwest Angle, Minn. (0.03% of sales). Exports of power to other utilities are not included.

This information is provided for several purposes. Short term forecasts of sales by billing month within rate groups are needed to forecast revenue for rate design and accounting. Short term forecasts of energy and peak is needed for system operations. Long term forecasts of energy and peak is required by power planning to determine long term supply requirements.

A "customer" in this document refers to a metered electrical service. Unmetered services, such as flat rate water heating and sentinel rentals do not count as customers, and street lights group a number of services as one customer. A customer is not the same as a building. One building can have multiple electric services and may count as more than one customer, or multiple buildings may have only one service and may count as only one customer. A customer in this document is also not the same as a customer on the billing system. The latter is a person or organization that Manitoba Hydro serves. One billing customer may pay the bill for multiple services and thus count as multiple customers in this document.

Electric consumption is read from a customer's meter in units of kilowatt-hours (kWh). A typical residential dwelling not using electricity for heating uses approximately 10,000 kWh per year. This document reports electric use in terms of gigawatt-hours (GWh). One GWh equals one million kWh, which is approximately the energy of 100 typical residential dwellings not using electricity for heating.

The highest load requirement for a time period is known as the peak load. It is given in terms of megawatts (MW). One MW equals one thousand kilowatts (kW). A typical residential dwelling not using electricity for heating would use a maximum of about 2.5 kW sometime during the year. However, dwellings will not all be at their maximum use at the same hour. The use of all dwellings at any specific hour is known as the coincident load. The coincident peak is the load at the hour of Manitoba's system peak. A typical dwelling not using electricity for heating would use about 1.6 kW at the coincident peak. Therefore 1 MW is approximately the coincident peak requirement of 600 typical dwellings not using electricity for heating.

Components of Manitoba's Electricity Use – 2015/16

General Consumers Sales (also referred to as Total Sales) includes the energy supplied to all of Manitoba Hydro's individually billed customers. During the 2015/16 fiscal year, Manitoba Hydro averaged 564,643 General Consumers Sales customers who consumed 21,654 GWh.

The major groups include

(1) Residential Basic, with 474,153 customers who used 7,074 GWh or 32.7% of Sales. These are mostly residential structures that include single-family dwellings, multi-family dwellings and individual apartment suites.
(2) General Service Mass Market, with 67,395 customers who used 8,442 GWh or 39.0% of Sales. These are small to large Commercial and Industrial customers.
(3) General Service Top Consumers, with 32 customers who used 5,886 GWh or 27.2% of sales. These are 17 high-usage companies (some count as multiple customers) that are forecast individually.

The remaining customers include Seasonal customers (billed twice a year rather than monthly), Diesel customers (four remote towns not connected to the integrated grid system), Flat Rate Water Heating and Area and Roadway Lighting. Their electricity use totals only 252 GWh or 1.2% of Total Sales. Over 50,000 of these services do not count as customers.

Manitoba Load at Common Bus is the total load metered at all the substations in the province that supplies Manitoba Hydro's non-Diesel customers and includes Distribution Losses and Construction Power. In 2015/16, Common Bus was 22,460 GWh or about 3.7% more than Total Sales.

Gross Firm Energy is the total load needed to be generated for domestic firm load requirements on the Integrated System (excludes diesel). It includes Transmission Losses and Station Service. Some customers are on non-firm contracts (Surplus Energy Program), and their load is not included as part of Manitoba Hydro's generation requirement. In 2015/16, Gross Firm Energy was 24,673 GWh or about 13.9% more than Total Sales.

Table 3 - Components of Manitoba Electricity Use

COMPONENTS OF MANITOBA ELECTRICITY USE 2015/16 (Customers, Actual Consumption and Average Use)				
Forecast Group	**Cust/Serv**	**GWh**	**% of Sales**	**kWh/cust**
Residential Basic	474,153	7,074	32.7%	14,920
Residential Diesel	583	8	0.0%	13,945
Residential Seasonal	20,176	81	0.4%	3,991
Residential Flat Rate Water Heating	3,454	18	0.1%	5,083
Total Residential	494,912	7,181	33.2%	
GS Mass Market	67,395	8,442	39.0%	125,260
GS Top Consumers	32	5,886	27.2%	186,357,969
GS Diesel	184	6	0.0%	30,496
GS Seasonal	882	5	0.0%	6,115
GS Flat Rate Water Heat	359	6	0.0%	16,286
GS Surplus Energy Program	30	25	0.1%	821,015
Total General Service	68,522	14,369	66.4%	
Sentinal Flat Rate	20,643	12	0.1%	567
Sentinal Rental	25,960	-	0.0%	-
Street Lighting	1,208	92	0.4%	76,517
Total Lighting	1,208	104	0.5%	
Total General Consumer Sales	564,643	21,654	100.0%	
Less Diesel Sales		(14)	-0.1%	
Distribution Losses		791	3.7%	
Construction Power		28	0.1%	
Manitoba Load at Common Bus		22,460	103.7%	
Transmission Losses		2,116	9.8%	
Less Non-Firm Energy		(25)	-0.1%	
Station Service		123	0.6%	
Gross Firm Energy		24,673	113.9%	
* flat rate and rental services are shown in yellow, which do not count as customers				

FORECAST OVERVIEW

General Consumers Customer Forecast

In 2015/16, Manitoba Hydro had an average of 564,643 General Consumer Sales customers. These were made up of 474,153 Residential Basic customers, 67,395 General Service Mass Market customers, 32 General Service Top Consumers customers and 30 SEP (Surplus Energy Program, i.e. non-firm) customers, with the remaining being Diesel, Seasonal and Area and Roadway Lighting.

During the last 10 years, Residential Basic customers have grown at an average of 5,041 (1.1%) per year. Manitoba Hydro's 2016 Economic Outlook provides the forecast of Residential Basic customers, and this document uses that forecast. Residential Basic customers are forecast to grow 5,318 (1.1%) customers per year over the next ten years and 4,951 (1.0%) customers per year over the next 20 years.

General Service Mass Market customers have grown 590 (0.9%) per year over the last 10 years. The sector is forecast to grow 474 (0.7%) per year over the next ten years and 477 (0.7%) per year over the next 20 years. Starting in 2016/17, seven of the smallest Top Consumers were moved to General Service Mass Market for forecasting purposes and the 2015/16 customers are adjusted to reflect the change in both the General Service Mass Market and Top Consumers sectors.

Residential Seasonal customers, mainly cottages with lower usage, are growing at a slower rate than Residential Basic. Seasonal customer growth has averaged 3 (0.0%) customers per year over the last 10 years. The sector is forecast to decrease at 142 (0.7%) customers annually over the next 10 years and 131 (0.7%) customers annually over the next 20 years due to the continued transfer of higher usage seasonal customers to Residential Basic.

Area and Roadway Lighting customers were re-grouped in 2006 when Manitoba Hydro changed its billing system, resulting in a change in lighting customer counts. Area and Roadway Lighting is expected to grow at 5 (0.4%) customers annually over the next 10 years and 5 (0.4%) customers annually over the next 20 years.

Table 4 - General Consumers Sales Customers

GENERAL CONSUMERS SALES (Average Customers)
History and Forecast
2005/06 - 2035/36

Fiscal	Residential			General Service					Lighting	Total
Year	Basic	Diesel	Seas	Mass Mkt	Top Cons	Diesel	Seas	SEP		Custs
2005/06	423,742	519	20,145	61,491	26	168	814	29	793	507,727
2006/07	427,886	525	20,312	63,596	26	169	783	28	1129	514,455
2007/08	432,144	531	20,437	63,855	26	175	798	27	1142	519,135
2008/09	437,263	540	20,648	64,140	26	178	818	24	1175	524,811
2009/10	441,710	539	20,839	64,758	26	177	830	24	1191	530,095
2010/11	445,882	550	20,950	65,193	26	176	842	24	1184	534,828
2011/12	450,748	568	20,844	65,546	32	174	847	26	1155	539,939
2012/13	456,130	577	20,731	65,974	31	175	850	28	1164	545,660
2013/14	462,274	583	20,757	66,569	31	179	861	28	1157	552,438
2014/15	468,499	583	20,626	67,042	30	183	872	28	1196	559,060
2015/16	474,153	583	20,176	67,395	32	184	882	30	1208	564,643
10 Year	5,041	6	3	590	1	2	7	0	42	5,692
Avg Gr.	1.1%	1.2%	0.0%	0.9%	2.0%	0.9%	0.8%	0.5%	4.3%	1.1%
2015/16 adj				67,402	25					
2016/17	479,962	589	19,837	67,854	24	185	904	30	1,216	570,601
2017/18	485,421	598	19,717	68,362	24	187	909	31	1,221	576,469
2018/19	490,910	605	19,597	68,857	24	189	914	31	1,226	582,352
2019/20	496,389	612	19,477	69,339	24	191	919	31	1,231	588,211
2020/21	501,758	619	19,357	69,804	24	193	924	31	1,236	593,945
2021/22	506,994	626	19,237	70,259	24	194	929	31	1,241	599,535
2022/23	512,155	634	19,117	70,724	24	196	934	31	1,246	605,060
2023/24	517,259	641	18,997	71,196	24	198	939	31	1,251	610,535
2024/25	522,306	648	18,877	71,669	24	199	944	31	1,256	615,954
2025/26	527,329	655	18,757	72,145	24	201	949	31	1,261	621,352
10 Year	5,318	7	-142	474	-1	2	7	0	5	5,671
Avg Gr.	1.1%	1.2%	-0.7%	0.7%	-0.2%	0.9%	0.7%	0.3%	0.4%	1.0%
2026/27	532,344	663	18,637	72,625	24	203	954	31	1,266	626,745
2027/28	537,341	670	18,517	73,108	24	204	959	31	1,271	632,125
2028/29	542,294	677	18,397	73,594	24	206	964	31	1,276	637,462
2029/30	547,117	684	18,277	74,077	24	208	969	31	1,281	642,667
2030/31	551,749	692	18,157	74,556	24	210	974	31	1,286	647,677
2031/32	556,213	699	18,037	75,031	24	211	979	31	1,291	652,516
2032/33	560,551	706	17,917	75,505	24	213	984	31	1,296	657,226
2033/34	564,806	713	17,797	75,981	24	215	989	31	1,301	661,856
2034/35	569,018	721	17,677	76,459	24	216	994	31	1,306	666,446
2035/36	573,175	728	17,557	76,939	24	218	999	31	1,311	670,981
20 Year	4,951	7	-131	477	0	2	6	0	5	5,317
Avg Gr.	1.0%	1.1%	-0.7%	0.7%	-0.1%	0.9%	0.6%	0.2%	0.4%	0.9%

General Consumers Sales Forecast

During 2015/16, Total General Consumer Sales was 21,654 GWh. The fiscal billing year (using weather from March 16, 2015 to March 15, 2016) was significantly warmer than normal giving a weather adjustment for the year of +532 GWh. The resulting weather adjusted Total Sales value was 22,186 GWh.

Over the last 10 years, Total Sales have grown at 188 GWh (0.9%) per year. The growth was 1.5% per year in Residential Basic, 1.1% per year in General Service Mass Market, and a reduction of 0.1% in General Service Top Consumers due to the economic downturn in 2009 and the loss of one Top Consumer customer. The historical growth includes the effect of past Demand Side Management (DSM) initiatives.

Sales are forecast to grow at 337 GWh (1.4%) per year over the next 10 years and 393 GWh (1.5%) per year over the next 20 years before accounting for future market-based DSM programs.

Most of the growth is forecast to occur in General Service Mass Market, at 200 GWh (1.9%) per year over the next 20 years, followed by Residential Basic at 98 GWh (1.2%) per year and Top Consumers at 95 GWh (1.5%) per year. Starting in 2016/17, seven of the smallest Top Consumers were moved to General Service Mass Market for forecasting purposes and the 2015/16 sales, totaling 404 GWh, are adjusted to reflect the change in both the General Service Mass Market and Top Consumers sectors.

Table 5 - General Consumers Sales Energy

GENERAL CONSUMERS SALES (GWh)
History and Forecast
2005/06 - 2035/36

Fiscal	Residential				General Service						Lighting	Total
Year	Basic	Diesel	Seas	FRWH	Mass Mkt	Top Cons	Diesel	Seas	FRWH	SEP		Sales
2005/06	6,171	7	59	30	7,587	5,948	5	5	9	23	91	19,935
2006/07	6,443	7	60	29	7,839	5,989	5	4	9	23	101	20,510
2007/08	6,736	7	68	27	8,006	6,075	5	4	9	24	101	21,061
2008/09	6,847	7	74	25	8,049	6,065	5	5	8	22	102	21,210
2009/10	6,786	7	81	24	7,985	5,461	6	5	8	20	102	20,486
2010/11	6,952	8	77	23	8,258	5,324	5	5	8	24	103	20,786
2011/12	6,818	8	83	22	8,162	5,531	5	5	8	25	103	20,771
2012/13	7,223	8	81	21	8,434	5,560	5	5	7	28	103	21,477
2013/14	7,767	9	92	20	8,839	5,461	5	5	7	29	104	22,338
2014/15	7,658	9	102	19	8,771	5,750	6	6	6	27	104	22,458
2015/16	7,074	8	81	18	8,442	5,886	6	5	6	25	104	21,654
Weather Adj.	363	0	0	0	167	0	0	0	0	2	0	532
2015/16 Wadj	7,437	8	81	18	8,608	5,886	6	5	6	27	104	22,186
10 Year Wadj	101	0	2	-1	91	-6	0	0	0	0	1	188
Avg Gr.	1.5%	2.2%	3.2%	-5.4%	1.1%	-0.1%	0.9%	1.5%	-4.7%	0.9%	1.3%	0.9%
2015/16 adj					9,012	5,482						
2016/17	7,671	9	89	17	9,286	5,835	6	5	6	25	104	23,053
2017/18	7,750	9	89	16	9,471	5,748	6	5	5	26	104	23,229
2018/19	7,834	9	89	15	9,639	5,675	6	5	5	26	105	23,407
2019/20	7,931	9	89	14	9,779	5,746	6	6	5	26	105	23,715
2020/21	8,017	9	89	14	9,931	5,818	6	6	5	26	105	24,024
2021/22	8,108	9	89	13	10,084	5,890	6	6	4	26	105	24,339
2022/23	8,194	9	88	12	10,241	5,958	6	6	4	26	105	24,650
2023/24	8,277	10	88	12	10,400	6,028	6	6	4	26	105	24,961
2024/25	8,355	10	88	11	10,560	6,100	6	6	4	26	105	25,271
2025/26	8,429	10	88	11	10,701	6,172	6	6	4	26	106	25,557
10 Year	99	0	1	-1	169	69	0	0	0	0	0	337
Avg Gr.	1.3%	2.0%	0.9%	-5.0%	1.7%	1.2%	1.0%	0.5%	-5.0%	-0.5%	0.1%	1.4%
2026/27	8,488	10	88	10	10,866	6,247	6	6	3	26	106	25,855
2027/28	8,525	10	88	9	11,034	6,322	6	6	3	26	106	26,134
2028/29	8,581	10	88	9	11,203	6,400	6	6	3	26	106	26,438
2029/30	8,648	10	88	9	11,446	6,532	6	6	3	26	106	26,879
2030/31	8,714	11	88	8	11,694	6,667	6	6	3	26	106	27,328
2031/32	8,820	11	88	8	11,945	6,805	7	6	3	26	106	27,823
2032/33	8,958	11	87	7	12,202	6,946	7	6	2	26	106	28,359
2033/34	9,103	11	87	7	12,465	7,090	7	6	2	26	107	28,910
2034/35	9,248	11	87	7	12,735	7,237	7	6	2	26	107	29,472
2035/36	9,404	11	87	6	13,013	7,387	7	6	2	26	107	30,055
20 Year	98	0	0	-1	200	95	0	0	0	0	0	393
Avg Gr.	1.2%	1.7%	0.4%	-5.0%	1.9%	1.5%	0.9%	0.5%	-5.0%	-0.2%	0.1%	1.5%

Manitoba Energy Forecast

The weather adjusted actual Gross Firm Energy was 25,355 GWh in 2015/16. Gross Firm Energy has grown 215 GWh (0.9%) per year for the past 10 years. This historical growth reflects the effect of past Demand Side Management (DSM) initiatives. Gross Firm energy is forecast to grow to 34,193 GWh by 2035/36 at an average growth of 442 GWh or 1.5% per year. This is before accounting for future market-based DSM programs.

Distribution Losses, which is the difference between Manitoba Hydro's substations and the customers' meters, has a wide variance from year to year and has ranged between 3.5% and 5.5% of Total Sales. It is forecast to be between 4.4% and 4.5% of Sales for the entire forecast.

Transmission Losses which is the difference between the generators and the substations is forecast to be between 9.1% and 9.2% of Total Sales for the entire forecast period.

Distribution Losses and Transmission Losses, totaling almost 14%, need to be added to Total Sales to estimate Gross Firm Energy. The 14% value should generally be used to estimate load at generation when only load at the customer's meter is known. For example, to convert Power Smart program savings from the customer meter to generation. The exception is for large General Service customers who own their own transformation and incur minimal Distribution Losses. For these customers, a 10% value should be used.

Table 6 - Components of Manitoba Energy

MANITOBA FIRM ENERGY (GWh)
History and Forecast
2005/06 - 2035/36

Fiscal Year	General Consumer Sales less Diesel	Dist. Losses	Dist. Loss %	Const. Power	Manitoba Load at Common Bus	Trans. Losses	Trans. Loss %	Less Non Firm Energy	Station Service	Gross Firm Energy
2005/06	19,923	797	4.0%	42	20,761	1,860	9.3%	23	158	22,757
2006/07	20,497	900	4.4%	45	21,442	1,885	9.2%	22	159	23,464
2007/08	21,049	940	4.5%	47	22,036	1,949	9.3%	24	161	24,122
2008/09	21,198	1,052	5.0%	56	22,305	1,979	9.3%	22	154	24,417
2009/10	20,473	813	4.0%	75	21,361	1,934	9.4%	20	137	23,412
2010/11	20,773	947	4.6%	85	21,806	1,977	9.5%	25	134	23,892
2011/12	20,757	736	3.5%	67	21,560	1,939	9.3%	25	131	23,605
2012/13	21,463	1,184	5.5%	59	22,706	1,936	9.0%	28	136	24,750
2013/14	22,324	1,205	5.4%	12	23,541	1,969	8.8%	29	144	25,625
2014/15	22,443	992	4.4%	15	23,450	1,949	8.7%	26	132	25,505
2015/16	21,640	791	3.7%	28	22,460	2,116	9.8%	25	123	24,673
Weather Adj.	532	94		0	625	59		2	0	682
2015/16 Wadj	22,172	885	4.0%	28	23,085	2,175	9.8%	27	123	25,355
10 Year Wadj	188	5		-1	191	32		0	-4	215
Avg Gr.	0.9%	0.6%		-3.9%	0.9%	1.6%		1.5%	-2.5%	0.9%
2016/17	23,038	1,014	4.4%	116	24,168	2,109	9.2%	25	133	26,385
2017/18	23,214	1,028	4.4%	120	24,363	2,126	9.2%	26	133	26,596
2018/19	23,392	1,042	4.5%	103	24,537	2,141	9.2%	26	133	26,785
2019/20	23,700	1,055	4.4%	35	24,789	2,163	9.1%	26	133	27,060
2020/21	24,009	1,067	4.4%	35	25,111	2,192	9.1%	26	133	27,410
2021/22	24,323	1,081	4.4%	0	25,404	2,217	9.1%	26	133	27,729
2022/23	24,634	1,094	4.4%	0	25,728	2,246	9.1%	26	133	28,082
2023/24	24,946	1,107	4.4%	0	26,053	2,274	9.1%	26	133	28,435
2024/25	25,255	1,121	4.4%	0	26,375	2,302	9.1%	26	133	28,785
2025/26	25,541	1,133	4.4%	0	26,674	2,328	9.1%	26	133	29,110
10 Year	337	25		-3	359	15		0	1	375
Avg Gr.	1.4%	2.5%		-100.0%	1.5%	0.7%		-0.5%	0.8%	1.4%
2026/27	25,839	1,145	4.4%	0	26,984	2,355	9.1%	26	133	29,447
2027/28	26,118	1,156	4.4%	0	27,274	2,381	9.1%	26	133	29,762
2028/29	26,421	1,168	4.4%	0	27,590	2,408	9.1%	26	133	30,106
2029/30	26,862	1,184	4.4%	0	28,046	2,448	9.1%	26	133	30,602
2030/31	27,311	1,200	4.4%	0	28,511	2,489	9.1%	26	133	31,108
2031/32	27,805	1,220	4.4%	0	29,025	2,534	9.1%	26	133	31,666
2032/33	28,341	1,241	4.4%	0	29,583	2,583	9.1%	26	133	32,273
2033/34	28,892	1,264	4.4%	0	30,156	2,633	9.1%	26	133	32,896
2034/35	29,454	1,287	4.4%	0	30,741	2,684	9.1%	26	133	33,532
2035/36	30,037	1,311	4.4%	0	31,348	2,737	9.1%	26	133	34,193
20 Year	393	21		-1	413	28		0	1	442
Avg Gr.	1.5%	2.0%		-100.0%	1.5%	1.2%		-0.3%	0.4%	1.5%

Comparison of the 2015 Forecast to Actuals

Comparison of the 2015 Forecast to the 2015/16 Weather Adjusted Actuals

The weather adjusted General Consumer Sales for 2015/16 was 22,186 GWh which was 565 GWh lower than the 2015 Forecast of 22,681 GWh after removing the Demand Side Management (DSM) program savings achieved in 2015/16.

The weather adjusted Residential Basic sector was 210 GWh lower than the 2015 Forecast and the weather adjusted General Service Mass Market sector for was 142 GWh lower than forecast.

In 2015/16, the Top Consumers sector consumed 5,886 GWh which was 141 GWh lower than the 2015 Forecast of 6,021 GWh. The difference is primarily due to production and project deferral.

Distribution losses were 149 GWh lower than forecast and Transmission losses were 120 GWh greater than forecast.

Overall, the weather adjusted Gross Firm Energy for 2015/16 was 25,355 GWh which was 565 GWh lower than the 2015 Forecast of 25,920 GWh.

The normalized Gross Total Peak for 2015/16 was 4,634 MW which was 155 MW lower than the 2015 Forecast of 4,789 MW.

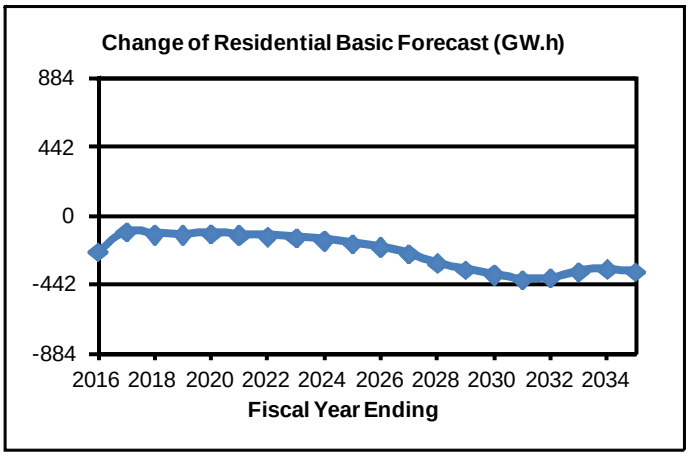
Table 7 - 2015/16 Forecast to Actual

2015 FORECAST COMPARED TO WEATHER ADJUSTED ACTUALS 2015/16 Energy (GWh) and Peak (MW)					
Forecast Group	Actuals	Weather Adjustment	Wthr Adj Actuals	2015 Forecast less DSM	WA Actuals less Forecast
Residential Basic	7,074	363	7,437	7,629	(191)
Residential Diesel	8	-	8	9	(1)
Residential Seasonal	81	-	81	98	(18)
Residential Flat Rate Water Heating	18	-	18	18	(0)
Total Residential	7,181	363	7,544	7,753	(210)
GS Mass Market	8,442	167	8,608	8,750	(142)
GS Top Consumers	5,886	-	5,886	6,027	(141)
GS Diesel	6	-	6	6	(0)
GS Seasonal	5	-	5	6	(0)
GS Flat Rate Water Heat	6	-	6	6	(0)
GS Surplus Energy Program	25	2	27	29	(2)
Total General Service	14,369	169	14,538	14,823	(285)
Sentinal Flat Rate	12	-	12	12	(0)
Sentinal Rental	-	-	-	-	-
Street Lighting	92	-	92	93	(0)
Total Lighting	104	-	104	104	(0)
Total General Consumer Sales	21,654	532	22,186	22,681	(495)
Less Diesel Sales	(14)	-	(14)	(14)	1
Distribution Losses	791	94	885	1,034	(149)
Construction Power	28	-	28	56	(28)
Manitoba Load at Common Bus	22,460	625	23,085	23,756	(672)
Transmission Losses	2,116	59	2,175	2,055	120
Less Non-Firm Energy	(25)	(2)	(27)	(29)	2
Station Service	123	-	123	137	(15)
Gross Firm Energy (GWh)	24,673	682	25,355	25,920	(565)
Gross Total Peak (MW)	4,479	155	4,634	4,789	(155)

Change between the 2015 and 2016 Forecasts

Change Between the 2015 and 2016 Residential Basic Forecast

Figure 1 - Change of Res Basic Forecast



The 2016 Residential Basic forecast starts in 2016/17 101 GWh lower from the 2015 forecast primarily due to the 2015/16 weather adjusted actual energy use being lower than forecast. The difference lessens to 101 GWh in 2016/17 and grows to 359 GWh by the end of the forecast period. 359 GWh represents less than one year of Manitoba system load growth (1 year = approximately 442 GWh).

Major changes and their effect in 2034/35:

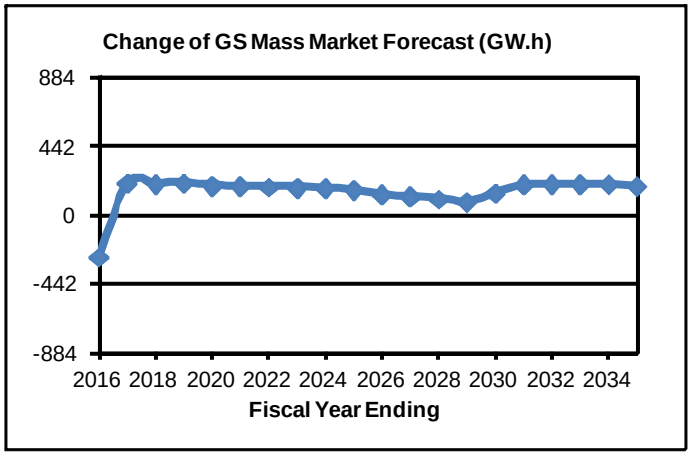
1. Decrease in the customer forecast by 17,752 customers (-220 GWh).
2. Changes in the average use forecast (-47 GWh), primarily due to:
   a. Increase in the forecast of real income: +116 GWh
   b. Changes to model and parameter estimates: -147 GWh
3. Change in the starting point (-230 GWh, which includes 39 GWh of achieved DSM)
4. Decrease in the forecast of Codes and Standards (+135 GWh)

Table 8 - Change of Res Basic Forecast

CHANGE OF RESIDENTIAL BASIC FORECAST (GWh) Comparison of 2015 to 2016 forecast										
Fiscal Year	2015 Fcst	2016 Fcst	Change	%		Fiscal Year	2015 Fcst	2016 Fcst	Change	%
2015/16	7,668	7,437	(230)	-3.0%		2025/26	8,632	8,429	(203)	-2.4%
2016/17	7,773	7,671	(101)	-1.3%		2026/27	8,732	8,488	(244)	-2.8%
2017/18	7,870	7,750	(120)	-1.5%		2027/28	8,830	8,525	(306)	-3.5%
2018/19	7,956	7,834	(122)	-1.5%		2028/29	8,926	8,581	(345)	-3.9%
2019/20	8,047	7,931	(115)	-1.4%		2029/30	9,024	8,648	(376)	-4.2%
2020/21	8,142	8,017	(125)	-1.5%		2030/31	9,122	8,714	(408)	-4.5%
2021/22	8,240	8,108	(132)	-1.6%		2031/32	9,218	8,820	(399)	-4.3%
2022/23	8,337	8,194	(143)	-1.7%		2032/33	9,316	8,958	(357)	-3.8%
2023/24	8,434	8,277	(157)	-1.9%		2033/34	9,445	9,103	(343)	-3.6%
2024/25	8,534	8,355	(179)	-2.1%		2034/35	9,607	9,248	(359)	-3.7%

Change Between the 2015 and 2016 General Service Mass Market Forecast

Figure 2 - Change of GS Mass Market Forecast



The 2016 General Service Mass Market (GSMM) forecast starts in 2016/17 204 GWh higher from the 2015 forecast primarily due to the transfer of seven Top Consumers into the Mass Market sector starting in 2016/17. The difference remains steady throughout the forecast, and by 2034/35, the Mass Market forecast is up 187 GWh, representing about a half a year of load growth.

Major changes and their effect in 2034/35:

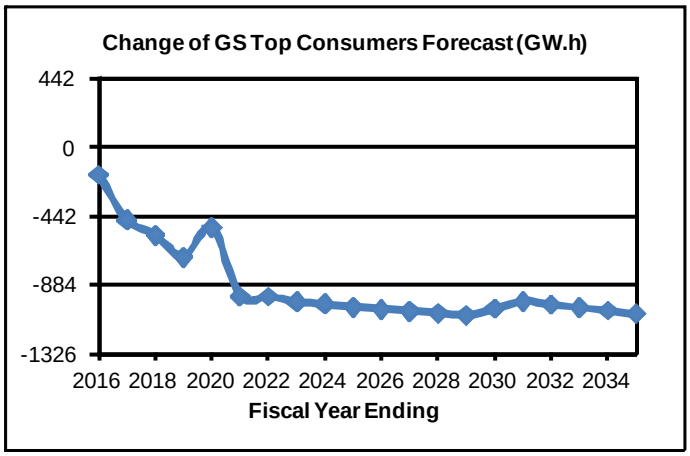
1. Seven Top Consumers transferred to the Mass Market as of 2016/17 (+449 GWh)
2. Change in the starting point (-269 GWh, which includes 128 GWh of achieved DSM)
3. Other model and economic differences (-210 GWh)
4. Decrease in the forecast of Codes & Standards (+217 GWh)

Table 9 - Change of GS Mass Market Forecast

CHANGE OF GS MASS MARKET FORECAST (GWh) Comparison of 2015 to 2016 forecast										
Fiscal Year	2015 Fcst	2016 Fcst	Change	%		Fiscal Year	2015 Fcst	2016 Fcst	Change	%
2015/16	8,878	8,608	(269)	-3.0%		2025/26	10,571	10,701	130	1.2%
2016/17	9,082	9,286	204	2.3%		2026/27	10,749	10,866	118	1.1%
2017/18	9,272	9,471	199	2.1%		2027/28	10,931	11,034	103	0.9%
2018/19	9,433	9,639	205	2.2%		2028/29	11,116	11,203	87	0.8%
2019/20	9,590	9,779	189	2.0%		2029/30	11,306	11,446	140	1.2%
2020/21	9,746	9,931	185	1.9%		2030/31	11,499	11,694	195	1.7%
2021/22	9,903	10,084	181	1.8%		2031/32	11,748	11,945	197	1.7%
2022/23	10,064	10,241	177	1.8%		2032/33	12,004	12,202	198	1.7%
2023/24	10,228	10,400	172	1.7%		2033/34	12,267	12,465	198	1.6%
2024/25	10,397	10,560	163	1.6%		2034/35	12,549	12,735	187	1.5%

Change Between the 2015 and 2016 GS Top Consumers Forecast

Figure 3 - Change of GS Top Consumer Forecast



The General Service Top Consumers forecast is 1,065 GWh lower from the 2015 forecast. Seven customers were moved from Top Consumers to the GS Mass Market sector. The short term (3 year) individual customer forecasts were down from 2015, primarily due to the advancement of an expected customer reduction. All longer term growth is now considered to be included within the Potential Large Industrial Load forecast (PLIL), including expansions and contractions expected to arise from committed plans in the Petro/Oil/Natural Gas and Mining Sectors. The 1,065 GWh reduction represents 2½ years of load growth.

Major changes and their effect in 2034/35:

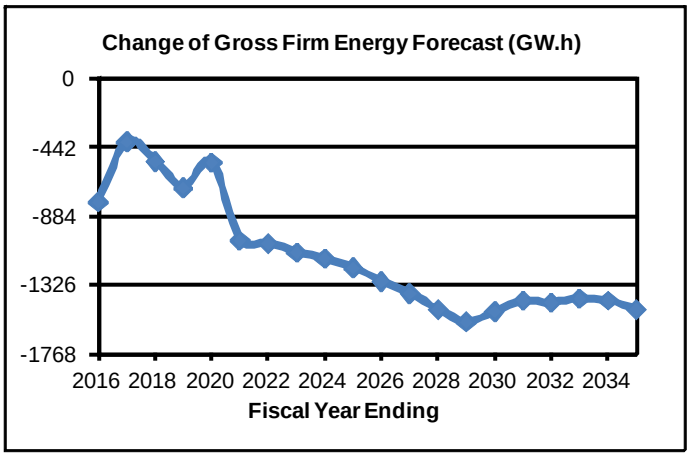
1. Seven Top Consumers moved to the Mass Market sector as of 2016/17 (-449 GWh)
2. Reassessment of short term customer planned projects. (-166 GWh)
3. Change in approach to longer term growth (PLIL) forecasts (-251 GWh)
4. The Potential Large Industrial Loads (PLIL) forecast begins in the fourth year of the forecast resulting in 16 years of PLIL in the 2016 forecast compared with 17 years of PLIL in the 2015 forecast. (-86 GWh)
5. Changes to PLIL forecast from updated model parameters and economic forecast (-113 GWh)

Table 10 - Change of GS Top Consumer Forecast

CHANGE OF GS TOP CONSUMERS FORECAST (GWh) Comparison of 2015 to 2016 forecast									
Fiscal Year	2015 Fcst	2016 Fcst	Change	%		Fiscal Year	2015 Fcst	2016 Fcst	Change	%
2015/16	6,058	5,886	(172)	-2.8%		2025/26	7,209	6,172	(1,037)	-14.4%
2016/17	6,299	5,835	(464)	-7.4%		2026/27	7,296	6,247	(1,049)	-14.4%
2017/18	6,308	5,748	(560)	-8.9%		2027/28	7,383	6,322	(1,061)	-14.4%
2018/19	6,376	5,675	(701)	-11.0%		2028/29	7,472	6,400	(1,072)	-14.3%
2019/20	6,257	5,746	(511)	-8.2%		2029/30	7,562	6,532	(1,030)	-13.6%
2020/21	6,771	5,818	(953)	-14.1%		2030/31	7,653	6,667	(986)	-12.9%
2021/22	6,845	5,890	(955)	-13.9%		2031/32	7,810	6,805	(1,005)	-12.9%
2022/23	6,948	5,958	(990)	-14.2%		2032/33	7,971	6,946	(1,025)	-12.9%
2023/24	7,031	6,028	(1,003)	-14.3%		2033/34	8,135	7,090	(1,045)	-12.8%
2024/25	7,122	6,100	(1,022)	-14.3%		2034/35	8,302	7,237	(1,065)	-12.8%

Change Between the 2015 and 2016 Gross Firm Energy Forecast

Figure 4 - Change of Energy Forecast



The Gross Firm Energy forecast starts 406 GWh (1.5%) lower in 2016/17 and by 2034/35 is down 1,479 GWh (4.2%) from the 2015 forecast. This is a reduction of just over 3 years of load growth. (1 year = approximately 442 GWh).

Summary of changes made in each sector and their effect in 2034/35:

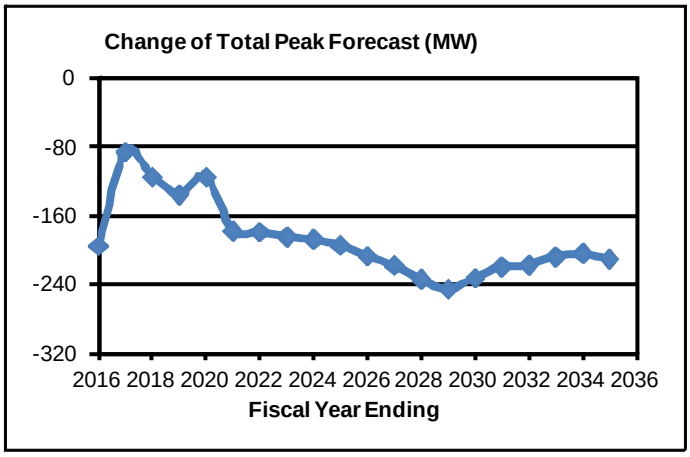
1. Residential Basic forecast is lower primarily due to a reduced customer forecast and starting point (-359 GWh)
2. General Service Mass Market forecast is lower primarily due to a lower starting point. (+187 GWh)
3. General Service Top Consumers forecast is lower due to adjustments in customer short term plans and changes to the longer term growth forecast (PLIL). (-1,065 GWh)
4. Other Sales and Losses. (-242 GWh)

Table 11 - Change of Energy Forecast

GROSS FIRM ENERGY (GWh) Comparison of 2015 to 2016 forecast										
Fiscal Year	2015 Fcst	2016 Fcst	Change	%		Fiscal Year	2015 Fcst	2016 Fcst	Change	%
2015/16	26,145	25,355	(790)	-3.0%		2025/26	30,408	29,110	(1,299)	-4.3%
2016/17	26,792	26,385	(406)	-1.5%		2026/27	30,823	29,447	(1,376)	-4.5%
2017/18	27,126	26,596	(530)	-2.0%		2027/28	31,243	29,762	(1,481)	-4.7%
2018/19	27,486	26,785	(701)	-2.5%		2028/29	31,664	30,106	(1,559)	-4.9%
2019/20	27,600	27,060	(539)	-2.0%		2029/30	32,094	30,602	(1,492)	-4.6%
2020/21	28,449	27,410	(1,039)	-3.7%		2030/31	32,531	31,108	(1,423)	-4.4%
2021/22	28,786	27,729	(1,057)	-3.7%		2031/32	33,101	31,666	(1,435)	-4.3%
2022/23	29,197	28,082	(1,115)	-3.8%		2032/33	33,684	32,273	(1,411)	-4.2%
2023/24	29,590	28,435	(1,155)	-3.9%		2033/34	34,317	32,896	(1,421)	-4.1%
2024/25	29,999	28,785	(1,214)	-4.0%		2034/35	35,011	33,532	(1,479)	-4.2%

Change Between the 2015 and 2016 Gross Total Peak Forecast

Figure 5 - Change of Peak Forecast



The Gross Total Peak Forecast is down 210 MW (3.3%) by 2034/35 from the 2015 Forecast. The peak forecast very closely follows the energy forecast with the reasons for increase in peak being similar to those for energy.

Partially offsetting the energy reduction is a 0.5% decrease of the peak load factor forecast in 2034/35. The load factor is decreasing from 63.0% in the 2015 forecast to 62.5% in the 2016 forecast. The load factor decrease is due to the reduction of the energy forecast of the Top Consumers sector which has a high load factor of 91%.

The decrease in peak in 2034/35 amounts to 210 MW, which is a reduction of 2½ years of load growth. (1 year = approximately 80 MW).

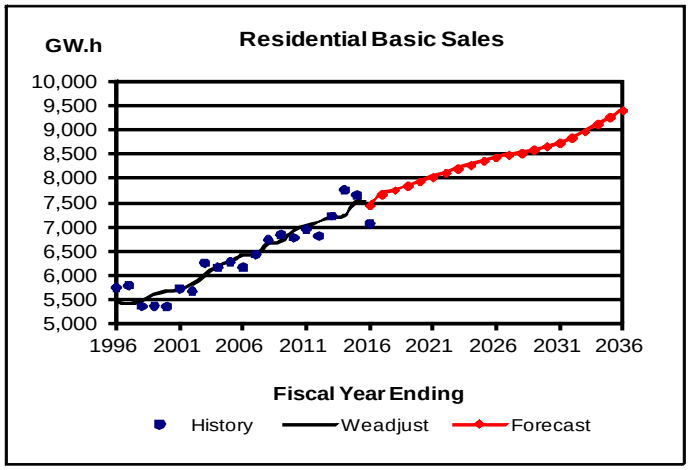
Table 12 - Change of Peak Forecast

GROSS TOTAL PEAK (MW) Comparison of 2015 to 2016 forecast										
Fiscal Year	2015 Fcst	2016 Fcst	Change	%		Fiscal Year	2015 Fcst	2016 Fcst	Change	%
2015/16	4,829	4,634	(195)	-4.0%		2025/26	5,547	5,341	(206)	-3.7%
2016/17	4,936	4,850	(86)	-1.7%		2026/27	5,619	5,402	(217)	-3.9%
2017/18	5,000	4,885	(115)	-2.3%		2027/28	5,692	5,458	(234)	-4.1%
2018/19	5,063	4,928	(135)	-2.7%		2028/29	5,765	5,520	(245)	-4.2%
2019/20	5,086	4,971	(115)	-2.3%		2029/30	5,840	5,608	(232)	-4.0%
2020/21	5,210	5,033	(178)	-3.4%		2030/31	5,915	5,696	(219)	-3.7%
2021/22	5,267	5,089	(179)	-3.4%		2031/32	6,012	5,796	(217)	-3.6%
2022/23	5,337	5,154	(184)	-3.4%		2032/33	6,112	5,905	(207)	-3.4%
2023/24	5,406	5,218	(187)	-3.5%		2033/34	6,220	6,017	(204)	-3.3%
2024/25	5,476	5,282	(194)	-3.5%		2034/35	6,341	6,131	(210)	-3.3%

FORECAST DETAILS

Residential Basic

Figure 6- Residential Basic Sales



In 2015/16, there were 474,153 Residential Basic customers. 78% are single detached, 9% multi attached, and 13% individually metered apartment suites. 54% are in Winnipeg where natural gas is available, 29% in natural gas available areas outside Winnipeg, and 17% do not have natural gas available.

Residential Basic has grown 107 GWh (1.7%) per year for the past 20 years and 101 GWh per year (1.5%) for the past 10 years which reflects the effect of past Demand Side Management (DSM) initiatives. It is forecast to grow 99 GWh (1.3%) per year for the next 10 years and 96 GWh (1.2%) per year for the next 20 years before program-based DSM initiatives.

The primary driver of Residential Basic growth is the population, which is forecast to grow 0.9% per year over the next 20 years.

Table 13 - Residential Sales

RESIDENTIAL BASIC (GWh) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Weather Adjust	Adjusted Sales	Fiscal Year	Forecast Sales
1996/97	5,797	-389	5,408	2016/17	7,671
1997/98	5,370	106	5,476	2017/18	7,750
1998/99	5,384	207	5,590	2018/19	7,834
1999/00	5,364	309	5,672	2019/20	7,931
2000/01	5,737	-36	5,701	2020/21	8,017
2001/02	5,674	131	5,805	2021/22	8,108
2002/03	6,266	-263	6,003	2022/23	8,194
2003/04	6,170	1	6,171	2023/24	8,277
2004/05	6,275	13	6,288	2024/25	8,355
2005/06	6,171	254	6,425	2025/26	8,429
2006/07	6,443	-18	6,425	2026/27	8,488
2007/08	6,736	-78	6,657	2027/28	8,525
2008/09	6,847	-154	6,693	2028/29	8,581
2009/10	6,786	134	6,920	2029/30	8,648
2010/11	6,952	78	7,030	2030/31	8,714
2011/12	6,818	296	7,114	2031/32	8,820
2012/13	7,223	-17	7,207	2032/33	8,958
2013/14	7,767	-540	7,228	2033/34	9,103
2014/15	7,658	-120	7,538	2034/35	9,248
2015/16	7,074	363	7,437	2035/36	9,404

Table 14 - Residential Basic Sales

RESIDENTIAL BASIC SALES
History and Forecast
2015/16 - 2035/36

Fiscal Year	Electric Heat Billed			Non Electric Heat Billed			Total Basic			% Elec Space Heat	% Elec Water Heat
	Custs	GWh	kWh/cust	Custs	GWh	kWh/cust	Custs	GWh	kWh/cust		
2015/16	183,851	4,159	22,621	290,302	2,916	10,043	474,153	7,074	14,920	38.8%	52.3%
2016/17	187,210	4,540	24,253	292,752	3,131	10,695	479,962	7,671	15,983	39.0%	52.9%
2017/18	190,134	4,584	24,110	295,288	3,166	10,722	485,421	7,750	15,966	39.2%	53.5%
2018/19	192,944	4,627	23,983	297,967	3,207	10,762	490,910	7,834	15,958	39.3%	53.9%
2019/20	195,625	4,673	23,886	300,764	3,258	10,834	496,389	7,931	15,978	39.4%	54.1%
2020/21	198,142	4,712	23,782	303,616	3,305	10,885	501,758	8,017	15,978	39.5%	54.3%
2021/22	200,492	4,752	23,700	306,502	3,356	10,949	506,994	8,108	15,991	39.5%	54.4%
2022/23	202,726	4,789	23,621	309,429	3,406	11,007	512,155	8,194	16,000	39.6%	54.4%
2023/24	204,868	4,823	23,544	312,390	3,453	11,055	517,259	8,277	16,002	39.6%	54.4%
2024/25	206,956	4,857	23,467	315,350	3,499	11,094	522,306	8,355	15,997	39.6%	54.4%
2025/26	209,008	4,888	23,387	318,321	3,541	11,123	527,329	8,429	15,984	39.6%	54.4%
2026/27	211,030	4,915	23,291	321,314	3,572	11,118	532,344	8,488	15,944	39.6%	54.4%
2027/28	213,028	4,936	23,169	324,313	3,589	11,066	537,341	8,525	15,864	39.6%	54.3%
2028/29	214,987	4,962	23,078	327,307	3,620	11,059	542,294	8,581	15,824	39.6%	54.3%
2029/30	216,888	4,990	23,006	330,229	3,658	11,077	547,117	8,648	15,806	39.6%	54.3%
2030/31	218,705	5,018	22,942	333,044	3,696	11,099	551,749	8,714	15,793	39.6%	54.2%
2031/32	220,453	5,056	22,936	335,760	3,763	11,208	556,213	8,820	15,857	39.6%	54.2%
2032/33	222,147	5,104	22,977	338,403	3,854	11,389	560,551	8,958	15,981	39.6%	54.1%
2033/34	223,803	5,154	23,027	341,003	3,949	11,581	564,806	9,103	16,116	39.6%	54.1%
2034/35	225,434	5,203	23,080	343,584	4,045	11,772	569,018	9,248	16,252	39.6%	54.0%
2035/36	227,027	5,255	23,148	346,148	4,149	11,985	573,175	9,404	16,407	39.6%	53.9%

Electric Heat Billed: Customers who have electric space heating included with their electric bill.
Non Electric Heat Billed: Customers who do not have electric space heating included with their electric bill.
% Electric Space Heat: The proportion of Total Basic customers who are Electric Heat Billed.
% Electric Water Heat: The proportion of Total Basic customers who have Electric Water Heaters.
2015/16: GWh and kWh/cust are not weather adjusted.

The average use (kWh/customer) for Electric Heat Billed customers is decreasing as individually metered apartment suites are making up a higher proportion of the growth. The average use for Non Electric Heat Billed customers is increasing mainly due to larger new homes, ventilation requirements in new dwellings and an increase in miscellaneous end uses.

Residential Diesel, Seasonal, and Flat Rate Water Heating

Residential Diesel

There were 583 Residential Diesel customers that used 8 GWh in 2015/16 with an average annual use of 13,945 kWh per customer. They have 60 amp service that does not allow for electric space heating. Space heating in the four diesel communities is mainly provided by fuel oil. The number of customers is expected to grow to 728 and usage is expected to increase 1.7% a year to 11 GWh by 2035/36 under the assumption that the communities continue to be separate from the Integrated System.

Residential Seasonal

There were 20,176 Residential Seasonal customers that used 81 GWh in 2015/16 with an average annual use of 3,991 kWh per customer. The number of customers is expected decrease to 17,557 customers by 2035/36 due to transfers of higher usage seasonal customers to Residential Basic. Seasonal customers are billed only twice a year either due to low usage (being a seasonal residence or cottage) or because of a location that makes it difficult to access for more frequent meter readings. The usage of Residential Seasonal customers is expected to increase 0.4% a year to 87 GWh in 2035/36.

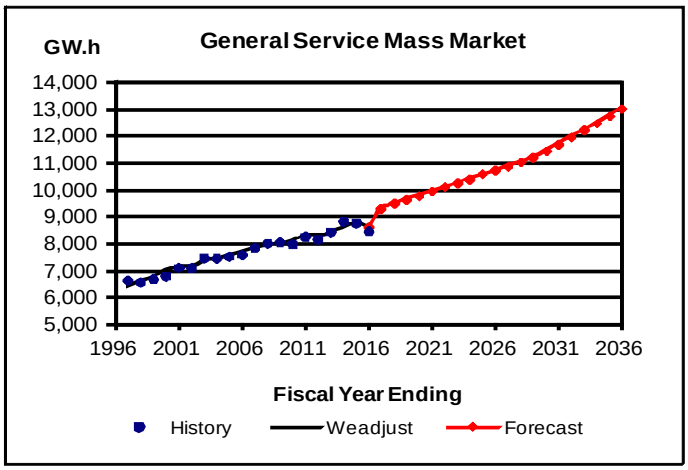
Residential Flat Rate Water Heating

Residential Water Heating is a flat rate unmetered service. This service has not been available to new customers since November 12, 1969. There were 3,454 remaining services in 2015/16. The number of services and usage is expected to decrease 5% per year throughout the forecast period. Usage was 18 GWh in 2015/16 and that will decrease to 6 GWh by 2035/36.

General Service Mass Market

General Service Mass Market includes all Commercial and Industrial customers, excluding the General Service Top Consumers. There were 67,395 General Service Mass Market customers in 2015/16. Approximately 15% are Industrial and the others are Commercial.

Figure 7 - General Service Mass Market



GS Mass Market has grown 114 GWh (1.5%) per year for the past 20 years and 91 GWh per year (1.1%) for the past 10 years. This historical growth reflects the effect of past Demand Side Management (DSM) initiatives. Starting 2016/17, seven Top Consumers totaling 404 GWh in 2015/16 were moved into the Mass Market sector for forecasting purposes which account for approximately 60% of the increase in 2016/17. The Mass Market Sector is forecast to grow 169 GWh (1.7%) per year for the next 10 years and 200 GWh (1.9%) per year for the next 20 years before program-based DSM initiatives.

The primary drivers for growth in the GS Mass Market are the population and the economy. Changes in residential customers and the Manitoba Gross Domestic Product (GDP) are reflected in the GS Mass Market's electricity use.

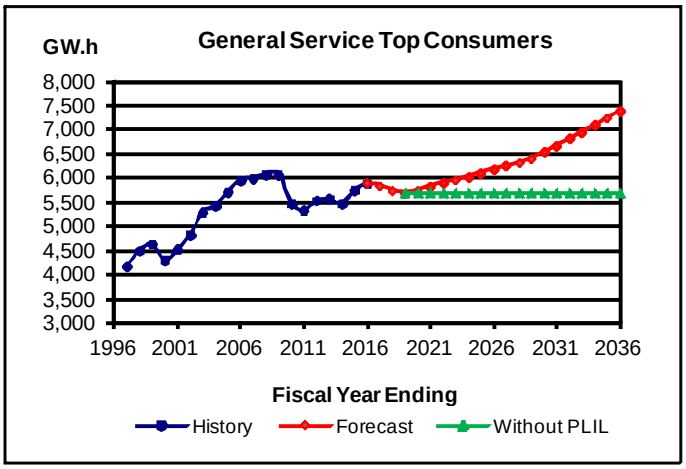
Table 15 - General Service Mass Market

GENERAL SERVICE MASS MARKET (GWh) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Weather Adjust	Adjusted Sales	Fiscal Year	Forecast Sales
1996/97	6,627	-193	6,434	2016/17	9,286
1997/98	6,562	53	6,615	2017/18	9,471
1998/99	6,668	108	6,776	2018/19	9,639
1999/00	6,796	187	6,983	2019/20	9,779
2000/01	7,110	5	7,114	2020/21	9,931
2001/02	7,084	50	7,135	2021/22	10,084
2002/03	7,467	-137	7,330	2022/23	10,241
2003/04	7,460	-17	7,443	2023/24	10,400
2004/05	7,516	40	7,556	2024/25	10,560
2005/06	7,587	115	7,702	2025/26	10,701
2006/07	7,839	-40	7,799	2026/27	10,866
2007/08	8,006	-48	7,958	2027/28	11,034
2008/09	8,049	-46	8,003	2028/29	11,203
2009/10	7,985	93	8,078	2029/30	11,446
2010/11	8,258	42	8,299	2030/31	11,694
2011/12	8,162	103	8,265	2031/32	11,945
2012/13	8,434	-39	8,395	2032/33	12,202
2013/14	8,839	-264	8,575	2033/34	12,465
2014/15	8,771	-56	8,715	2034/35	12,735
2015/16	8,442	167	8,608	2035/36	13,013

General Service Top Consumers

General Service Top Consumers represent the top energy consuming businesses in Manitoba and account for 27% of all General Consumers Sales. GS Top Consumers include 10 distinct companies that count as 23 customers in the Primary Metals, Chemicals, Petrol/Oil/Natural Gas and Pulp/Paper sectors.

Figure 8 - General Service Top Consumers



GS Top Consumers increased 90 GWh (1.8%) per year over the past 20 years but decreased 6 GWh per year (-0.1%) over the past 10 years. The decrease was due to the economic downturn experienced from 2008 to 2011 and the loss of one Top Consumer. Starting in 2016/17, seven of the smallest Top Consumers, totaling 404 GWh in 2015/16, were moved to the General Service Mass Market Sector for forecasting purposes. Restated Top Consumers sales for 2015/16 would become 5,482 GWh, with expected growth of 319 GWh in 2016/17.

The Top Consumers sector is now forecast to grow an average of 69 GWh (1.2%) per year for the next 10 years and an average of 95 GWh (1.5%) per year for the next 20 years. Short term increases are expected in the Petro/Oil/Natural Gas sector. These are offset by reductions in the Primary Metals sector. Long term growth is forecast to be steady based on an expectation of good economic growth into the future.

Table 16 - General Service Top Consumers

GENERAL SERVICE TOP CONSUMERS (GWh) HISTORICAL/FORECAST WITH PLIL					
Fiscal Year	Sales	Fiscal Year	Individual	PLIL	Total
1996/97	4,173	2016/17	5,835	0	5,835
1997/98	4,493	2017/18	5,748	0	5,748
1998/99	4,632	2018/19	5,675	0	5,675
1999/00	4,299	2019/20	5,675	71	5,746
2000/01	4,515	2020/21	5,675	143	5,818
2001/02	4,818	2021/22	5,675	215	5,890
2002/03	5,282	2022/23	5,675	283	5,958
2003/04	5,423	2023/24	5,675	353	6,028
2004/05	5,714	2024/25	5,675	425	6,100
2005/06	5,948	2025/26	5,675	497	6,172
2006/07	5,989	2026/27	5,675	572	6,247
2007/08	6,075	2027/28	5,675	647	6,322
2008/09	6,065	2028/29	5,675	725	6,400
2009/10	5,461	2029/30	5,675	857	6,532
2010/11	5,324	2030/31	5,675	992	6,667
2011/12	5,531	2031/32	5,675	1,130	6,805
2012/13	5,560	2032/33	5,675	1,271	6,946
2013/14	5,461	2033/34	5,675	1,415	7,090
2014/15	5,750	2034/35	5,675	1,562	7,237
2015/16	5,886	2035/36	5,675	1,712	7,387

For the short term, General Service Top Consumers are forecast individually. Expected increases and decreases from customer's current and upcoming operating and expansion plans are compiled for the first three years of the forecast but exclude longer term plans that are uncommitted and subject to change.

For the long term, the growth of all Top Consumers is forecast together econometrically. The econometric long term Top Consumer forecast is referred to as Potential Large Industrial Loads (PLIL). PLIL is based on the historic growth of the ten companies that now comprise Top Consumers as well as one former Top Consumers customer that closed in 2009. These are large companies that both drive and define the national economy. The historical data used for modeling PLIL includes company expansions, cutbacks and shutdowns, new startups of companies that then were added to the Top Consumers classification, and the incremental growth of the individual Top Consumers. Therefore, the forecast implicitly includes the same expectations.

Historical growth of the Top Consumer sector is modeled using Gross Domestic Product (GDP) and electricity price as independent variables. The historic correlation between GDP, price and Top Consumer growth has been very strong and is expected to continue to be strong in the future. Future projections of GDP and price are used to forecast the future increase in Top Consumer growth starting from the fourth year of the forecast.

The sum of the individual company forecasts (less the seven Top Consumers moved to General Service Mass Market) is expected to grow from 5,482 GWh in 2015/16 to 5,675 GWh in 2018/19. After 2018/19, the individual forecasts for these customers are held constant. Longer term growth is considered to be included in PLIL, including growth and contractions expected to arise from committed plans in the Petro/Oil/Natural Gas and Mining sectors beyond year three.

PLIL is added starting in year four of the forecast. The econometric forecast for PLIL is based on an expected annual Canada/U.S. real GDP growth rate of 2.1%, leading to a forecast growth of 1.5% annually. When the historic real GDP growth rate over the past 20 years was 2.4%, the Top Consumers sector growth averaged 1.8% annually.

The Top Consumers sector is expected to grow 193 GWh in the first three years based on individual customer short term plans, and another 1,712 GWh in years 4 to 20 for PLIL.

General Service Diesel, Seasonal, and Flat Rate Water Heat

General Service Diesel

In 2015/16, there were 184 General Service Diesel Full Cost customers using 6 GWh. The General Service Diesel sector is forecast to use 7 GWh by 2035/36.

General Service Seasonal

In 2015/16, there were 882 General Service Seasonal customers using 5 GWh. The General Service Seasonal sector is expected to grow to 6 GWh by 2035/36.

General Service Flat Rate Water Heating

General Service Water Heating is a flat rate unmetered service that has not been available to new customers since November 12, 1969. There were 359 remaining services in 2015/16. The number of services is expected to decrease 5% per year throughout the forecast period. Consumption was 6 GWh in 2015/16 and that is forecast to decrease to 2 GWh by 2034/35.

General Service Surplus Energy Program

Participants in the Surplus Energy Program (SEP) used 27 GWh in 2015/16 and are expected to to use 25 GWh in 2016/17 and for the remainder of the forecast period. This energy is considered to be “interruptible” and thus “non-firm”. The energy used by these customers is included in Sales, but it is excluded from the Gross Firm Energy forecast.

Plug-In Electric Vehicles

This forecast includes an estimate of the future adoption of Plug-In Electric Vehicles in the Manitoba Hydro service area. This is made up of two types:

(1) Plug-In Hybrid Electric Vehicles (PHEVs) run on an electric battery but use an internal combustion engine (ICE) or gasoline powered generator to extend the driving range when the battery charge runs low. An example is the Chevrolet Volt. As of March 1, 2016 there were 65 PHEVs registered in Manitoba.

(2) Plug-in Electric Vehicles (PEVs) run only on electric battery power. Pure electric plug-in vehicles include the Nissan Leaf, the Tesla, Mitsubishi MiEV, and New Flyer Xcelsior transit bus. As of March 1, 2016 there were 75 PEVs registered in Manitoba.

The forecast of electric vehicles does not include non-plug-in Hybrid Electric Vehicles (HEVs). These vehicles, such as the non-plug-in Toyota Prius, have an internal combustion engine as well as a battery and electric motor to drive the wheels. The HEV battery is charged with power from the ICE and through regenerative breaking. It is not charged by plugging in and therefore does not affect electricity consumption in Manitoba. As of March 1, 2016 and after 15 years in the market, there were only 4,650 HEVs registered in Manitoba, representing 0.5% of all registered road motor vehicles.

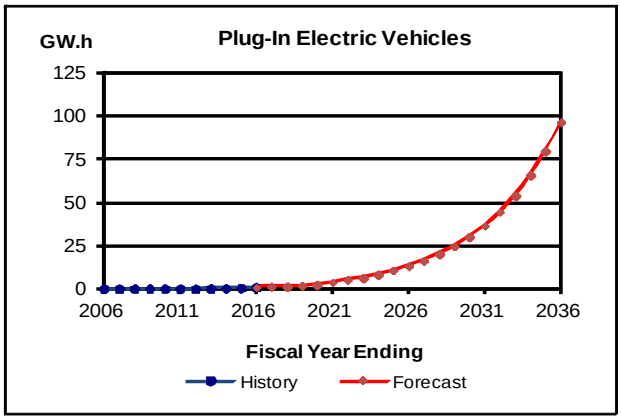
According to EV-Volumes, an EV sales database and consulting group, there were 540,000 plug-in vehicles sold worldwide in 2015, making up 0.6% of new vehicle sales in the last year. Total worldwide number of electric plug-in vehicles surpassed the one million mark in September of 2015. Out of the total global vehicle count of just over one billion, electric plug-in vehicles represent 0.1% of the total. The United States accounts for 406,000 of total electric plug-in vehicle sales to date or approximately 40% of all electric vehicles sales worldwide. In Canada, 18,451 plug-in electric vehicles were registered as of December 31, 2015 according to FleetCarma. Plug-in vehicles make up 0.08% of total road motor vehicle registrations in Canada. In Manitoba, as of fiscal year ending 2016, there were 140 plug-in vehicles out of a total of 870,589 making up 0.02% of total road motor vehicle registrations (Table 17).

On March 31, 2016, Tesla Motors unveiled its most affordable EV, the Model 3 and opened it up for preorders. The Model 3 price starts at US $35,000. By May 19, 2016, 373,000 potential

customers reserved the Model 3 with a $1,000 down payment. Cancellations are allowed up until 2020. Delivery of the first Model 3's is anticipated for late 2017, early 2018. Deliveries will first go to California, and then to the American East Coast. Tesla Motors has sold almost 125,000 electric cars worldwide since delivery of its first Tesla Roadster in 2008. Based on the 20 Tesla vehicles registered in Manitoba, the number of Model 3s on preorder from Manitoba is estimated at 60. Model 3's will probably be arriving in Manitoba in 2019 or even 2020.

The Electric Vehicle Forecast

Figure 9 - Plug-In Electric Vehicles



As of March 1st, 2016, there were a total of 140 plug-in electric vehicles, including four electric buses, registered in Manitoba with the Manitoba Public Insurance Corporation. Last year's 2015 Load Forecast predicted a total of 137 plug-in vehicles to be registered in Manitoba at fiscal year ending 2016. The latest electric vehicle forecast is adjusted to incorporate the slightly higher actual registrations recorded in fiscal year ending 2016. The Table 17 details the Manitoba actual and forecasted number of new vehicles per year, the total number of vehicles each year, as well as the corresponding numbers for Plug-In Electric Vehicles. The forecast incorporates passenger as well as commercial category vehicles such as Sport Utility Vehicles (SUVs), light and heavy duty trucks, and transit buses. Pull-trailers, farm equipment, motor boats and motor cycles are not included in the count. A passenger PEV consumes approximately 3,500 kWh annually, the equivalent use of one residential, electric hot water tank. An electric transit bus consumes 87,500 kWh annually. That is the equivalent use of three electrically heated single detached dwellings. The number of new PEVs is expected to slowly increase until it reaches about 0.71% of new vehicle sales (481 units) in 2025/26 and 4.36% of new vehicle sales (3,399 units) in 2035/36. The total number of PEVs on the road is forecasted to be 0.21% of total vehicle registrations (2,345 units) in 2025/26 increasing to 1.37% of total vehicle registrations (18,742 units) by 2035/36.

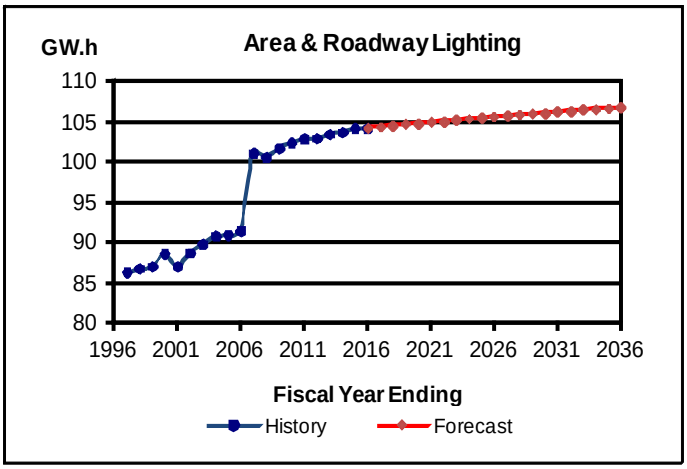
Total energy use for PEVs in Manitoba is forecasted to be 13 GWh in 2025/26 and 96 GWh by 2035/36. Peak usage coincident to Manitoba Hydro's system peak is forecasted to be 1.6 MW in 2025/26 and 12.0 MW in 2035/36. Forecasted use decreased from 2015 forecast due an adjustment in the annual consumption of electric transit buses.

Table 17 - Plug-In Electric Vehicles

PLUG-IN ELECTRIC VEHICLE FORECAST History and Forecast 2005/06 - 2035/36								
Fiscal Year	New Vehicles Purchased	New PEV Purchased	New PEV %	Total Vehicles	Total PEV	Total % PEV	Cumul Total PEV GWh	Cumul Total PEV MW
2005/06	46,127	0	0.0%	672,122	0	0.0%	0	0
2006/07	46,164	0	0.0%	686,576	0	0.0%	0	0
2007/08	47,953	0	0.0%	704,519	0	0.0%	0	0
2008/09	46,710	0	0.0%	716,963	0	0.0%	0	0
2009/10	45,355	0	0.0%	763,919	0	0.0%	0	0
2010/11	48,546	1	0.0%	780,979	1	0.0%	0	0
2011/12	52,236	8	0.0%	801,262	9	0.0%	0	0
2012/13	56,275	28	0.0%	814,569	37	0.0%	0	0
2013/14	57,783	32	0.1%	828,252	69	0.0%	0	0
2014/15	58,882	30	0.1%	857,029	99	0.0%	1	0
2015/16	57,809	41	0.1%	870,589	140	0.0%	1	0
2016/17	58,819	55	0.1%	891,983	195	0.0%	1	0.1
2017/18	59,829	67	0.1%	913,743	262	0.0%	1	0.2
2018/19	60,839	84	0.1%	935,872	346	0.0%	2	0.2
2019/20	61,848	120	0.2%	958,367	466	0.0%	2	0.3
2020/21	62,858	192	0.3%	981,230	658	0.1%	4	0.5
2021/22	63,868	220	0.3%	1,004,460	878	0.1%	5	0.6
2022/23	64,878	267	0.4%	1,028,057	1,145	0.1%	7	0.8
2023/24	65,888	325	0.5%	1,052,022	1,470	0.1%	8	1.0
2024/25	66,898	395	0.6%	1,076,354	1,865	0.2%	11	1.3
2025/26	67,907	481	0.7%	1,101,053	2,345	0.2%	13	1.6
2026/27	68,917	585	0.8%	1,126,120	2,930	0.3%	16	2.0
2027/28	69,927	711	1.0%	1,151,554	3,641	0.3%	20	2.5
2028/29	70,937	865	1.2%	1,177,355	4,506	0.4%	24	3.1
2029/30	71,947	1,052	1.5%	1,203,523	5,558	0.5%	30	3.7
2030/31	72,957	1,280	1.8%	1,230,059	6,837	0.6%	36	4.5
2031/32	73,966	1,556	2.1%	1,256,962	8,393	0.7%	44	5.5
2032/33	74,976	1,892	2.5%	1,284,232	10,285	0.8%	54	6.7
2033/34	75,986	2,301	3.0%	1,311,870	12,586	1.0%	65	8.2
2034/35	76,996	2,797	3.6%	1,339,875	15,383	1.1%	79	9.9
2035/36	78,006	3,399	4.4%	1,368,247	18,782	1.4%	96	12.0

Area & Roadway Lighting

Figure 10 - 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 groups. Sentinel Lighting 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 public roadway lighting in Manitoba. In 2006, a readjustment of the rate classes moved some flat rate General Service meters into the Lighting sector. Only Street Lights count as customers.

The Area and Roadway Lighting sector is forecast to increase from 104 GWh in 2015/16 to 107 GWh by 2035/36 at an average annual growth rate of 0.1 GWh or 0.1% per year. This does not include the effect of future Demand Side Management (DSM) initiatives in this sector.

Table 18 - Area & Roadway Lighting

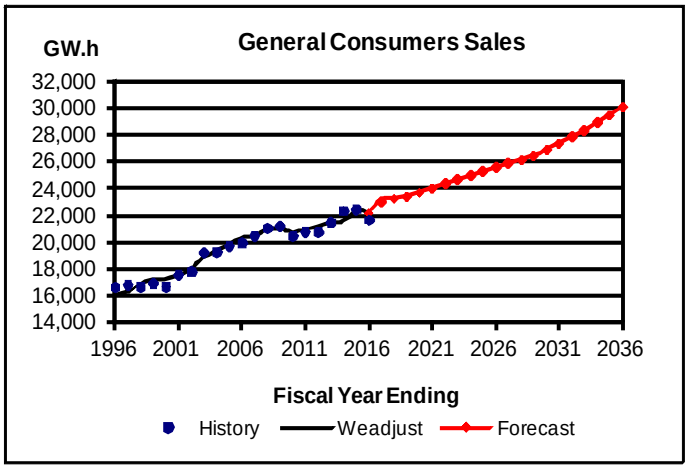
AREA & ROADWAY LIGHTING (GWh) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Weather Adjust	Adjusted Sales	Fiscal Year	Forecast Sales
1996/97	86	0	86	2016/17	104
1997/98	87	0	87	2017/18	104
1998/99	87	0	87	2018/19	105
1999/00	89	0	89	2019/20	105
2000/01	87	0	87	2020/21	105
2001/02	89	0	89	2021/22	105
2002/03	90	0	90	2022/23	105
2003/04	91	0	91	2023/24	105
2004/05	91	0	91	2024/25	105
2005/06	91	0	91	2025/26	106
2006/07	101	0	101	2026/27	106
2007/08	101	0	101	2027/28	106
2008/09	102	0	102	2028/29	106
2009/10	102	0	102	2029/30	106
2010/11	103	0	103	2030/31	106
2011/12	103	0	103	2031/32	106
2012/13	103	0	103	2032/33	106
2013/14	104	0	104	2033/34	107
2014/15	104	0	104	2034/35	107
2015/16	104	0	104	2035/36	107

Table 19 - Area & Roadway Lighting

AREA AND ROADWAY LIGHTING History and Forecast 2005/06 - 2035/36								
Fiscal	Sentinal Flat Rates		Sentinal Rentals		Street Lighting		Total Lighting	
Year	(Services)	(GWh)	(Services)	(GWh)	(Custs)	(GWh)	(Custs)	(GWh)
2005/06	19,652	10	7,826	0	793	81	793	91
2006/07	18,669	11	23,994	0	1,129	90	1,129	101
2007/08	18,947	11	24,272	0	1,142	90	1,142	101
2008/09	19,228	11	24,542	0	1,175	91	1,175	102
2009/10	19,539	11	24,886	0	1,191	91	1,191	102
2010/11	19,835	11	25,216	0	1,184	92	1,184	103
2011/12	20,033	11	25,427	0	1,155	91	1,155	103
2012/13	20,238	12	25,613	0	1,164	92	1,164	103
2013/14	20,399	12	25,764	0	1,157	92	1,157	104
2014/15	20,495	12	25,853	0	1,196	92	1,196	104
2015/16	20,643	12	25,960	0	1,208	92	1,208	104
2016/17	20,834	12	26,138	0	1,216	93	1,216	104
2017/18	20,969	12	26,287	0	1,221	93	1,221	104
2018/19	21,104	12	26,436	0	1,226	93	1,226	105
2019/20	21,239	12	26,585	0	1,231	93	1,231	105
2020/21	21,374	12	26,734	0	1,236	93	1,236	105
2021/22	21,509	12	26,883	0	1,241	93	1,241	105
2022/23	21,644	12	27,032	0	1,246	93	1,246	105
2023/24	21,779	12	27,181	0	1,251	93	1,251	105
2024/25	21,914	12	27,330	0	1,256	93	1,256	105
2025/26	22,049	12	27,479	0	1,261	93	1,261	106
2026/27	22,184	13	27,628	0	1,266	93	1,266	106
2027/28	22,319	13	27,777	0	1,271	93	1,271	106
2028/29	22,454	13	27,926	0	1,276	93	1,276	106
2029/30	22,589	13	28,075	0	1,281	93	1,281	106
2030/31	22,724	13	28,224	0	1,286	93	1,286	106
2031/32	22,859	13	28,373	0	1,291	93	1,291	106
2032/33	22,994	13	28,522	0	1,296	93	1,296	106
2033/34	23,129	13	28,671	0	1,301	93	1,301	107
2034/35	23,264	13	28,820	0	1,306	93	1,306	107
2035/36	23,399	13	28,969	0	1,311	94	1,311	107

Total General Consumers Sales

Figure 11 - General Consumers Sales



General Consumers Sales includes sales to all of Manitoba Hydro's individually billed customers, but excludes export sales. This 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.

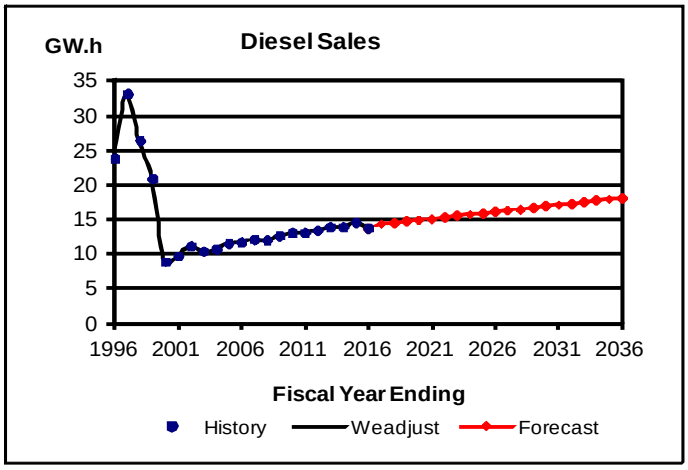
Weather adjusted General Consumers Sales has grown 311 GWh (1.6%) per year for the past 20 years and 188 GWh (0.9%) per year over the past 10 years. This historical growth includes the effect of past Demand Side Management (DSM) initiatives. Sales are forecast to grow 337 GWh (1.4%) per year for the next 10 years and 393 GWh (1.5%) per year for the next 20 years before program-based DSM initiatives.

Table 20 - General Consumers Sales

GENERAL CONSUMERS SALES (GWh) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Weather Adjust	Adjusted Sales	Fiscal Year	Forecast Sales
1996/97	16,851	-583	16,268	2016/17	23,053
1997/98	16,681	159	16,840	2017/18	23,229
1998/99	16,929	316	17,245	2018/19	23,407
1999/00	16,696	497	17,193	2019/20	23,715
2000/01	17,590	-32	17,558	2020/21	24,024
2001/02	17,805	183	17,988	2021/22	24,339
2002/03	19,246	-401	18,846	2022/23	24,650
2003/04	19,280	-15	19,265	2023/24	24,961
2004/05	19,735	52	19,788	2024/25	25,271
2005/06	19,935	371	20,306	2025/26	25,557
2006/07	20,510	-58	20,452	2026/27	25,855
2007/08	21,061	-127	20,934	2027/28	26,134
2008/09	21,210	-201	21,009	2028/29	26,438
2009/10	20,486	227	20,713	2029/30	26,879
2010/11	20,786	120	20,906	2030/31	27,328
2011/12	20,771	401	21,172	2031/32	27,823
2012/13	21,477	-55	21,422	2032/33	28,359
2013/14	22,338	-807	21,531	2033/34	28,910
2014/15	22,458	-176	22,281	2034/35	29,472
2015/16	21,654	532	22,186	2035/36	30,055

Diesel Sales

Figure 12 - Diesel Sales



There are four communities served by diesel generation in Manitoba: Brochet, Lac Brochet, Tadoule Lake and Shamattawa. Sales within these communities are included in General Consumers Sales, but are not part of the Integrated System, and are thus not part of Common Bus or Gross Firm Load.

Between 1997 and 1999, eleven communities previously served by diesel generation were connected to the Integrated System resulting in the drop in overall diesel sales. The four sites that were to remain diesel were converted from 15 amp service to 60 amp service between 1991 and 2001 causing the increase in those years.

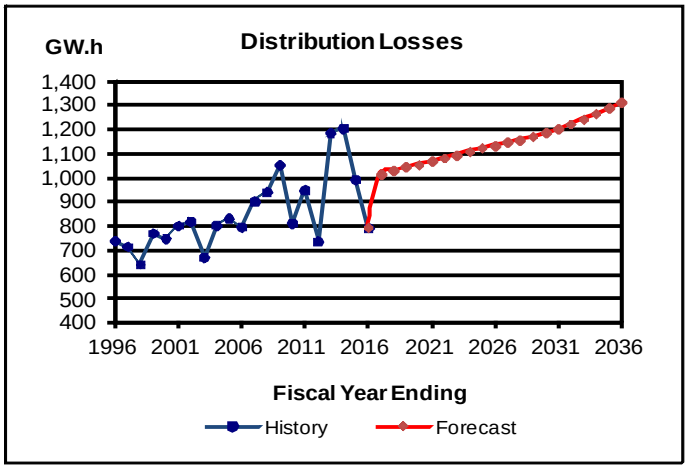
Diesel customers do not have electric heat, which requires a minimum 200 amp service, therefore there is no weather effect.

Table 21 - Diesel Sales

DIESEL SALES (GWh) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Weather Adjust	Adjusted Sales	Fiscal Year	Forecast Sales
1996/97	33	0	33	2016/17	14
1997/98	26	0	26	2017/18	15
1998/99	21	0	21	2018/19	15
1999/00	9	0	9	2019/20	15
2000/01	10	0	10	2020/21	15
2001/02	11	0	11	2021/22	15
2002/03	10	0	10	2022/23	16
2003/04	11	0	11	2023/24	16
2004/05	12	0	12	2024/25	16
2005/06	12	0	12	2025/26	16
2006/07	12	0	12	2026/27	16
2007/08	12	0	12	2027/28	16
2008/09	13	0	13	2028/29	17
2009/10	13	0	13	2029/30	17
2010/11	13	0	13	2030/31	17
2011/12	13	0	13	2031/32	17
2012/13	14	0	14	2032/33	17
2013/14	14	0	14	2033/34	18
2014/15	15	0	15	2034/35	18
2015/16	14	0	14	2035/36	18

Distribution Losses

Figure 13 - Distribution Losses



Distribution Losses are made up of the power loss between the distribution substation (Manitoba Load at Common Bus less Construction) and the customer's meter (General Consumers Sales less Diesel), as well as all other differences between what was billed and what was metered. The other differences include:

1. The offset between cycle billing (General Consumers Sales) and actual calendar month usage (Common Bus).
2. Customer Accounting adjustments,
3. Inaccuracies associated with estimated billing (including flat rate estimates),
4. The metered but unbilled consumption of Manitoba Hydro offices, and
5. Energy lost due to theft.

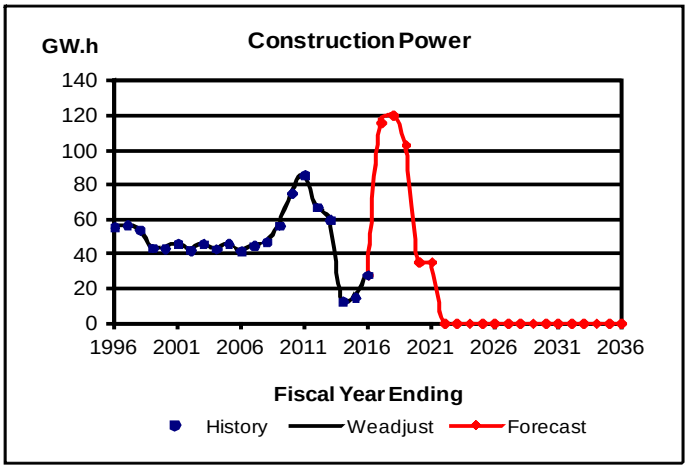
Distribution Losses are forecast in 2016/17 to be 4.4% of the General Consumers Sales less Diesel and remain between 4.4% and 4.5% throughout the forecast.

Table 22 - Distribution Losses

DISTRIBUTION LOSSES (GWh) HISTORICAL / PERCENT OF SALES / FORECAST							
Fiscal Year	Losses	Sales less Diesel	% Losses	Fiscal Year	Forecast Losses	Sales less Diesel	% Losses
1996/97	715	16,818	4.3%	2016/17	1,014	23,038	4.4%
1997/98	641	16,655	3.9%	2017/18	1,028	23,214	4.4%
1998/99	771	16,908	4.6%	2018/19	1,042	23,392	4.5%
1999/00	749	16,687	4.5%	2019/20	1,055	23,700	4.4%
2000/01	802	17,580	4.6%	2020/21	1,067	24,009	4.4%
2001/02	819	17,793	4.6%	2021/22	1,081	24,323	4.4%
2002/03	671	19,236	3.5%	2022/23	1,094	24,634	4.4%
2003/04	804	19,269	4.2%	2023/24	1,107	24,946	4.4%
2004/05	830	19,724	4.2%	2024/25	1,121	25,255	4.4%
2005/06	797	19,923	4.0%	2025/26	1,133	25,541	4.4%
2006/07	900	20,497	4.4%	2026/27	1,145	25,839	4.4%
2007/08	940	21,049	4.5%	2027/28	1,156	26,118	4.4%
2008/09	1,052	21,198	5.0%	2028/29	1,168	26,421	4.4%
2009/10	813	20,473	4.0%	2029/30	1,184	26,862	4.4%
2010/11	947	20,773	4.6%	2030/31	1,200	27,311	4.4%
2011/12	736	20,757	3.5%	2031/32	1,220	27,805	4.4%
2012/13	1,184	21,463	5.5%	2032/33	1,241	28,341	4.4%
2013/14	1,205	22,324	5.4%	2033/34	1,264	28,892	4.4%
2014/15	992	22,443	4.4%	2034/35	1,287	29,454	4.4%
2015/16	791	21,640	3.7%	2035/36	1,311	30,037	4.4%

Construction Power

Figure 14 - Construction Power



Construction Power 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. Construction Power also includes Station Service until a plant is commissioned. Until 2013, about 48 GWh of heating load at the Gillam, Limestone and Kettle town sites was included in Construction Power. This energy is now included in Distribution Losses.

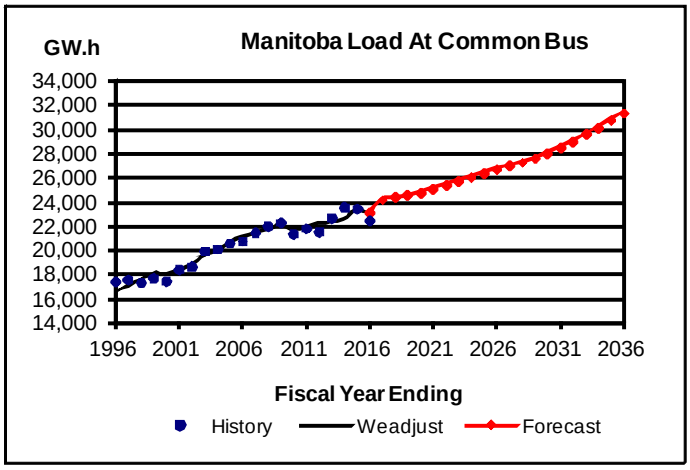
The Construction Power forecast includes: (1) the Keeyask Generating Station, (2) the Keewatinoow Converter Station, started in January 2012 with expected completion in the Fall of 2018 and (3) the Riel Converter Station with an expected completion date of 2019.

Table 23 - Construction Power

CONSTRUCTION POWER (GWh) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Usage	Weather Adjust	Adjusted Usage	Fiscal Year	Forecast Usage
1996/97	56	0	56	2016/17	116
1997/98	54	0	54	2017/18	120
1998/99	43	0	43	2018/19	103
1999/00	43	0	43	2019/20	35
2000/01	46	0	46	2020/21	35
2001/02	42	0	42	2021/22	0
2002/03	46	0	46	2022/23	0
2003/04	43	0	43	2023/24	0
2004/05	46	0	46	2024/25	0
2005/06	42	0	42	2025/26	0
2006/07	45	0	45	2026/27	0
2007/08	47	0	47	2027/28	0
2008/09	56	0	56	2028/29	0
2009/10	75	0	75	2029/30	0
2010/11	85	0	85	2030/31	0
2011/12	67	0	67	2031/32	0
2012/13	59	0	59	2032/33	0
2013/14	12	0	12	2033/34	0
2014/15	15	0	15	2034/35	0
2015/16	28	0	28	2035/36	0

Manitoba Load at Common Bus

Figure 15 - Manitoba Load at Common Bus



Manitoba Load at Common Bus is the total load measured from all the distribution points (i.e. substations) within Manitoba. It includes all energy supplied to General Consumers Sales customers, Construction Power plus associated Distribution Losses, but excludes Diesel customers, Transmission Losses and Station Service.

Common Bus is metered and totaled to correspond exactly to each calendar month. Weather adjustment is done on a calendar month basis.

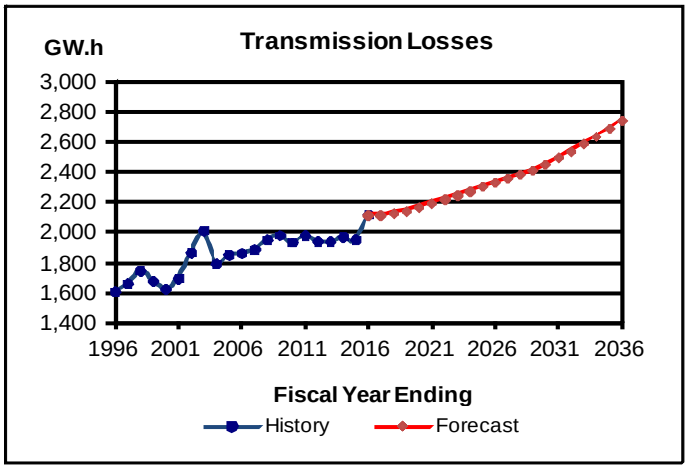
Weather adjusted Common Bus has grown 320 GWh (1.6%) per year for the past 20 years and 191 GWh (0.9%) per year during the past 10 years reflecting the recent economic downturn. This historical growth also includes the effect of past Demand Side Management (DSM) initiatives. Common Bus is forecast to grow 359 GWh (1.5%) per year for the next 10 years and 413 GWh (1.5%) per year for the next 20 years before program-based DSM initiatives.

Table 24 - Manitoba Load at Common Bus

MANITOBA LOAD AT COMMON BUS (GWh) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Energy	Weather Adjust	Adjusted Energy	Fiscal Year	Forecast Energy
1996/97	17,590	-594	16,996	2016/17	24,168
1997/98	17,350	248	17,598	2017/18	24,363
1998/99	17,722	355	18,077	2018/19	24,537
1999/00	17,479	573	18,051	2019/20	24,789
2000/01	18,428	-135	18,293	2020/21	25,111
2001/02	18,655	159	18,813	2021/22	25,404
2002/03	19,953	-359	19,594	2022/23	25,728
2003/04	20,116	-108	20,007	2023/24	26,053
2004/05	20,600	47	20,647	2024/25	26,375
2005/06	20,761	409	21,170	2025/26	26,674
2006/07	21,442	-38	21,404	2026/27	26,984
2007/08	22,036	-197	21,839	2027/28	27,274
2008/09	22,305	-219	22,086	2028/29	27,590
2009/10	21,361	363	21,724	2029/30	28,046
2010/11	21,806	64	21,869	2030/31	28,511
2011/12	21,560	660	22,220	2031/32	29,025
2012/13	22,706	-352	22,354	2032/33	29,583
2013/14	23,541	-921	22,620	2033/34	30,156
2014/15	23,450	-41	23,408	2034/35	30,741
2015/16	22,460	625	23,085	2035/36	31,348

Transmission Losses

Figure 16 - 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. Transmission Losses only contains losses associated with supplying Manitoba customers. Losses attributable to exports and the gains attributable to imports are excluded. Transmission Losses are mostly losses on the High Voltage Direct Current (HVDC) lines, and are substantial because of the distance of transmission from northern generation to southern distribution points, but are much less than what AC losses would be over that distance. Transmission Losses vary year to year depending on water conditions, system configuration, outages and the magnitude of the load. High losses experienced in 2002/03 were due to two HVDC transformer failures.

Transmission Losses are forecast to be 9.1% to 9.2% of the General Consumers Sales less Diesel Sales.

Table 25 - Transmission Losses

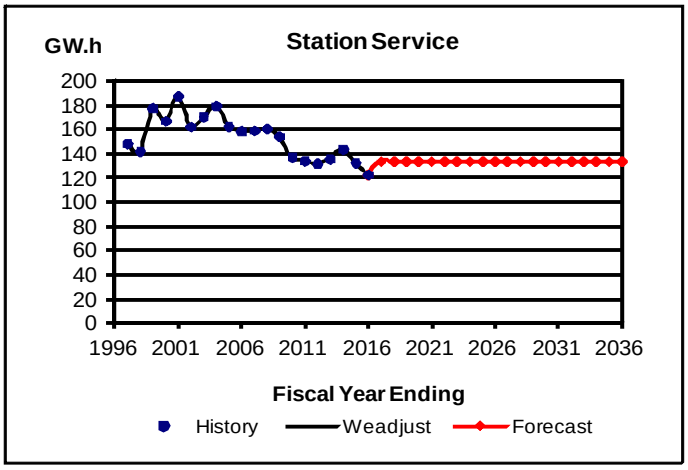
TRANSMISSION LOSSES (GWh) HISTORICAL / PERCENT OF SALES / FORECAST							
Fiscal Year	Losses	Sales less Diesel	% Losses	Fiscal Year	Forecast Losses	Sales less Diesel	% Losses
1996/97	1,660	16,818	9.9%	2016/17	2,109	23,038	9.2%
1997/98	1,745	16,655	10.5%	2017/18	2,126	23,214	9.2%
1998/99	1,675	16,908	9.9%	2018/19	2,141	23,392	9.2%
1999/00	1,623	16,687	9.7%	2019/20	2,163	23,700	9.1%
2000/01	1,696	17,580	9.6%	2020/21	2,192	24,009	9.1%
2001/02	1,864	17,793	10.5%	2021/22	2,217	24,323	9.1%
2002/03	2,012	19,236	10.5%	2022/23	2,246	24,634	9.1%
2003/04	1,792	19,269	9.3%	2023/24	2,274	24,946	9.1%
2004/05	1,852	19,724	9.4%	2024/25	2,302	25,255	9.1%
2005/06	1,860	19,923	9.3%	2025/26	2,328	25,541	9.1%
2006/07	1,885	20,497	9.2%	2026/27	2,355	25,839	9.1%
2007/08	1,949	21,049	9.3%	2027/28	2,381	26,118	9.1%
2008/09	1,979	21,198	9.3%	2028/29	2,408	26,421	9.1%
2009/10	1,934	20,473	9.4%	2029/30	2,448	26,862	9.1%
2010/11	1,977	20,773	9.5%	2030/31	2,489	27,311	9.1%
2011/12	1,939	20,757	9.3%	2031/32	2,534	27,805	9.1%
2012/13	1,936	21,463	9.0%	2032/33	2,583	28,341	9.1%
2013/14	1,969	22,324	8.8%	2033/34	2,633	28,892	9.1%
2014/15	1,949	22,443	8.7%	2034/35	2,684	29,454	9.1%
2015/16	2,116	21,640	9.8%	2035/36	2,737	30,037	9.1%

Station Service

Figure 17 - Station Service

Station Service is the energy used by power plants to generate power and service their own load. Manitoba energy or peak without Station Service is referred to as "Net", and with Station Service as "Gross".

Station Service energy is forecast to be 133 GWh and Station Service peak is forecast to be 23 MW from 2016/17 to 2035/36.



Station Service for Keeyask and for future non-committed plants is excluded from this forecast.

Table 26 - Station Service

STATION SERVICE (GWh) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Usage	Weather Adjust	Adjusted Usage	Fiscal Year	Forecast Usage
1996/97	148	0	148	2016/17	133
1997/98	142	0	142	2017/18	133
1998/99	177	0	177	2018/19	133
1999/00	167	0	167	2019/20	133
2000/01	187	0	187	2020/21	133
2001/02	162	0	162	2021/22	133
2002/03	170	0	170	2022/23	133
2003/04	179	0	179	2023/24	133
2004/05	163	0	163	2024/25	133
2005/06	158	0	158	2025/26	133
2006/07	159	0	159	2026/27	133
2007/08	161	0	161	2027/28	133
2008/09	154	0	154	2028/29	133
2009/10	137	0	137	2029/30	133
2010/11	134	0	134	2030/31	133
2011/12	131	0	131	2031/32	133
2012/13	136	0	136	2032/33	133
2013/14	144	0	144	2033/34	133
2014/15	132	0	132	2034/35	133
2015/16	123	0	123	2035/36	133

Table 27 - Monthly Station Service Energy

MONTHLY STATION SERVICE ENERGY (GWh)
History and Forecast

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2005/06	12.6	11.0	10.0	11.1	10.1	9.6	11.8	15.2	18.4	16.7	17.0	14.9	158.3
2006/07	10.2	8.9	8.4	10.3	9.3	8.6	13.4	16.1	16.7	18.6	19.7	18.7	158.8
2007/08	15.7	12.1	9.1	8.2	8.4	7.3	8.7	14.7	19.2	18.6	19.7	18.8	160.5
2008/09	13.8	9.4	7.5	9.5	10.4	7.1	10.6	15.1	20.1	20.4	14.9	15.5	154.2
2009/10	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
2010/11	10.2	9.9	7.3	6.7	7.2	7.4	9.5	12.9	16.4	17.1	14.4	15.0	134.1
2011/12	12.0	9.9	7.5	7.1	7.3	6.7	9.5	13.1	15.1	16.0	13.8	13.1	131.3
2012/13	11.0	9.4	7.7	7.0	6.7	6.4	11.4	14.3	16.2	16.6	13.7	15.2	135.5
2013/14	12.6	11.1	7.0	7.5	7.6	6.9	11.2	13.5	17.8	17.0	15.8	15.8	143.8
2014/15	12.1	9.6	7.7	7.5	7.2	7.0	8.9	13.2	14.4	16.1	15.0	13.7	132.4
2015/16	10.6	8.9	6.8	6.3	7.1	7.9	8.5	13.4	13.7	13.9	13.1	12.5	122.6
2016/17 - 2035/36	11.8	9.9	7.2	7.1	7.3	7.3	9.5	13.3	15.3	15.7	14.6	14.0	133.0

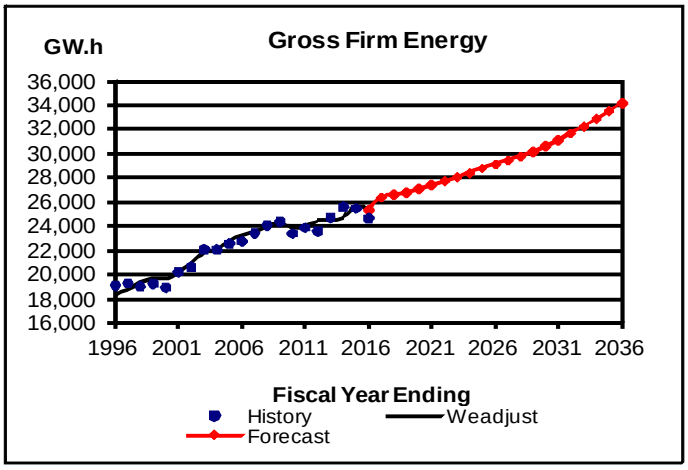
Table 28 - Monthly Station Service Peak

MONTHLY STATION SERVICE PEAK (MW)
History and Forecast

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
2015/16 Actual	16	11	8	8	8	15	12	25	21	20	21	19	25
2016/17 - 2035/36	19	13	10	11	10	11	17	23	22	23	25	23	23

Gross Firm Energy

Figure 18 - Gross Firm Energy



Gross Firm Energy is the energy required to serve Manitoba Hydro's customers on the Integrated System. It excludes exports, interruptible (non-firm) loads, Diesel Sales and Station Service for Keeyask and non-committed plants.

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

Weather adjusted Gross Firm Energy has grown 352 GWh (1.6%) per year for the past 20 years and 215 GWh (0.9%) per year during the past 10 years reflecting the recent 2008 economic downturn. This historical growth includes the effect of past Demand Side Management (DSM) initiatives. Energy is forecast to grow 375 GWh (1.4%) per year for the next 10 years and 442 GWh (1.5%) per year for the next 20 years before program-based DSM initiatives.

Table 29 - Gross Firm Energy

GROSS FIRM ENERGY (GWh) HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Energy	Weather Adjust	Adjusted Energy	Fiscal Year	Forecast Energy
1996/97	19,321	-647	18,674	2016/17	26,385
1997/98	19,014	272	19,286	2017/18	26,596
1998/99	19,273	387	19,660	2018/19	26,785
1999/00	18,971	627	19,597	2019/20	27,060
2000/01	20,262	-143	20,119	2020/21	27,410
2001/02	20,656	174	20,830	2021/22	27,729
2002/03	22,110	-394	21,716	2022/23	28,082
2003/04	22,069	-121	21,948	2023/24	28,435
2004/05	22,589	53	22,641	2024/25	28,785
2005/06	22,757	444	23,200	2025/26	29,110
2006/07	23,464	-41	23,423	2026/27	29,447
2007/08	24,122	-212	23,910	2027/28	29,762
2008/09	24,417	-236	24,181	2028/29	30,106
2009/10	23,412	396	23,808	2029/30	30,602
2010/11	23,892	72	23,965	2030/31	31,108
2011/12	23,605	716	24,321	2031/32	31,666
2012/13	24,750	-383	24,367	2032/33	32,273
2013/14	25,625	-991	24,634	2033/34	32,896
2014/15	25,505	-44	25,461	2034/35	33,532
2015/16	24,673	682	25,355	2035/36	34,193

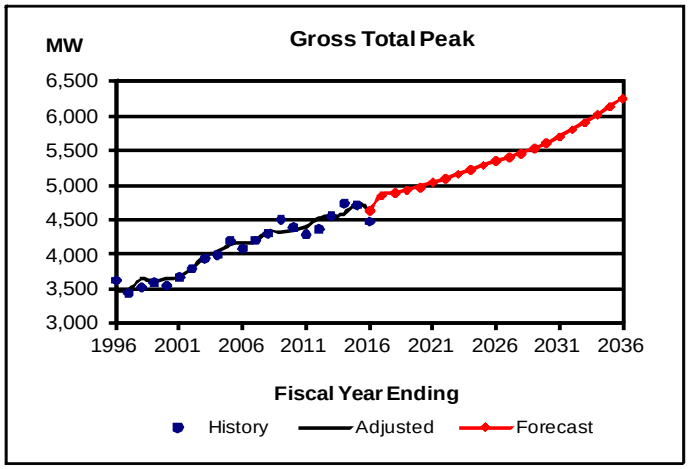
Table 30 - Monthly Gross Firm Energy

MONTHLY GROSS FIRM ENERGY (GWh)
History and Forecast
2005/06 - 2035/36

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2005/06	1,727	1,698	1,660	1,735	1,649	1,610	1,781	2,045	2,301	2,240	2,171	2,139	22,757
2006/07	1,712	1,690	1,681	1,826	1,746	1,622	1,870	2,092	2,303	2,458	2,304	2,159	23,464
2007/08	1,842	1,701	1,663	1,820	1,727	1,650	1,836	2,108	2,490	2,584	2,427	2,273	24,122
2008/09	1,881	1,737	1,662	1,730	1,787	1,681	1,874	2,154	2,652	2,702	2,226	2,331	24,417
2009/10	1,861	1,744	1,671	1,667	1,644	1,672	1,888	1,935	2,560	2,524	2,213	2,032	23,412
2010/11	1,699	1,692	1,611	1,716	1,698	1,638	1,778	2,129	2,563	2,682	2,322	2,364	23,892
2011/12	1,862	1,751	1,603	1,789	1,741	1,643	1,814	2,125	2,435	2,526	2,251	2,064	23,605
2012/13	1,802	1,698	1,688	1,869	1,727	1,606	1,941	2,265	2,665	2,766	2,342	2,383	24,750
2013/14	2,041	1,754	1,650	1,766	1,725	1,657	1,914	2,258	2,884	2,895	2,553	2,527	25,625
2014/15	2,048	1,837	1,690	1,788	1,778	1,703	1,909	2,424	2,638	2,770	2,581	2,339	25,505
2015/16	1,940	1,799	1,724	1,868	1,775	1,728	1,872	2,137	2,469	2,695	2,418	2,248	24,673
15/16 Wadj	1,984	1,788	1,789	1,820	1,777	1,703	1,935	2,260	2,643	2,764	2,491	2,402	25,355
2016/17	2,017	1,875	1,801	1,891	1,833	1,761	2,021	2,365	2,807	2,959	2,556	2,500	26,385
2017/18	2,033	1,889	1,814	1,904	1,847	1,773	2,036	2,385	2,831	2,985	2,578	2,520	26,596
2018/19	2,047	1,901	1,827	1,919	1,863	1,785	2,051	2,402	2,852	3,007	2,596	2,537	26,785
2019/20	2,066	1,923	1,847	1,944	1,893	1,806	2,074	2,427	2,877	3,033	2,617	2,555	27,060
2020/21	2,093	1,947	1,869	1,973	1,928	1,833	2,098	2,453	2,910	3,069	2,650	2,587	27,410
2021/22	2,117	1,971	1,892	1,998	1,952	1,856	2,124	2,482	2,942	3,102	2,679	2,614	27,729
2022/23	2,144	1,996	1,916	2,023	1,978	1,879	2,151	2,514	2,979	3,142	2,713	2,647	28,082
2023/24	2,171	2,021	1,941	2,049	2,003	1,903	2,178	2,545	3,016	3,181	2,747	2,680	28,435
2024/25	2,198	2,046	1,965	2,074	2,027	1,927	2,205	2,577	3,053	3,219	2,780	2,713	28,785
2025/26	2,223	2,070	1,987	2,097	2,050	1,949	2,230	2,606	3,087	3,255	2,811	2,743	29,110
2026/27	2,249	2,094	2,011	2,122	2,074	1,972	2,257	2,636	3,122	3,292	2,843	2,775	29,447
2027/28	2,273	2,117	2,033	2,145	2,097	1,994	2,281	2,664	3,155	3,327	2,873	2,804	29,762
2028/29	2,299	2,142	2,057	2,170	2,121	2,017	2,308	2,694	3,191	3,364	2,906	2,836	30,106
2029/30	2,338	2,178	2,092	2,206	2,157	2,051	2,346	2,739	3,242	3,418	2,953	2,882	30,602
2030/31	2,377	2,216	2,127	2,244	2,193	2,086	2,386	2,783	3,294	3,472	3,000	2,929	31,108
2031/32	2,420	2,256	2,167	2,285	2,233	2,125	2,429	2,833	3,351	3,533	3,053	2,981	31,666
2032/33	2,467	2,300	2,209	2,329	2,276	2,166	2,476	2,887	3,414	3,599	3,111	3,038	32,273
2033/34	2,515	2,346	2,252	2,374	2,320	2,209	2,524	2,943	3,479	3,668	3,171	3,096	32,896
2034/35	2,564	2,392	2,296	2,420	2,365	2,252	2,573	3,000	3,546	3,737	3,231	3,156	33,532
2035/36	2,615	2,439	2,342	2,468	2,412	2,297	2,624	3,059	3,615	3,810	3,294	3,217	34,193

Gross Total Peak

Figure 19 - Gross Total Peak



Gross Total Peak is the maximum integrated (i.e. average) hourly load required to serve Manitoba Hydro's customers on the Integrated System. It excludes exports and Diesel Sales. It includes Station Service and Curtailable Loads.

Typically, the peak occurs on a very cold winter weekday either in the morning (often from 8 a.m. to 9 a.m.) or in the afternoon (from 5 p.m. to 6 p.m.). Electric heating is a main contributor to 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 and peak hour.

The adjusted Gross Total Peak has grown from 3,486 MW in 1996/97 to 4,634 MW in 2015/16 at an average growth of 60 MW or 1.5% per year. It is forecast to grow to 6,250 MW at 81 MW (1.5%) per year by 2035/36.

Table 31 – Gross Total Peak

GROSS TOTAL PEAK (MW) HISTORICAL/ADJUSTED/FORECAST					
Fiscal Year	Peak	Adjustment	Adjusted Peak	Fiscal Year	Forecast Peak
1996/97	3,444	42	3,486	2016/17	4,850
1997/98	3,525	115	3,640	2017/18	4,885
1998/99	3,596	14	3,610	2018/19	4,928
1999/00	3,555	90	3,645	2019/20	4,971
2000/01	3,672	5	3,677	2020/21	5,033
2001/02	3,797	-4	3,793	2021/22	5,089
2002/03	3,948	24	3,972	2022/23	5,154
2003/04	3,994	31	4,025	2023/24	5,218
2004/05	4,201	-72	4,129	2024/25	5,282
2005/06	4,085	84	4,169	2025/26	5,341
2006/07	4,208	-26	4,182	2026/27	5,402
2007/08	4,304	21	4,325	2027/28	5,458
2008/09	4,509	-195	4,314	2028/29	5,520
2009/10	4,393	-56	4,336	2029/30	5,608
2010/11	4,286	106	4,392	2030/31	5,696
2011/12	4,367	146	4,514	2031/32	5,796
2012/13	4,559	-13	4,547	2032/33	5,905
2013/14	4,743	-165	4,578	2033/34	6,017
2014/15	4,713	10	4,723	2034/35	6,131
2015/16	4,479	155	4,634	2035/36	6,250

Table 32 - Monthly Gross Total Peak

MONTHLY GROSS TOTAL PEAK (MW)
History and Forecast
2005/06 - 2035/36

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
2005/06	2,959	2,845	3,052	3,116	3,050	2,837	2,948	3,672	3,912	3,630	4,085	3,498	4,085
2006/07	3,092	2,821	3,015	3,141	3,040	2,954	3,220	3,789	4,011	4,208	4,203	3,847	4,208
2007/08	3,494	2,736	3,042	3,294	3,033	2,777	2,979	3,996	4,078	4,304	4,289	4,095	4,304
2008/09	3,221	2,893	2,952	2,920	3,110	2,726	3,159	3,804	4,427	4,509	4,196	4,223	4,509
2009/10	3,196	2,933	3,000	2,758	2,933	2,982	3,054	3,297	4,393	4,256	4,092	4,235	4,393
2010/11	2,905	2,843	2,805	2,991	3,163	2,709	3,056	3,927	4,195	4,286	4,250	4,169	4,286
2011/12	3,183	2,886	3,056	3,278	3,189	3,045	3,129	3,756	4,095	4,367	4,270	3,608	4,367
2012/13	3,328	2,775	3,161	3,260	3,253	2,870	3,312	4,087	4,410	4,559	4,543	4,013	4,559
2013/14	3,622	3,129	3,103	3,179	3,276	3,227	3,448	4,026	4,656	4,743	4,579	4,541	4,743
2014/15	3,754	2,955	2,967	3,094	3,190	2,938	3,382	4,391	4,532	4,713	4,573	4,390	4,713
2015/16	3,447	3,000	3,114	3,351	3,314	3,427	3,134	3,858	4,021	4,479	4,424	4,247	4,479
15/16 Norm	3,468	3,028	3,137	3,238	3,244	3,043	3,318	4,101	4,374	4,572	4,483	4,390	4,634
2016/17	3,629	3,169	3,283	3,389	3,395	3,185	3,473	4,292	4,578	4,785	4,692	4,594	4,850
2017/18	3,669	3,201	3,316	3,423	3,430	3,218	3,509	4,342	4,610	4,819	4,724	4,647	4,885
2018/19	3,694	3,224	3,341	3,451	3,462	3,240	3,535	4,375	4,650	4,861	4,765	4,680	4,928
2019/20	3,728	3,259	3,378	3,495	3,514	3,277	3,574	4,419	4,692	4,904	4,804	4,711	4,971
2020/21	3,777	3,299	3,418	3,545	3,576	3,325	3,616	4,467	4,748	4,965	4,867	4,770	5,033
2021/22	3,819	3,339	3,460	3,590	3,620	3,365	3,660	4,520	4,801	5,019	4,920	4,818	5,089
2022/23	3,868	3,382	3,504	3,636	3,667	3,408	3,707	4,577	4,862	5,084	4,983	4,879	5,154
2023/24	3,916	3,425	3,549	3,682	3,714	3,452	3,753	4,634	4,923	5,147	5,046	4,940	5,218
2024/25	3,965	3,468	3,593	3,728	3,760	3,495	3,800	4,691	4,984	5,210	5,108	5,000	5,282
2025/26	4,009	3,507	3,634	3,770	3,802	3,535	3,843	4,743	5,039	5,268	5,166	5,056	5,341
2026/27	4,056	3,548	3,677	3,814	3,846	3,576	3,887	4,798	5,097	5,328	5,225	5,113	5,402
2027/28	4,099	3,587	3,717	3,855	3,888	3,615	3,929	4,848	5,150	5,384	5,280	5,167	5,458
2028/29	4,147	3,629	3,761	3,899	3,933	3,657	3,975	4,904	5,209	5,445	5,340	5,226	5,520
2029/30	4,215	3,690	3,824	3,964	3,998	3,719	4,040	4,983	5,292	5,531	5,426	5,309	5,608
2030/31	4,285	3,752	3,888	4,030	4,064	3,781	4,107	5,063	5,376	5,619	5,512	5,394	5,696
2031/32	4,362	3,821	3,959	4,103	4,137	3,850	4,181	5,153	5,470	5,717	5,609	5,489	5,796
2032/33	4,446	3,895	4,036	4,182	4,217	3,925	4,262	5,251	5,573	5,824	5,715	5,593	5,905
2033/34	4,532	3,971	4,115	4,263	4,298	4,002	4,344	5,352	5,679	5,935	5,824	5,700	6,017
2034/35	4,620	4,049	4,195	4,346	4,382	4,080	4,429	5,455	5,787	6,048	5,936	5,808	6,131
2035/36	4,711	4,130	4,279	4,432	4,468	4,161	4,516	5,562	5,899	6,165	6,051	5,922	6,250

Peak load is measured and recorded differently than energy data. The system load at every hour is calculated by System Operations as:

Hourly Gross Total Peak (t)
= Hourly Total Generation (t)
- Hourly Metered Exports (t) + Hourly Metered Imports (t)
- Losses Associated with Exports (t) + Gains Associated with Imports (t)
+ Curtailments (t)

Losses for exports and gains for imports are only known on a monthly energy basis. The hourly value is obtained by using the ratio of exports/imports for the hour to the total exports/imports for the month and applying that to the total metered loss/gain for the month. The remaining difference between the balance of the load and Common Bus is taken as the Transmission Losses associated with Manitoba load.

Curtailments for individual customers are calculated as the difference between what the customer would have used if not curtailed versus what they actually used.

Annual Peak

The forecast annual peak is higher than the maximum of the monthly peaks. This is because the peak can occur in any one of the winter months. The same characteristic is apparent in historical peaks. The average historical annual peak is higher than the maximum of the highest average monthly peaks. For studies requiring yearly data, the annual peak should be used.

16 Hour Peak

The peaks in this document are integrated hourly peaks. For some studies and analysis of avoided cost or DSM savings, an estimate of the average peak during onpeak hours (from 6 a.m. to 10 p.m.) may be desired. To convert hourly peak to 16 hour peak, multiply the hourly peak in the associated month by the following percentages:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
94.4%	94.9%	95.8%	96.0%	96.3%	96.0%	96.6%	95.6%	95.8%	96.6%	95.6%	95.5%	94.8%

VARIABILITY AND ACCURACY

Weather Effect and Weather Adjustment

The weather effect is determined in any sector every year by regressing the previous two years of actual monthly energies against the actual HDD and CDD for the month. This results in a GWh per HDD effect and a GWh per CDD effect for that sector for that year.

Only sectors whose major variation is due to weather can have a weather effect estimated. Sectors that vary primarily due to industrial output levels or seasonal but non-weather reasons may yield false weather effects if estimated. Weather effects are not determined for the GS Top Consumers, Seasonal, Diesel, Water Heating and Lighting sectors.

For sectors where a weather effect is calculated, this document shows energy as the reported value and as a weather adjusted value. Forecasts are based on the weather adjusted values. The calculations are:

Weather Adjustment = HDD weather effect * (HDD actual - HDD normal)
+ CDD weather effect * (CDD actual - CDD normal)

Weather Adjusted Actual = Actual - Weather Adjustment

Following are the HDD and CDD weather effect factors by sector:

Residential Basic: 0.6 GWh / HDD, 1.0 GWh / CDD
GS Mass Market: 0.3 GWh / HDD, 0.8 GWh / CDD
General Consumers Sales: 0.9 GWh / HDD, 1.8 GWh / CDD
Gross Firm Energy: 1.2 GWh / HDD, 2.9 GWh / CDD
Gross Total Peak: 49 MW / degree (at -30 degrees Celsius),
119 MW / degree (at +30 degrees Celsius)

Effect of Extreme Weather

A record cold winter will increase load 4% and a record warm winter will decrease it 4%. An additional 2% load increase is possible due to a record hot summer and a 1% decrease due to a record cool summer.

The effect of extreme weather is larger on a monthly basis, and even larger on a daily basis.

		Effect of Weather due to Winter Extremes on Gross Firm Energy							
	GWh/DDH	Normal		Record Warm			Record Cold		
	1.2	DDH	GWh	DDH	GWh	Effect	DDH	GWh	Effect
Year:	2016/17	4,540	26,385	3,678	25,378	-4%	5,439	27,437	4%
Month:	Jan 2017	945	2,959	663	2,628	-11%	1,261	3,328	12%
Day:	Jan 2017	30	95	6	67	-30%	56	125	31%

		Effect of Weather due to Summer Extremes on Gross Firm Energy							
	GWh/DDC	Normal		Record Cool Summer			Record Hot Summer		
	2.9	DDC	GWh	DDC	GWh	Effect	DDC	GWh	Effect
Year:	2016/17	179	26,385	69	26,069	-1%	364	26,915	2%
Month:	July 2016	67	1,891	6	1,716	-9%	142	2,105	11%
Day:	July 2016	2	61	0	55	-10%	14	95	56%

The effect of a change in temperature on the load at the time of peak due to a 5 degree temperature difference is 18% in the summer and 5% in the winter.

Summer	Winter	Effect of Change in Temperature on Gross Total Peak							
MW/Deg	MW/Deg	Normal		Warm Winter, Cool Summer			Cold Winter, Hot Summer		
119	49	Temp	MW	Temp	MW	Effect	Temp	MW	Effect
Summer	2016/17	30	3,389	25	2,792	-18%	35	3,986	18%
Winter:	2016/17	-30	4,850	-25	4,607	-5%	-35	5,094	5%

Load Variability

Uncertainty is an inherent characteristic of forecasting. The load will vary both year to year and long term because of underlying changes in population growth, economic growth, changes in the operations of Top Consumers, and overall use patterns. An economic recession will slow energy growth and an economic boom will increase it. Cycles cannot be predicted in advance so some appropriate midpoint must be chosen as the forecast.

This forecast was created as Manitoba Hydro's best estimate of Manitoba's future energy requirement with an expectation of a 50% chance that actual growth will be higher than the forecast, and a 50% chance that actual growth will be lower than the forecast. This can also be called the P50 (50^{th} Percentile) or Base Forecast.

To evaluate the potential for variation, historic load variability has been analyzed using a probabilistic-based approach. Doing this provides an estimate of the magnitude of the potential load variation from the forecast due to population, economy and other effects. 10% and 90% confidence bands (-/+ 1.28 standard deviations), also known as P10 and P90, were selected to be a proxy for the Low and High Load Forecast Scenarios for use in risk analysis studies. They are calculated as follows:

Load = Base Forecast -/+ 1.28 x Standard Deviation

For other probability points, substitute for the 1.28 the following numbers:

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

This calculation gives the variability due to long term economic effects. It does not include variability due to weather which was removed through the use of weather adjusted load. The standard deviation of the weather variation has been found to be approximately 2% of both the energy and peak. Annual weather variations tend to be independent of the economy, so if a combined variance is desired, then the variance due to weather can be added to the variance without weather to derive an overall variance that includes weather.

The following four charts and tables summarize the variability for energy and peak. By 2035/36, the Load Forecast has an 80% probability of being accurate to within ±1,737 GWh or ±5.1%. Due to the inherent variability of the load, this is the best level of accuracy possible.

The overall economic standard deviation in 2035/36 is 1,355 GWh or 4.0% of the forecast energy. Analyzed individually, the economic standard deviation of the Top Consumers sector is 1,326 GWh (17.9%), Residential is 509 GWh (5.4%) and Mass Market is also 463 GWh (3.6%), showing that the Top Consumers sector is the majority of the variance.

Figure 20 - Energy Variability

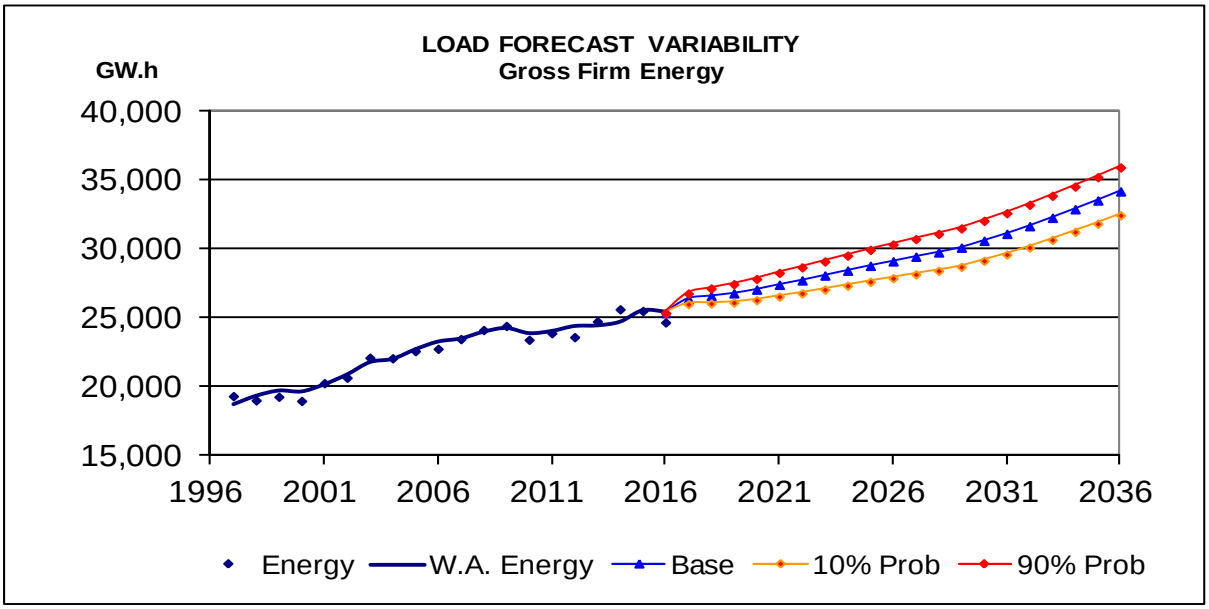


Table 33 – Energy Variability

Fiscal Year	Gross Firm Base Fcst	Long Term Economic Std Dev	10.0% Prob Point	90.0% Prob Point
2016/17	26,385	299	26,002	26,769
2017/18	26,596	424	26,053	27,139
2018/19	26,785	520	26,119	27,452
2019/20	27,060	601	26,290	27,830
2020/21	27,410	673	26,548	28,272
2021/22	27,729	737	26,784	28,674
2022/23	28,082	797	27,060	29,103
2023/24	28,435	853	27,342	29,527
2024/25	28,785	905	27,626	29,945
2025/26	29,110	954	27,887	30,333
2026/27	29,447	1,001	28,164	30,730
2027/28	29,762	1,046	28,421	31,103
2028/29	30,106	1,090	28,709	31,502
2029/30	30,602	1,131	29,152	32,052
2030/31	31,108	1,172	29,606	32,609
2031/32	31,666	1,210	30,115	33,218
2032/33	32,273	1,248	30,673	33,872
2033/34	32,896	1,285	31,249	34,543
2034/35	33,532	1,321	31,839	35,225
2035/36	34,193	1,355	32,455	35,930

Figure 21 - Peak Variability

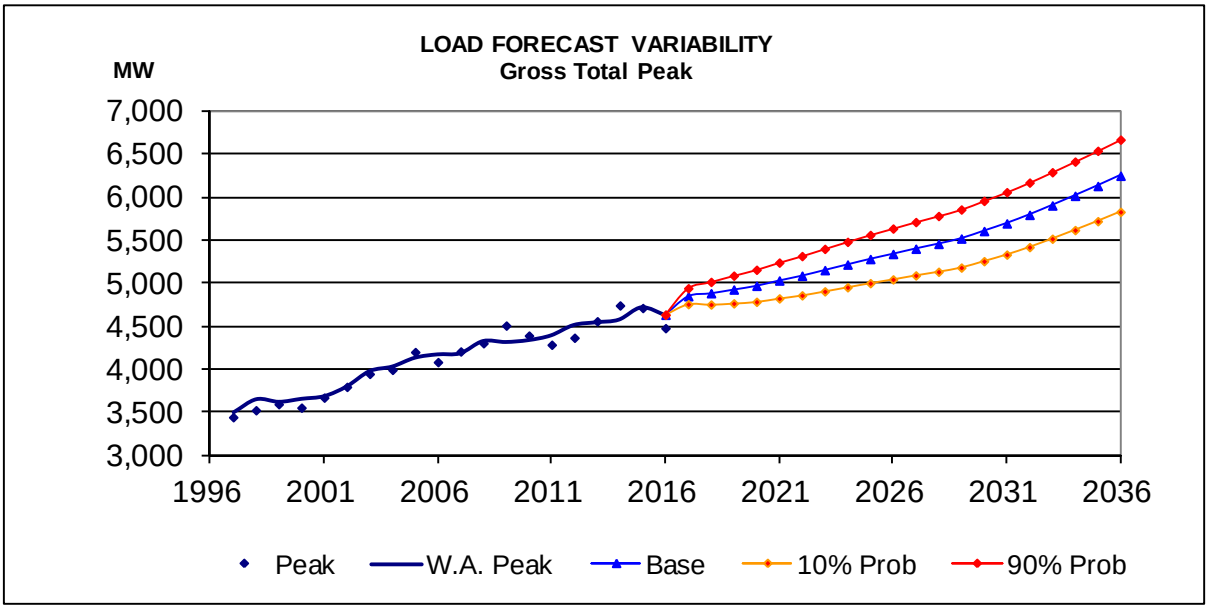


Table 34 – Peak Variability

Fiscal Year	Gross Total Peak Base Fcst	Long Term Economic Std Dev	10.0% Prob Point	90.0% Prob Point
2016/17	4,850	72	4,758	4,943
2017/18	4,885	102	4,754	5,016
2018/19	4,928	126	4,767	5,089
2019/20	4,971	145	4,785	5,158
2020/21	5,033	162	4,825	5,241
2021/22	5,089	178	4,860	5,317
2022/23	5,154	193	4,907	5,400
2023/24	5,218	206	4,954	5,482
2024/25	5,282	219	5,002	5,562
2025/26	5,341	231	5,046	5,636
2026/27	5,402	242	5,092	5,712
2027/28	5,458	253	5,134	5,782
2028/29	5,520	263	5,183	5,858
2029/30	5,608	273	5,257	5,958
2030/31	5,696	283	5,334	6,059
2031/32	5,796	292	5,421	6,170
2032/33	5,905	302	5,518	6,291
2033/34	6,017	310	5,619	6,415
2034/35	6,131	319	5,722	6,540
2035/36	6,250	327	5,830	6,670

5 and 10 Year Forecast Accuracy

Due just to the load variation caused by population growth and economic growth, there is only a certain level of accuracy possible. Using the load variability estimates of the previous section, due to economic variability alone, there is only an 80% chance that a 5 year energy forecast will be within 3.1% of the actual, and an 80% chance that a 10 year energy forecast will be within 4.2% of the actual.

Recognizing this inherent uncertainty of the forecast, historic forecast variation has been tracked. The following four figures and tables compare previous load forecasts to actual results 5 and 10 years later.

The energy savings achieved under Manitoba Hydro's market-based DSM programs between the year the forecast was prepared and the year being forecast was subtracted first from the forecast value. The remaining difference is taken as an estimate of the accuracy of the forecast.

The following figures and tables may suggest cycles in the forecast made up of alternating periods of over-forecasting and under-forecasting. These are not so much due to a bias in the forecast as they are due to unexpected periods of recession or economic growth. Once one of these unexpected periods occur, the accuracy of the previous five 5-year forecasts for 5 years, and the accuracy of the previous ten 10-year forecasts for ten years will be affected thus causing periods of over- or under-forecasting.

Compensation for these periods of over and under-forecasting cannot be applied until after the events occur and only then can they be identified and quantified. The forecast assumes average expected economic conditions. When economic conditions are abnormal, the forecast will be high or low.

The weather adjusted Gross Firm Energy is shown in two separate columns in the Energy Accuracy table (Table 35) and they vary in each year due to the difference in weather normals used in each of the respected forecasts. Weather normals differences are due to the use of a 25 year rolling average which relies on the previous 25 years of weather data while at the time the forecast is created.

Figure 22 - Energy Accuracy

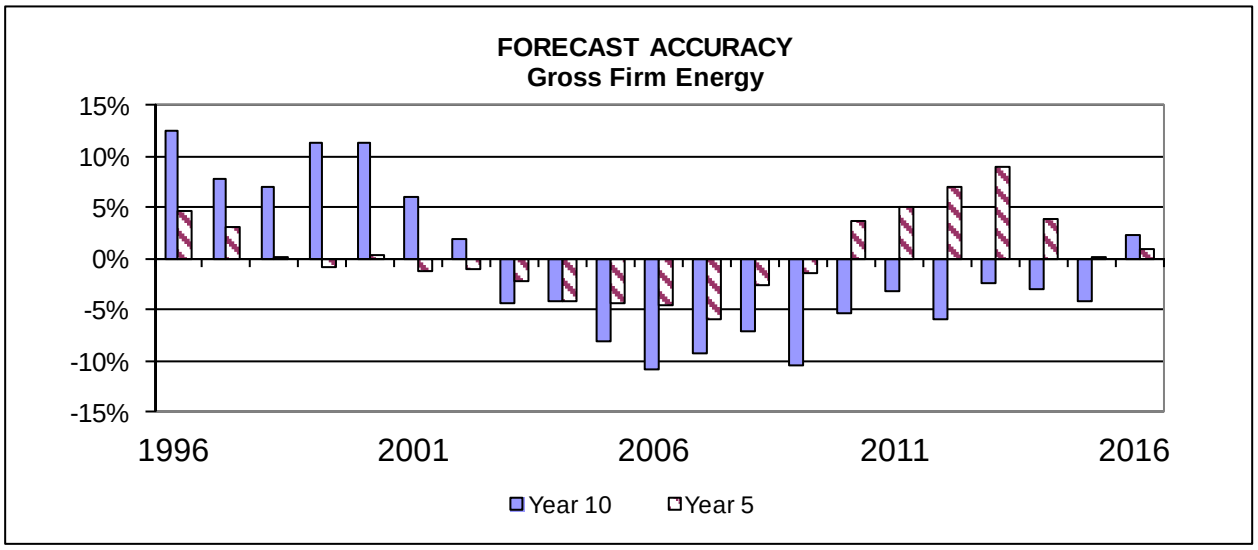


Table 35 - Energy Accuracy

Fiscal Year	Actual Gross Firm Energy	Forecast Prepared 5 Years Previous	W.A. Gross Firm Energy	5 Year Percent Accuracy	Forecast Prepared 10 Years Previous	W.A. Gross Firm Energy	10 Year Percent Accuracy
1995/96	19,148	19,179	18,318	4.7%	20,659	18,370	12.5%
1996/97	19,321	19,395	18,810	3.1%	20,174	18,716	7.8%
1997/98	19,014	19,455	19,429	0.1%	20,661	19,320	6.9%
1998/99	19,273	19,675	19,818	-0.7%	21,919	19,708	11.2%
1999/00	18,971	19,767	19,703	0.3%	21,833	19,629	11.2%
2000/01	20,262	20,018	20,241	-1.1%	21,300	20,103	6.0%
2001/02	20,656	20,783	20,980	-0.9%	21,364	20,979	1.8%
2002/03	22,110	21,395	21,861	-2.1%	20,916	21,868	-4.4%
2003/04	22,069	21,134	22,062	-4.2%	21,191	22,107	-4.1%
2004/05	22,589	21,693	22,664	-4.3%	20,870	22,714	-8.1%
2005/06	22,757	22,216	23,277	-4.6%	20,812	23,346	-10.9%
2006/07	23,464	22,107	23,489	-5.9%	21,395	23,595	-9.3%
2007/08	24,122	23,353	23,962	-2.5%	22,328	24,034	-7.1%
2008/09	24,417	23,926	24,259	-1.4%	21,756	24,320	-10.5%
2009/10	23,412	24,734	23,850	3.7%	22,611	23,892	-5.4%
2010/11	23,892	25,239	24,020	5.1%	23,299	24,071	-3.2%
2011/12	23,605	25,909	24,202	7.1%	22,924	24,376	-6.0%
2012/13	24,750	26,464	24,270	9.0%	23,844	24,433	-2.4%
2013/14	25,625	25,512	24,538	4.0%	23,938	24,696	-3.1%
2014/15	25,505	25,492	25,469	0.1%	24,456	25,508	-4.1%
2015/16	24,673	25,622	25,375	1.0%	25,990	25,414	2.3%

Figure 23 - Peak Accuracy

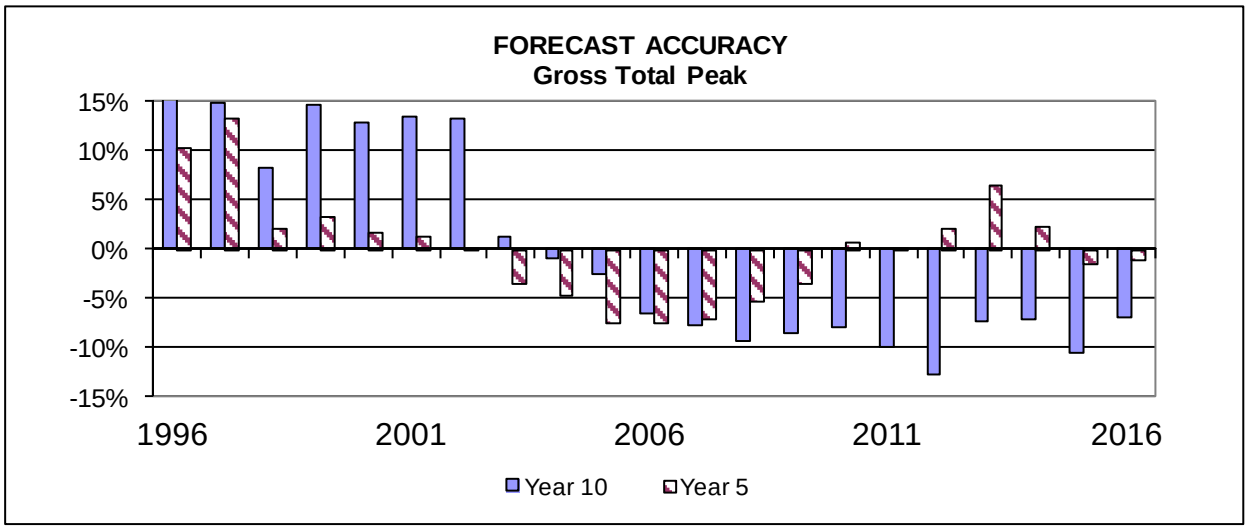


Table 36 - Peak Accuracy

Fiscal Year	Actual Gross Total Peak	Forecast Prepared 5 Years Previous	Normalized Gross Total Peak	5 Year Percent Accuracy	Forecast Prepared 10 Years Previous	Normalized Gross Total Peak	10 Year Percent Accuracy
1995/96	3,628	3,850	3,491	10.3%	4,081	3,491	16.9%
1996/97	3,444	3,906	3,450	13.2%	3,962	3,450	14.8%
1997/98	3,525	3,768	3,688	2.1%	3,990	3,688	8.2%
1998/99	3,596	3,703	3,586	3.3%	4,108	3,586	14.5%
1999/00	3,555	3,738	3,678	1.6%	4,152	3,678	12.9%
2000/01	3,672	3,758	3,711	1.3%	4,210	3,711	13.4%
2001/02	3,797	3,759	3,755	0.1%	4,251	3,755	13.2%
2002/03	3,948	3,801	3,939	-3.5%	3,989	3,939	1.3%
2003/04	3,994	3,833	4,025	-4.8%	3,990	4,025	-0.9%
2004/05	4,201	3,817	4,129	-7.6%	4,023	4,129	-2.6%
2005/06	4,085	3,860	4,169	-7.4%	3,899	4,169	-6.5%
2006/07	4,208	3,894	4,195	-7.2%	3,868	4,195	-7.8%
2007/08	4,304	4,097	4,329	-5.4%	3,927	4,329	-9.3%
2008/09	4,509	4,161	4,314	-3.6%	3,948	4,314	-8.5%
2009/10	4,393	4,371	4,337	0.8%	3,993	4,337	-7.9%
2010/11	4,286	4,398	4,392	0.1%	3,959	4,392	-9.9%
2011/12	4,367	4,606	4,513	2.1%	3,942	4,513	-12.7%
2012/13	4,559	4,705	4,421	6.4%	4,098	4,421	-7.3%
2013/14	4,743	4,524	4,423	2.3%	4,107	4,423	-7.1%
2014/15	4,713	4,661	4,736	-1.6%	4,236	4,736	-10.6%
2015/16	4,479	4,739	4,789	-1.1%	4,455	4,789	-7.0%

LOAD SENSITIVITES AND EXTREME EVENTS

Manitoba Hydro examines the effect of possible events on the load. The information presented here provides planners with an understanding of what the potential scale of these individual events may have on the system load requirements.

The individual effects of each event can be included in scenario or sensitivity analysis if the need arises. Each change in assumption can be individually applied to the forecast as required to capture the annual energy and peak effect of the desired assumption in any given year. All values are listed at Generation and include transmission and distribution losses.

The sensitivities provide an estimate of what effect a change in assumption will have on the annual energy and peak over the 20 year forecast period.

Effects are summarized below, and the details of each effect follow.

Sensitivity of the Load to an Assumption Change	Energy (GWh)	Peak (MW)
0.1% Increase/Decrease in Population	± 297	± 54
0.1% Increase/Decrease in Income	± 47	± 9
0.1% Increase/Decrease in GDP	± 199	± 36
0.1% Increase/Decrease in Electricity Price	∓ 154	∓ 28
Climate Change per Degree Celsius Warmer	+ 50	- 49

Evaluation of Extreme Events	Energy (GWh)	Peak (MW)
All Natural Gas in Manitoba to Electricity	+ 16,000	+ 7,000
Increase/Decrease of One Very Large Industrial Customer	± 1,500	± 180
Maximum Potential Effect of Increased Online Shopping	- 775	- 143
Additional Load if 100% Electric Vehicle Saturation Rate	+ 8,792	+ 1,099
Illustrated Effect of Grid Parity (e.g. Solar Panels)	- 857	- 78

For context, one year of energy growth is 442 GWh and one year of peak growth is 80 MW.

Population / Economic / Price Changes

The population, economy and prices are the most significant drivers of the load in Manitoba. These effect of each driver based on the coefficients found in the models is summarized below.

Population: A one-time 1% increase in population (12,971 people) results in a 1% increase in the number of Residential Basic customers (4,742 customers representing 71 GWh) and a 0.33% change in the number of GS Mass Market customers (224 customers representing 61 GWh). The total effect on Manitoba Gross Firm Energy would be 148 GWh (0.59%) for any given year. Assuming a 0.1% change in the annual average population growth rate over the 20 year forecast period, the total effect would be a change of 297 GWh in the 20th year of the forecast.

Income: A one-time 1% increase in real income results in a 0.29% increase in Residential average use (43 kWh per customer and 21 GWh overall). On Manitoba Gross Firm Energy it is 23 GWh (0.09%). Assuming a 0.1% change in the annual average income growth rate over the 20 year forecast period, the total effect would be a change of 47 GWh in the 20th year of the forecast.

GDP: A one-time 1% increase in Manitoba GDP results in a 0.54% increase in GS Mass Market Small and Medium average use (555 kWh per customer totaling 37 GWh). A 1% increase in Canada/US GDP results in 0.30% increase in GS Large Customer average use (18,850 kWh per customer totaling 6 GWh) and a 0.84% increase in Top Consumers use (46 GWh). The total effect of a 1% increase in GDP on Manitoba Gross Firm Energy is 100 GWh (0.39%). Assuming a 0.1% change in the annual average GDP growth rate over the 20 year forecast period, the total effect would be a change of 199 GWh in the 20th year of the forecast.

Electricity Price: A one-time 1% increase in real electricity price results in a 0.29% decrease in Residential average use (-43 kWh per customer totaling -21 GWh). It will also result in a 0.18% decrease in GS Mass Market Small and Medium average use (-185 kWh per customer totaling -12 GWh), a 0.47% decrease in GS Mass Market Large average use (-29,532 kWh per customer totaling -10 GWh) and a 0.48% decrease in GS Top Consumers use (-26 GWh). The total effect of a 1% increase in real electricity price on Manitoba Gross Firm Energy is -77 GWh (-0.30%). Assuming a 0.1% change in the annual average GDP growth rate over the 20 year forecast period, the total effect would be a change of 154 GWh in the 20th year of the forecast.

Below is a summary of the 20 year impact to the forecast should a change of 0.1% to the annual growth rate for each of the economic assumption is assumed.

	Energy (GWh)	Peak (MW)
0.1% Increase/Decrease in Population	± 297	± 54
0.1% Increase/Decrease in Income	± 47	± 9
0.1% Increase/Decrease in GDP	± 199	± 36
0.1% Increase/Decrease in Electricity Price	∓ 154	∓ 28

Climate Change

The Intergovernmental Panel on Climate Change projects an increase in global temperature as a result of rising concentrations of greenhouse gases in the atmosphere. Changes to temperature and extreme events have the potential to influence future energy demands.

In the last 100 years, the city of Winnipeg's 25-year average temperature has resulted in Heating Degree Days (HDD) in the range of 4,500 to 5,000 each year. A 25 year moving average is used for the forecast to help minimize the effects of year to year variability and to represent the long term climatology. This section quantifies the general effect caused by a 1°C increase in average daily temperature throughout the year.

In Manitoba Hydro's case, if Winnipeg experienced a uniform 1°C warming throughout the year, winter months would be subject to less heating while summer months would be subject to more cooling. Over 200 winter days, every degree Celsius of temperature rise above average conditions will result in an approximate decrease of 200 Heating Degree Days (HDD) per year, and a corresponding approximate increase of 100 Cooling Degree Days (CDD) per year over 100 summer days.

Applying the Weather effect for Manitoba Hydro at Generation gives:

Decrease of 200 HDD ➔ -240 GWh and -49 MW in the winter

Increase of 100 CDD ➔ +290 GWh and +119 MW in the summer

The resulting total effect of every one degree increase in temperature would be:

An increase of 50 GWh to annual energy and a decrease of 49 MW to system peak.

	Energy (GWh)	Peak (MW)
Climate Change per Degree Celsius Warmer	+ 50	- 49

Conversion of all Natural Gas Use to Electricity

Currently, about 275,000 Residential and General Service customers use natural gas as a fuel for space heating, water heating, cooking, etc. Given possible future green initiatives that could implement carbon taxes on fossil fuels, a scenario to consider is the conversion of all natural gas used as a fuel to electricity.

Assumptions exclude industries using natural gas as an ingredient, not as a fuel, and use a fuel efficiency averaging 82% and a load factor of 26%.

	Energy (GWh)	Peak (MW)
All Natural Gas in Manitoba to Electricity	+ 16,000	+ 7,000

Potential Changes in Load from Very Large Industrial Customers

This forecast includes an expectation that there may be new large industrial users of electricity that may come to Manitoba. GS Top Consumers includes a Potential Large Industrial Loads category that adds 1,712 GWh to GS Top Consumers by 2035/36. This is expected to be made up of increases and decreases by current top consumers, additions of new top consumers and company closures. However, this forecast does not anticipate the scenario of one customer using up the entire PLIL projection as a single startup.

Manitoba Hydro's largest customer currently uses in excess of 1,500 GWh annually and has a coincident peak load of about 180 MW. It is feasible that one or more customers of this size could decide to start up in Manitoba in the next 20 years. A single large new customer could

use the entire amount of energy that has been forecast under the Potential Large Industrial Loads projection.

Similarly, it is possible that one or more very large customers may discontinue operations in Manitoba. This could also be the equivalent of losing Manitoba Hydro's largest customer.

	Energy (GWh)	Peak (MW)
Increase/Decrease of One Very Large Industrial Customer	± 1,500	± 180

Maximum Potential Load Effect of Increased Online Shopping

Online shopping is a growing service offering by many retailers. It is possible that this trend could lead to fewer retail establishments if online shopping becomes pervasive. The potential load reduction of such a scenario will be the electricity use of about 5,800 General Service customers in the Retail sector who currently use about 680 GWh. At generation, this represents a potential total of 775 GWh and 143 MW (using a 62% load factor). This assumes that the structures used for retail are torn down or are refurbished with other businesses that would otherwise have built a new structure.

	Energy (GWh)	Peak (MW)
Maximum Potential Load Effect of Increased Online Shopping	- 775	- 143

Potential Load from High Adoption of Electric Vehicle Technology

This forecast includes the expected impact due to adoption of electric vehicles within Manitoba over the next twenty years. The specifics have been detailed in the Electric Vehicle Forecast section of this document.

It is possible that the current technological challenges will be solved, price will match those of internal combustion vehicles, and range anxiety will be alleviated. If or when these issues are resolved, It is possible that electric vehicles may eventually grow to be the dominant vehicle.

The maximum load required, if 100% of all new passenger and commercial vehicles purchased every year within the forecast period are Plug-In Electric Vehicles (PEVs), would be 8,888 GWh of energy and 1,111 MW of load. Currently, the forecast for electric vehicles load by 2035/36 is 96 GWh and 12 MW. Therefore the maximum additional load required over the current forecast for 100% saturation is 8,792 GWh (20 years of load growth) and 1,099 MW (about 14 years of peak growth).

	Energy (GWh)	Peak (MW)
Additional Load if 100% Electric Vehicle Saturation Rate	+ 8,792	+ 1,099

Illustrated Effect of Grid Parity

Grid Parity is when a customer will have an economic option to provide some or all of the electricity needs their home or business requires with an alternative energy source. Grid parity requires the self-generated kWh cost to be competitive with utility power when considering operating, maintenance costs and a reasonable amortization period for capital costs.

Solar photovoltaic installations are frequently referenced in discussions related to grid parity as costs continue to decline. Initial adoption rates may be gradual and may take years to mature. For illustrative purposes, the effect at utility generation if 100,000 residential and 10,000 commercial customers added solar panels would be:

	Energy (GWh)	Peak (MW)
Illustrated Effect of Grid Parity (e.g. Solar Panels)	- 857	- 78

ASSUMPTIONS

Economic Assumptions

Economic forecast assumptions are taken from the economic variables that become part of Manitoba Hydro's 2015 Economic Outlook and the 2015 Energy Price Outlook.

Residential Customers - The number of Residential Basic customers in Manitoba is forecast to increase by 1.2% (5,809 units) in 2016/17 and averages 1.0% per year over the forecast period. This compares to a historical average increase of 1.1% per year over the last ten years. Residential customers are used in the Residential and GS Mass Market customer forecasts.

Electricity and Natural Gas Prices - The electricity price forecast is based on the Consumer Price Index (CPI) and rate increase projections contained in the Integrated Financial Forecast. The real electricity price is forecast to increase by 2.1% in 2016/17, annually increase between 1.9% and 2.2% from 2017/18 to 2027/28 and then reduce to a 0.2% annual increase for the remaining seven years of the forecast. 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. The ratio of prices is used in the Residential Basic forecast.

Manitoba Disposable Income - Real Manitoba disposable income per Res Basic customer grew 1.4% for the past 20 years and 1.9% for the past 10 years. It is forecast to grow 0.9% annually for the next 20 years. Manitoba disposable income is used in the Res Basic forecast.

Gross Domestic Product (GDP) - Real economic growth in Manitoba averaged 2.5% annually for the past 20 years and 2.4% annually for the past 10 years. Real Manitoba GDP is expected to grow 2.1% in 2016/17 and average 1.8% annually for the next 20 years. Manitoba GDP is used in the GS Mass Market Small and Medium forecasts.

Gross Domestic Product (Canadian and US GDP) – Combined real economic growth in Canada and US averaged 2.4% annually for the past 20 years and 1.5% annually for the past 10 years. It is forecast to grow 2.0% in 2016/17 and average 2.1% annually for the next 20 years. This is used in the GS Mass Market Large and GS Top Consumer forecasts.

Price / Income / GDP Elasticity

The economic effects of price, income and GDP have been incorporated into the 2016 forecast. The elasticity of each has been estimated from econometric modeling. See the Methodology section for more details. A summary of the elasticities found is:

	Price Elasticity	Real Income Elasticity	Real GDP Elasticity
Residential Basic	-0.29	0.29	
GS Mass Mkt Small/Medium	-0.18		0.54
GS Mass Mkt Large	-0.47		0.30
GS Top Consumers	-0.48		0.84
Gross Firm Energy	-0.32	0.10	0.41

Demand Side Management (DSM) in the Forecast

This forecast reflects future DSM savings associated with existing Provincial building codes and improved equipment efficiency standards and regulations (Codes and Standards). This is the only effect of DSM initiatives that is specifically accounted for in the forecast.

Savings due to DSM programs to date are embedded in the historical data that is the basis for this forecast. The current level of past achieved DSM savings is assumed to remain in place throughout the future. Future DSM savings arising from future Power Smart offerings and market engagement above the current level and incremental to the above mentioned Codes and Standards are not reflected in this forecast. They are accounted for separately in Manitoba Hydro's Power Smart Plan and Power Resource Plan.

As a result, historical growth rates in this document are not directly comparable to future growth rates because the history includes the effect of past program-based DSM initiatives, but the forecast does not.

For customers involved in Load Displacement and Alternative Energy initiatives, the forecast excludes the effect of the initiatives, and projects the load without the savings due to the initiatives.

Normal Weather Assumptions

Weather for forecast purposes is measured by degree days. Winnipeg temperatures are used, as Winnipeg is central to most of the weather-dependent load (Residential and General Service Mass Market) in Manitoba.

Cold weather is expressed in Heading Degree Days (HDD), which is the number of average degrees colder than 14 degrees Celsius each day. Hot weather is expressed in Cooling Degree Days (CDD), which is the number of average degrees warmer than 18 degrees Celsius each day. Daily temperature is the average of the high and low temperature for the day. The equations are:

HDD = sum (max(0, 14 - (Daily high + Daily low) / 2))

CDD = sum (max(0, (Daily high + Daily low) / 2) - 18)

The base temperature of 14 degrees for HDD is the temperature below which most buildings have their heating systems (furnaces) running.

The base temperature of 18 degrees for CDD is the temperature above which buildings start to run their space cooling systems (air-conditioning).

The forecast is prepared assuming normal weather. Normal weather for the 2016 forecast is determined from the 25 year average of Heating Degree Days and Cooling Degree Days in Winnipeg over the period April 1991 to March 2016.

The 25 year weather normals used for every year of this forecast are 4,539.7 HDD and 179.1 CDD. This is a decrease of 28.9 HDD from last year's normal of 4,568.6 HDD, and no change from last year's normal of 179.1 CDD.

The range of HDD from 1991 to 2016 was from a warm winter of 3,677.6 HDD in 2011/12 (862.1 HDD below normal) to a cold winter of 5,439.3 HDD in 1995/96 (899.6 HDD above normal).

The range of CDD from 1991 to 2016 was from a cool summer of 71.8 CDD in 2004/05 (107.3 CDD below normal) to a hot summer of 267.3 CDD in 1995/96 (88.2 CDD above normal).

METHODOLOGY

Residential Basic Methodology

Several different models and forecasts were used to determine the Residential Basic Model. These are the steps to produce the forecast:

1. **Forecast Residential Dwellings** - The forecast of Manitoba residential customers in Manitoba Hydro's 2016 Economic Outlook was used for the total number of Residential Basic customers for the 2016/17 to 2035/36 period. The customer forecast was based on the average of several Manitoba population forecasts from various external agencies multiplied by a forecast of the people per customer ratio. The customer forecast was reduced by about 0.5% to account for customers with multiple services to obtain the forecast of individual dwellings.

2. **Forecast Existing Dwellings** – Existing dwellings were broken down by dwelling type (single detached, multi attached, and Individually metered apartment suites) within each fuel region (Winnipeg, Gas Available outside Winnipeg and No Gas Available). The rate of change due to demolitions and type change (e.g. bulk apartments to individually metered) as well as customer switches of their space heating fuel were taken into account.

3. **Historical Space Heating Systems –** The number of historical dwellings by type and region were each divided into nine space heating systems: Electric Forced Air Furnace, Electric Baseboard, Electric Ground Source Heat Pump, Electric Boiler, Gas High-Efficiency Furnace, Gas Mid-Efficiency Furnace, Gas Standard-Efficiency Furnace, Gas Boiler, and Other heat that is not billed for gas or electric. Percentages of each heat type in existing dwellings were taken from the 2014 Residential Energy Use Survey.

4. **Forecast of Space Heating Systems in New Dwellings** – Econometric equations were developed to forecast the number of electric space heating systems in new single detached and multi attached dwellings in Winnipeg and South Gas regions as follows:

   Logit (Percentage of New Dwellings (t))

   = -5.45 + 2.20 * T + 2.07 * PGEFF (lag(t)) Single Detached, Winnipeg

   = -2.11 + 0.78 * T + 2.92 * PGEFF (lag(t)) Single Detached, South Gas

= -7.25 + 3.72 * T + 6.38 * PGEFF (lag(t))	Multi Attached, Winnipeg
= -3.26 + 0.39 * T + 5.82 * PGEFF (lag(t))	Multi Attached, South Gas

Logit	- A log transformation of percentages used for saturation analysis
T	- A trend variable capturing the effect of natural gas price changes
PGEFF	- Ratio of the gas to electricity price for high efficiency furnaces
lag(t)	- The weighted average (38%, 6%, 6%, 50%) of the 1, 3, 4 and 5 year lags

R-squared: 80.2%, 89.6%, 48.9%, 75.7%

T-stats:

Constant:	-10.14, -9.72, -3.34, -6.15
T:	7.53, 6.61, 3.16, 1.35
PGEFF:	2.49, 8.71, 1.90, 7.11

The 2014 Residential Energy Use Survey was used to break the forecast of new electric heat dwellings and new non-electric-heat dwellings within single detached, multi attached and individually metered apartment suites by Winnipeg, South Gas and No Gas areas into specific furnace types.

5. **Forecast of Space Heating Systems in Existing Dwellings** – The average age of heating systems in existing dwellings was determined from the 2014 Residential Energy Use Survey. The number of replacements was estimated using a Weibull distribution based on the average age of each furnace type from the survey. Switches of furnace types were estimated using survey respondents in older dwellings with newer heating systems and included saving estimates from the Heating Fuel Choice initiative. Their former heating system was verified using billing system information.

6. **Forecast of Water Heating Systems in New and Existing Dwellings –** Electric and natural gas water heater saturations and average age were estimated for dwellings with and without natural gas space heat using information from the 2014 Residential Energy Use Surveys. The number of replacements was forecast using a Weibull distribution based on the average age of water heaters and switches between fuels were taken into account when forecasting future numbers of water heaters. Saving estimates from the Heating Fuel Choice initiative were included.

7. **Other End Uses** – Other major uses of residential electricity were forecast by dwelling type, including central air conditioning, major appliances, televisions and lighting using the saturation data from the 2014 Residential Energy Use Survey.

8. **Determine Overall Average Use** – An econometric linear model was used to forecast the average annual electricity use per customer of the Residential Basic sector. The Average Use per customer without Demand Side Management (DSM) programs and Codes & Standards (C&S) savings was used as the dependent variable in the model. Historical data from 1992/93 to 2015/16 was modeled. The resulting model and parameters are:

   (Total Usage + DSM programs + C&S savings) / Customers
   = 3949 + 29645 x Saturation - 639 x Price + 0.0669 x Income + 67.2 x T(t)

Saturation	- Electric Heat Customer Count / Total Res Basic Customer Count
Price	- Manitoba Real Residential Electricity Price lagged 2.5 yrs
Income	- Manitoba Real Income per Res Basic Customer
T	- A trend variable capturing increases in electric use and house size

   R-squared: 99.4%
   T-stats:

Constant:	1.97
Saturation:	2.66
Price:	-4.40
Income:	2.80
T:	3.45

9. **Appliance Use and Balancing** – Conditional Demand Analysis using the Residential Survey data combined with customer annual use from billing data was used to derive average annual energy use by type of heating system and appliance for existing and new dwellings. These average uses were multiplied by the number of each type of system and appliance to get the total energy use. This was balanced against Step 8 results to ensure reasonableness.

10. **Determine Total GWh used** – The forecast number of dwellings multiplied by the overall average use determined the GWh forecast. The forecast of energy savings from Codes and Standards as outlined in Manitoba Hydro's Power Smart Plan were subtracted, and the

future use of Electric Vehicles in the Residential sector was added. The result was the forecast of Residential Basic customer total energy use. This excludes savings from future Demand Side Management initiatives.

General Service Mass Market Methodology

A) General Service Mass Market Customer Forecast

Econometric analysis of historical sales data was used to develop models to forecast the number of General Service Mass Market customers. Forecasts of Manitoba Gross Domestic Product (GDP) and Manitoba Hydro Residential Basic Customers were then input into the models to generate forecasts for the number of customers for each year of the forecast period.

The number of Small Non-Demand, Small Demand and Medium customers was modeled using yearend historical customer data from 1985/86 to 2015/16. The resulting model and parameters are as follows:

Number of Customers at yearend (t)

= 34087 + 0.191 x MGDP + 0.046 x RES

MGDP - Manitoba Real Gross Domestic Product
RES - Yearend number of Residential Basic Customers

R-squared: 99.6%
T-stats:

Constant:	18.16
MGDP:	7.46
RES:	6.48

General Service Mass Market customer growth was assigned to Small Non Demand, Small Demand and Medium classes by using their 3 year average growth by class and allocating the customers appropriately.

The number of General Service Large customers was modeled using yearend historical customer data from 1989/90 to 2015/16. The resulting model and parameters are as follows:

Number of GS Large Customers at yearend (t)

= -339 + 0.013 x CUGDP + 0.0013 x RES

CUGDP - Canada / U.S. Blended Real Gross Domestic Product
RES - Yearend number of Residential Basic Customers

R-squared: 98.8%
T-stats:

Constant:	-9.24
CUGDP:	2.98
RES:	10.20

B) General Service Mass Market Average Use Forecast

Historical Average Use per General Service customer was calculated after removing the effects of DSM and Codes & Standards. The average use of the combined Small Non-Demand (SND), Small Demand (SD) and Medium classes were forecast using an econometric linear regression model that included Electricity Price and Manitoba GDP. Historical data from 1989/90 to 2015/16 was used. The resulting model and parameters are as follows:

Average Use per SND, SD and Medium

= 63457 - 2740 x Elec Price + 1.24 x MGDP + 3572 x Dummy

Elec Price - SND, SD and Medium Average Real Electricity Price
MGDP - Manitoba Real Gross Domestic Product
Dummy - "1" up to 2005/06 due to a billing system change causing a reclassification of customers in 2006/07

R-squared: 99.1%
T-stats:

Constant:	11.33
Elec Price:	-5.48

MGDP:	22.12
Dummy:	4.33

The Average Use for Large Mass Market customers was modeled using historical data from 1989/90 to 2015/16. The resulting model and parameters are as follows:

Average Use per GS Large

= 7912265 - 631604 x Elec Price + 487 x CUGDP + 264846 x Dummy

Elec Price	- GS Large Average Real Electricity Price
CUGDP	- Canada / U.S. Blended Real Gross Domestic Product
Dummy	- Included from 1999/00 to 2005/06 to reflect the average use of the 750V-30kV group being higher for those years by about 250,000 kWh

R-squared: 97.7%

T-stats:

Constant:	12.77
Elec Price:	-7.08
CUGDP:	10.98
Dummy:	3.98

The GS Mass Market Small, Medium and Large groups are further subdivided into rate groups that are based on customer's usage. If usage by an individual customer increases (or decreases) sufficiently then they are re-assigned to the appropriate rate group. This action results in the average use of each group to remain relatively stable. For the forecast, the average use of each rate group is held constant. The number of customers in each group is adjusted so that both the total number of customers and overall average use forecast by these models is achieved.

C) General Service Mass Market Total Use Forecast

Total GWh for the General Service Mass Market sector was forecast by multiplying the forecast number of customers in each rate group by the forecast average use. The forecast of energy savings from Codes and Standards as outlined in Manitoba Hydro's Power Smart Plan were subtracted, and the future use of Electric Vehicles in the GS Mass Market sector was added.

General Service Top Consumers Methodology

Each company in the Top Consumers group was forecast individually. Information on individual company operating plans was collected from company specific prospectus and quarterly reports, industry news and reports, and from Manitoba Hydro's Key & Major Account advisors. This information is used in the preparation of company specific short term forecasts for committed projects. The short term plans are forecasted to occur in the first three years. In the long term, following the third year, the company specific energy forecast is held constant for the remainder of the forecast period.

To account for longer term energy requirements in this group of consumers, a special classification called Potential Large Industrial Loads (PLIL) has been created. PLIL is used instead of attempting to forecast each top consumer individually for the long term. It is based on the historical growth of the Top Consumers group and represents the natural growth or contraction of all the Top Consumers together, including unexpected major expansions, contractions, new customers, or loss of customers.

An econometric model of Top Consumers was used to forecast PLIL. The model was developed by fitting historical Top Consumers annual energy from 1983/84 to 2015/16 to the Top Consumer Electricity Price and to a blended Canadian and U.S. Real GDP.

The resulting model and parameters are as follows:

Total Load = 2854 - 508 x Top Price + 0.951 x CUGDP

Top Price - Manitoba Top Consumers Real Electricity Price
CUGDP - Canada / U.S. Blended Real Gross Domestic Product

R-squared: 95.7%
T-stats:

Constant:	2.94
Top Price:	-2.94
CUGDP:	12.70

The forecasted growth from this model was used in years 4 through 20 as PLIL.

Electric Vehicles

The methodology for forecasting Electric Vehicles used historical data, supplied by Statistics Canada and Manitoba Public Insurance, on automobile registrations per year in Manitoba to help estimate future trends. Appropriate assumptions from recent relevant literature were applied to Manitoba's situation. The forecast section on Electric Vehicles provides further details.

Other Sectors

Seasonal, Water Heating, Lighting

Most of the smaller sales sectors, including Seasonal, Flat Rate Water Heating and Area and Roadway Lighting were forecast by analysis of the changes in the number of customers or services and in changes in average use per customer or service. Growth rates were applied based on history and a best estimate as to what the future will bring.

Diesel

Each of the diesel generated supplied communities was individually forecast and included in the forecast under the assumption that these communities are not anticipated to be connected to the Integrated System during the forecast period.

Monthly Sales Allocations

Monthly percentages of customer growth through the year and GWh for each month of the year were averaged for the past three to five years. The most appropriate growths were applied to the forecasts of annual customers and kWh to get the monthly forecasts.

Monthly and Annual Gross Firm Energy and Gross Total Peak

The 5 year monthly percentage of Common Bus and Station Service are applied to their annual energy to calculate their monthly values. Transmission Losses are calculated using a 5 year average of their ratio to Common Bus. Monthly Common Bus, Transmission Losses and Station Service are added up to give the Monthly System Energy. Monthly Common Bus, Transmission Losses, Station Service and Gross Firm Energy are totaled to give the Annual Gross Firm Energy.

The Gross Total Peak is calculated from Load Factors applied to the forecast monthly Gross Total Energy. Prior to calculating the Load Factors, the Top Consumer energy and peak are subtracted because the Top Consumers have a higher average hourly energy relative to their peak value than the Residential and General Service Mass Market Customers. A 10 year historical average Load Factor is calculated for the remaining energy and is applied to the forecast monthly energy to get the peaks for the remaining energy. The Top Consumer peaks are added using a 92% Load Factor applied to the Top Consumer monthly energy.

The annual Gross Total Peak is calculated using the 3 winter months of December, January and February when the actual peak has typically occurred and applied a ratio from the January peak to be used as the annual peak.

Historical weather adjusted energy is used to calculate the annual Load Factor. The historical trend of the load factor increasing 0.08% per year is applied to the forecast in the winter months when the annual system peak occurs. The number of hours in each month is used to calculate monthly Load Factors.

Growth Rates

Annual GWh/year growth rates in this document are linear growth rates, calculated as:

GWh growth / number of years.

Annual percentage growth rates in this document are compound growth rates calculated as:

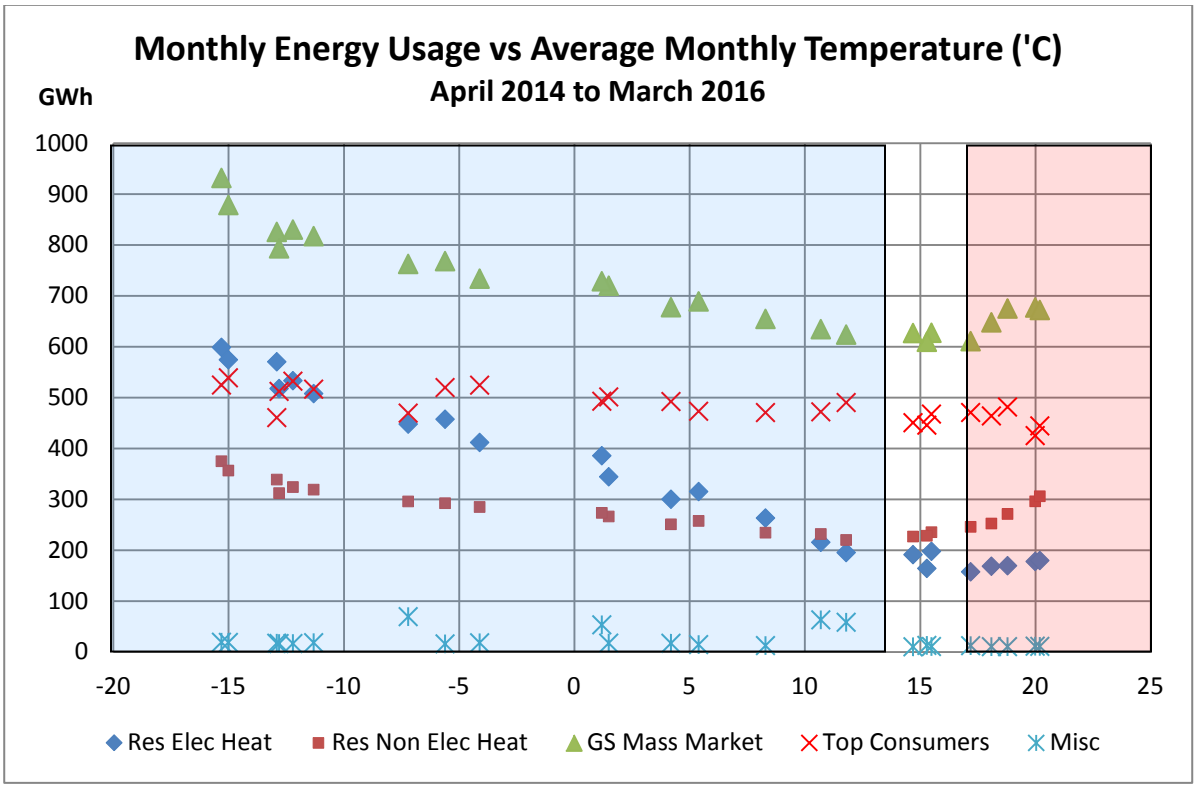
(final GWh / initial GWh) ^ (1 / number of years) – 1.

Weather Normalization Model

Historical weather adjusted actuals are the foundation of the underlying historical information used in the Residential Average Use and General Service Mass Market Average Use models. Manitoba Hydro forecasts with the assumption of normal weather. The process of adjusting annual historical usage to reflect the same weather pattern reduces the inherit variability caused by weather in the underlying data in each respective model.

The relationship of energy to weather is depicted below. The energy usage in each month is compared to the average monthly temperature. Heating Degree Days (HDD) occur in the shaded blue area where daily temperature averages are less than 14°C. Similarly, Cooling Degree Days (CDD) occur in the shaded red area where the daily temperature averages are above 18°C. Sectors with significant heating and cooling loads show an increase in energy consumption as the temperature departs from the base load. Base load temperature, where there are no significant heating or cooling loads, range between 14°C to 18°C.

The sectors that are weather adjusted are the General Service Mass Market, Residential Electric Heat and Residential Non Electric Heat.



The weather effect is determined in these sectors every year by regressing the previous two years of actual monthly energies against the actual HDD and CDD for the billing month. Due to the nature of cycle billing, the weather best associated with the billing cycle is the 16th of the previous month to the 15th of the current month. The result is a GWh/HDD coefficient and a GWh/CDD coefficient for each sector for each historical year. With each sector using the exact same two year period, the coefficients produced in each sector can be added together to form the HDD and CDD coefficients for General Consumers Sales for the given year.

The weather normalization model is also applied for Common Bus. Common Bus is metered at month end and as such, the weather used for the analysis is from the 1st of the month to the last day of the month. For the Common Bus weather normalization model, the usage attributable to the Top Consumers is removed because Top Consumers energy usage fluctuations is primarily related to production and is not weather related. The weather coefficients used at Generation are the Common Bus coefficients increased proportionately for Transmission Losses.

The weather regression model in each sector would be as follows:

GWh = h * HDD + c * CDD + Constant

h - Heating Degree Day coefficient (GWh per HDD)
c - Cooling Degree Day coefficient (GWh per CDD)
Constant - Base load portion not affected by heating or cooling (GWh)

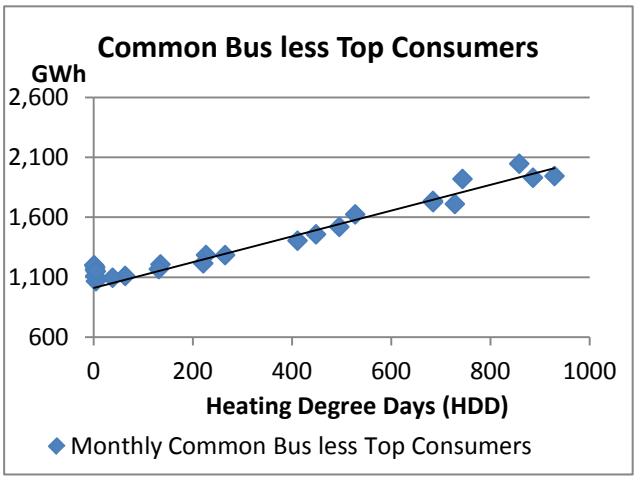
The resulting model and parameters for Common Bus calculated for April 2014 to March 2016 would be as follows:

GWh = 1009.7 + 1.074*HDD + 2.437* CDD

R-squared: 97.8%

T-stats:

Constant:	41.99
HDD:	25.45
CDD:	4.34
Standard Error:	49.6



GLOSSARY OF TERMS

Area and Roadway Lighting sector - includes electricity sales for the Sentinel Lighting and Street Lighting rate groups.

Common Bus - is the total load measured from all the distribution points (i.e. substations) within Manitoba. It includes all energy supplied to General Consumers Sales customers, Construction Power plus associated Distribution Losses, but excludes Diesel customers, Transmission Losses and Station Service.

Customer – Most metered electrical services count as a customer. Unmetered services such as flat rate water heating and sentinel rental services do not count as a customer. Street lighting counts all the services grouped as a premise as one customer.

Codes and Standards – A Demand Side Management (DSM) initiative associated with existing Provincial building codes and improved equipment efficiency standards. This is the only DSM initiative that is specifically accounted for in the forecast.

Cooling Degree Days (CDD) - CDD is a measurement designed to reflect the demand for energy needed to cool a building. CDD is the number of degrees warmer than 18 degrees Celsius each day is, based on the average of the high and low temperature of the day.

CDD = sum (max(0, (Daily high + Daily low) / 2) - 18)

Curtailable - is a 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.

Gas Available Area – A city or town in Manitoba where customers have natural gas service available and can choose to heat their dwelling with either natural gas or electricity. Approximately 83% of Residential Basic customers, including the entire city of Winnipeg, have gas available.

General Consumers Sales - includes the energy supplied to all of Manitoba Hydro's individually billed customers. It excludes export sales.

General Service Mass Market - includes all Commercial and Industrial customers, excluding the Top Consumers group.

General Service Sector - made up of sales to Commercial and Industrial businesses served by Manitoba Hydro. This sector consists of five rate groups (Basic, Diesel, Seasonal, Flat Rate Water Heating and Surplus Energy Program).

General Service Top Consumers - is made up of the largest electricity users of Manitoba Hydro.

Gross Firm Energy - is the energy required to serve Manitoba Hydro's customers on the Integrated System. It excludes exports, interruptible (non-firm) loads and diesel customers.

Gross Total Peak - is the maximum integrated (i.e. average) hourly load required to serve Manitoba Hydro's customers on the Integrated System. It excludes exports and diesel customers. It includes curtailable loads.

GWh (gigawatt-hour) - The unit of energy primarily used in this document. One GWh equals one million kWh (kilowatt-hours), which is approximately equal to the energy of 100 typical dwellings not using electricity for heating, or 40 dwellings that use electricity for heating.

Heating Degree Days (HDD) – HDD is a measurement designed to reflect the demand for energy needed to heat a building. HDD is the number of degrees colder than 14 degrees Celsius each day is, based on the average of the high and low temperature of the day.

HDD = sum (max(0, 14 - (Daily high + Daily low) / 2))

Integrated System - is the power grid that connects Manitoba Hydro's generation sources to its customers. All Manitoba Hydro's customers except diesel are on the Integrated System.

Interruptible (Non-Firm) Energy - includes all energy sold to Manitoba customers on a non-firm basis. Currently, the only rate group for this is the Surplus Energy Program (SEP).

kWh/cust (kilowatt-hours per customer): The unit of energy primarily used in this document to represent the average use of one customer. The total usage in GWh of a group of customers is divided by the number of customers and then multiplied by one million.

Load Factor - is the ratio of the average hourly energy over a period, usually a year, divided by the energy used at a specific hour, usually the hour of system peak. A load factor of 25% means that the average energy is one-quarter of what is used at system peak. A load factor greater than 100% means that the average hourly energy is more than what is used at system peak. Given a specific energy, a lower load factor means a higher peak. The equation is:

Load Factor = (Total Energy / Hours) / (Energy over the hour of system peak)

Manitoba Load at Common Bus - is the total load measured from all the distribution points (i.e. substations) within Manitoba. It includes all energy supplied to General Consumers Sales customers plus associated Distribution Losses, but excludes diesel customers, Transmission Losses and Station Service.

MW (megawatt): The unit of peak demand primarily used in this document. One MW is a million watts. One thousand MW of peak demand for one hour equals one GWh of energy. Alternatively, one MW for a thousand hours also equals one GWh of energy.

Net Firm Energy and **Net Total Peak** - are the same as Gross Firm Energy and Gross Total Peak except they exclude Station Service. The reporting of Manitoba Load in the Load Forecast used "Net" until 2008. It presented both until 2011. Starting with the 2012 forecast, only the "Gross" is presented. Net can be calculated when needed by subtracting Station Service from the Gross.

Residential Basic – is the primary residential customer group made up of single detached and multi attached dwellings as well as individually metered apartment suites.

Residential sector - made up of sales to residential customers for non-business operations. The Residential sector is comprised of four rate groups (Basic, Diesel, Seasonal, and Flat Rate Water Heating).

Station Service - is the energy used by power plants to generate power and service their own load.