Manitoba Hydro

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February 2, 2023

Dr. D. Christle
Secretary and Executive Director
Public Utilities Board
400-330 Portage Avenue
Winnipeg, Manitoba
R3C 0C4

Dear Dr. Christle:

RE: MANITOBA HYDRO 2023/24 & 2024/25 GENERAL RATE APPLICATION – CORRECTIONS

On November 15, 2022, Manitoba Hydro filed its 2023/24 & 2024/25 General Rate Application ("Application") with the Public Utilities Board and Intervenors of past record. The Application requires a number of corrections listed below:

- **Appendix 4.3** – two figures were mislabeled in body of figure and 1 figure title was mislabeled:
    - PDF page 10 – Updated Figure 2 - Line 1 should read "Net Income before Write-off of Keeyask in-service deferral"
    - PDF page 13 – Updated Figure 4 Title – should read "Benefit to Customers – Deferral of Small Software Systems CCA"
    - PDF page 31 – Updated Figure 13 - Line 3 in both tables should read "Amortization of phase-in deferral"
- **Appendix 5.1** – the updated Electric Load Scenario includes the following minor changes; none of which impact any of the underlying data used in the Cost of Service Study or Rate Schedules:
    - PDF page 5 (page iii) – Updated 3rd paragraph to reflect the proper treatment of the 20-yr Efficiency Manitoba extrapolated plan.
    - PDF page 17 (page 9) – Updated TABLE 4 – General Consumers Sales Energy to correct historical growth for GS Mass Market
    - PDF page 18 (page 10) – Updated 1st paragraph to reflect increase in GWh from past 10 years and updated 4th paragraph to reflect the use of 6% for Transmission Losses.
    - PDF page 19 (page 11) – Updated TABLE 5 – Components of Manitoba Energy to reflect increase in percentage of the 10 year historical Gross Firm Energy Column.
    - PDF page 27 (page 19) – Updated 3rd paragraph – Potential Large Industrial Load "increase" instead of "decline".

  - PDF page 49 (page 41) – Updated 3rd paragraph to correct the growth of MWs values.
  - PDF page 55 (page 47) – Updated 3rd paragraph to reflect the proper treatment of the 20-yr EM extrapolated plan AND updated 7th & 8th paragraph for correction of GWh and MW growths over the forecast period.
  - PDF page 71 (page 63) – Updated TABLE 19 – General Consumer Sales Energy (Extrapolated) to update total sales column forecast years 2022/23 – 2031/32 to the correct values corresponding to each year and correct historical growth for GS Mass Market
  - PDF page 74 (page 66) – Updated TABLE 22 – Manitoba Load at Common Bus (Extrapolated) to update the 21/22 Normalized peak usage
  - PDF page 76 (page 68) – Updated TABLE 24 – Manitoba Gross Total Peak (Extrapolated) to update forecast years 2022/23 – 2041/42 to the correct values corresponding to each year.
- **Tab 8 –** two figures were corrected:
  - PDF page 15 – Figure 8.7: rate for Winnipeg included rate increases for three years instead of two years as proposed, therefore all dollar values for the Winnipeg row have been updated
  - PDF page 36 – Figure 8.28: "Revenue" was based on the approved 2022 demand rate, rather than the April 2024 proposed rate – this column has been updated
- **Appendix 8.4** – two pages have been updated:
  - PDF page 21 (page 19) – 250 LED "Exclusive Pole/Luminaire" should read "$24.00"
  - PDF page 25 (page 23) – Decorative Lighting "Connected load @" should read "$1.080/kW"
  - PDF page 25 (page 23) – Decorative Lighting "Minimum Monthly Bill" should read "$22.13"
- **Appendix 8.7** – incorrect rate in the Outdoor Lighting Rate table
  - PDF page 22 (page 20) – 250 LED "Exclusive Pole/Luminaire" should read "$24.23".
- **Appendix 9.8 –** incorrect amount in 2019/20 Corporate Accruals & Adjustments line
  - PDF page 3 - Figure 2: "Corporate Accruals & Adjustments" line was inadvertently presented as 4,946 instead of 4,741 in 2019/20, resulting in total O&A Costs Attributable to Electric Operations (O&A) of $511,756. The correct O&A total for 2019/20 is $511,961.
- **MFR 88 – Figure 1 correction:**
  - PDF page 584 – For Gillam 2017 Municipal Road Upgrade the "Final Pre-Construction Budgets" should read "10"
  - PDF page 584 – For Gillam Trailer Court Sewer Linear Infrastructure the "Final Pre-Construction Budgets" should read "11"
  - PDF page 584 – For Bipole III- Transmission Line the "Final Pre-Construction Budgets" should read "1655"
  - PDF page 584 – For Bipole III – Converter Stations the "Final Pre-Construction Budgets" should read "2675"
  - PDF page 584 – For the Bipole III – Collector Lines "Final Pre-Construction Budgets" should read "260"
  - PDF page 584 – For the Bipole III – Community Development Initiative "Final Pre-Construction Budgets" should read "62"

Enclosed please find revised copies of the above noted Tab and Appendices, these corrections have also been made to the files on Manitoba Hydro's external website.

Should you have any questions with respect to the foregoing, please do not hesitate to contact the writer at 204-360-3633 or Odette Fernandes at 204-360-3633.

Yours truly,

MANITOBA HYDRO LEGAL SERVICES
Per:

BRENT A. CZARNECKI
Senior Counsel

Att.

cc : Bob Peters, Board Counsel
All Intervenors of Past Record

Figure 1 Impact to Net Income – Amortization of Keeyask In-Service Deferral

Impact to Net Income Amortization of Keeyask In-Service Deferral *(in Millions)*	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32
Net Income before amortization of Keeyak in-service deferral	$ 751	$ 470	$ 296	$ 150	$ 167	$ 98	$ 93	$ 112	$ 106	$ 170
Amortization of Keeyask in-service deferral		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net Income including amortization of Keeyask in service deferral	**$ 751**	**$ 469**	**$ 295**	**$ 149**	**$ 166**	**$ 97**	**$ 92**	**$ 111**	**$ 105**	**$ 169**

Figure 2 shows the impact on net income for the next 10 years if this deferral is not endorsed and the PUB directs Manitoba Hydro to write off the balance of $104 million.

Figure 2 Impact to Net Income – Write-off of Keeyask In-Service Deferral

Impact to Net Income Write-Off of Keeyask In-Service Deferral *(in Millions)*	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32
Net Income before write-off of Keeyask in-service deferral	$ 751	$ 469	$ 295	$ 149	$ 166	$ 97	$ 92	$ 111	$ 105	$ 169
Write-off Keeyask in-service deferral	-	(104)	-	-	-	-	-	-	-	-
Remove amortization of Keeyask in service deferral	-	1	1	1	1	1	1	1	1	1
Net Income if Keeyask in service deferral is not endorsed	**$ 751**	**$ 366**	**$ 296**	**$ 150**	**$ 167**	**$ 98**	**$ 93**	**$ 112**	**$ 106**	**$ 170**

As stated in Manitoba Hydro's 2021-22 Interim Rate Application (pages 37-39), under the previous CGAAP method used by Manitoba Hydro, depreciation and finance expense costs were recognized in revenue requirement on a per unit of output basis (i.e. costs recognized equally based on the number of generating units placed in-service). When applied to the Keeyask generating station which has seven turbine units, Manitoba Hydro's past practice would recognize into service 1/7 of the total asset value for all generating station assets completed and available for use (i.e. 1/7 of the powerhouse, dams, spillway and water control structures). As 1/7 of the asset costs are placed into service, Manitoba Hydro would recognize 1/7 of the depreciation and finance costs. The per generating unit method was used by Manitoba Hydro for the in-service of its past generating stations, most recently for Wuskwatim (2012) and allows for the matching of the timing of the recognition of depreciation and finance expense on the plant assets with the timing of the recognition of the revenue brought on with each turbine going into service.

Under IFRS, assets are to be placed in service when they are recognized as being used and useful. This accounting standard results in a significant increase in the assets placed in-service with the first turbine unit (i.e. 100% of the powerhouse, dams, spillway and water control) and a decrease in the assets placed in-service with the subsequent six turbine units (i.e. unit specific assets) compared to Manitoba Hydro's past accounting practice. At each in-service,

software systems which will be expensed as costs are incurred. The average service life of small systems is approximately six years. Since these costs are regular and recurring, Manitoba Hydro is proposing not to defer these costs. If costs were deferred and amortized there would be no benefit to customers after 2027/28. From 2030/31 and on the annual amount deferred would equally offset the annual amount amortized, as shown in Figure 4.

Figure 4 Benefit to Customers – Deferral of Small Software Systems CCA

Benefit to Customers Deferral of Small Software Systems CCA *(in Millions)*	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31 & On
CCA Costs	$ 13.00	$ 8.50	$ 8.50	$ 8.50	$ 8.50	$ 8.50	$ 8.50	$ 8.50
CCA Amortization if Deferred	(1.08)	(2.88)	(4.29)	(5.71)	(7.13)	(8.54)	(8.88)	(8.50)
Benefit to customers - deferral of recurring CCA costs	**$ 11.92**	**$ 5.63**	**$ 4.21**	**$ 2.79**	**$ 1.38**	**$ (0.04)**	**$ (0.38)**	**$ -**

1.4.3 Existing Depreciation Methodology for Rate Setting Purposes

In response to Directives 8 & 9 of Order 43/13 and Directive 17 of Order 59/18, Manitoba Hydro has undertaken a comprehensive review of its depreciation methodologies and has obtained a detailed depreciation study (IFRS-Compliant ASL Study) as requested by the PUB. Based on this review, Manitoba Hydro is advancing several recommendations for the PUB's approval in relation to the depreciation methodology applied for rate setting purpose and regulatory deferral accounts associated with depreciation. The findings from Manitoba Hydro's review and the resulting recommendations being advanced by Manitoba Hydro are as follows:

- **Need for an amortization period:** The cumulative regulatory deferral balance related to depreciation methodology for rate setting purposes (including gains and losses) has grown to $355 million. If an amortization period is not established for this deferral, the balance will continue to grow to $1.8 billion by the end of the 20-year forecast period. Continuing to defer these costs without a recovery mechanism has several impacts. Firstly, Manitoba Hydro is unable to fully recover its plant asset costs while the assets are in use. Unrecovered costs are pushed out to future customers who will not receive the benefits from these assets, which is contrary to the principle of intergenerational equity. Additionally, from an external audit perspective, PUB approval of an amortization period for this deferral account will demonstrate that the deferral has future value to the utility in terms of the ability to generate cash inflows from rates and as such, the account qualifies for recognition as an asset.

the associated expenses over the period expected to benefit from the costs previously deferred.

Figure 13 shows the impact to net income of phasing in the transition to IFRS Depreciation

Figure 13 Impact to Net Income – Establishment and Amortization of IFRS Depreciation Phase-in Deferral

Impact to Net Income
Establishment and Amortization of IFRS Depreciation Phase-in Deferral

(in Millions)	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32
Net Income without IFRS depreciation phase-in deferral	$ 751	$ 428	$ 232	$ 94	$ 117	$ 55	$ 57	$ 82	$ 82	$ 153
Additions to IFRS depreciation phase-in deferral	-	41	65	60	55	50	45	40	35	30
Amortization of phase-in deferral	-	-	(2)	(5)	(6)	(8)	(10)	(11)	(12)	(14)
Net Income including IFRS depreciation phase-in deferral	**$ 751**	**$ 469**	**$ 295**	**$ 149**	**$ 166**	**$ 97**	**$ 92**	**$ 111**	**$ 105**	**$ 169**

	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38	2038/39	2039/40	2040/41	2041/42
Net Income without IFRS depreciation phase-in deferral	$ 179	$ 214	$ 278	$ 256	$ 293	$ 326	$ 375	$ 456	$ 524	$ 586
Additions to IFRS depreciation phase-in deferral	25	20	15	10	5	-	-	-	-	-
Amortization of phase-in deferral	(14)	(15)	(16)	(16)	(16)	(17)	(17)	(17)	(17)	(17)
Net Income including IFRS depreciation phase-in deferral	**$ 190**	**$ 219**	**$ 277**	**$ 250**	**$ 282**	**$ 309**	**$ 358**	**$ 439**	**$ 507**	**$ 569**

1.4.17 Establish an Amortization Period for the Change in Depreciation Method Deferral and Cease Additions to the Account

As part of Manitoba Hydro's request for the PUB to approve the use of IFRS ELG for rate setting purposes, Manitoba Hydro is seeking PUB approval to cease additions to the Change in depreciation method deferral account and to begin amortizing the balance in the account into income on a straight-line basis over a period of 30 years for Manitoba Hydro, 42 years for WPLP and 62 years for KHLP effective September 1, 2023. The amortization periods are based on the weighted average probable remaining life of the asset components contributing to the deferral balance and will ensure fairness to customers by recognizing the associated depreciation expenses over the remaining periods expected to benefit from the use of the assets.

Figure 14 shows the impact of the recommended amortization periods on forecasted net income.

2021

Electric Load Scenario

Market Forecast & Load Research

March 2022

Manitoba Hydro

IMPORTANT:

EXECUTIVE SUMMARY

Overview

The 2021 Electric Load Scenario represents Manitoba Hydro's estimate of its future load requirements for its service area. The service area consists of the entire province of Manitoba (99.85% of sales), as well as two resale customers that supply energy to Creighton, Saskatchewan (0.12% of sales) and the Northwest Angle, Minnesota (0.03% of sales) with exports of power to other utilities not included.

This scenario analysis has been primarily prepared as part of Manitoba Hydro's submission to the Manitoba Public Utility Board for the 2023/24 & 2024/25 General Rate Application. This scenario will support as an estimate to determine the need for rate increases that are necessary for the corporation to maintain a reasonable financial position and progress towards attaining and maintaining its financial targets. Maintaining the financial strength of the corporation is vital to provide customers with long-term rate stability and predictability.

This scenario represents a single potential future and Manitoba Hydro is exploring how the trends of the evolving energy landscape could impact the demand for energy in Manitoba as part of the ongoing Integrated Resource Planning ("IRP") Development process.

This scenario analysis continues to employ underlying assumptions consistent to those used in previous estimates of future load requirements such as economic, normal weather and Demand Side Management (DSM) assumptions. In addition, this scenario continues to apply industry standard forecast methodologies applied in previous forecasts such as employing a bottom-Up approach, utilizing economic inputs from reputable economics consultants along with the application of econometric modelling, end use modelling and individual customer projections.

The 2021 Electric Load Scenario was prepared for the 20-year planning horizon from 2020/21 to 2040/41 and all underlying models and assumptions are prepared until 2040/41. In keeping in concert with planning timelines consistent with Manitoba Hydro's submission to the Manitoba Public Utility Board for the 2023/24 & 2024/25 General Rate Application, the scenario has been updated such that 2021/22 is reflective of weather normalized actual consumption and has been extrapolated an additional year (2041/42) to continue to reflect a 20-year planning horizon (2022/23 to 2041/42). The extrapolation of the scenario can be found in Appendix A.

Including projected energy savings from program-based offerings provided by Efficiency Manitoba, the Gross Firm Energy in Manitoba is forecast to grow from a weather adjusted value of 25,136 GWh in 2021/22 to 26,083 GWh in 2031/32. This represents an average growth of 95 GWh or 0.4% per year for the first 10 years of the forecast (2022/23 to 2031/32). Gross Firm Energy is forecast to be 33,218 GWh by 2041/42, representing a growth rate of 713 GWh or 2.4% per year (2032/33 to 2041/42) and growing at 404 GWh or 1.4% per year over the 20 year planning horizon.

Including projected demand savings from program-based offerings provided by Efficiency Manitoba, Gross Total Peak is forecast to grow from an adjusted value of 4,737 MW in 2021/22 to 4,980 MW in 2031/32. This represents an average growth 24 MW or 0.5% a year for the first 10 years of the forecast (2022/23 to 2031/32). Gross Total Peak is forecast to be 6,283 MW by 2041/42, representing a growth rate of 130 MW or 2.4% per year (2032/33 to 2041/42) and growing at 77 MW or 1.4% per year over the 20 year planning horizon.

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

i. **Residential Basic** is forecast to grow at an average of 2.3% per year over the next 20 years after including the impacts of program-based DSM. Population is forecast to grow steadily at 1.1% per year over the next 20 years which drives long-term Residential Basic customer growth. The Residential growth in the first 10 years of the forecast are tempered by electric price increases which are forecast to be 3.5% until 2029/30. The Residential growth beyond 2030 is primarily driven by the forecasted growth in electric vehicles, lower projected annual electric rate increase of 2.0% and lower reductions due to Codes and Standards than projected in the first 10 years of the forecast.

ii. **General Service Mass Market** is forecast to grow at an average of 1.2% per year over the next twenty years after including the impacts of program-based DSM. The primary drivers for growth in the GS Mass Market are the population and the economy. Changes in the number of residential customers and the Manitoba Gross Domestic Product (GDP) are reflected in the GS Mass Market's electricity use. The GS Mass Market Sectors is forecast to grow at a faster pace beyond 2030 mainly driven by the uptake of Electric Vehicles and lower electric price increases than the first 10 years of the forecast.

iii. **General Service Top Consumers** is forecast to grow at an average of 0.6% per year over the next twenty years after including the impacts of program-based DSM. For the short term (first 5 years), General Service Top Consumers are forecast individually. For the long term (years 6 to 20), the growth of Top Consumers is forecast together econometrically and is referred to as Potential Large Industrial Loads (PLIL). The Top Consumers sector is expected to decline 375 GWh in the first five years based on individual customer short term plans expected in the Petro/Oil/Natural Gas and Chemical Treatment sectors, and then grow 1,065 GWh in years 6 to 20 for PLIL.

Demand Side Management (DSM) Savings

Prior to 2019, the forecast of Demand Side Management (DSM) savings was provided under a 15-year forecast coordinated by the Manitoba Hydro's DSM Planning & Evaluation Department. The forecast was developed through an intensive planning process which built on the Corporation's experience and continuous involvement in demand side management since 1989.

In June 2017, the Government of Manitoba passed legislation, The Efficiency Manitoba Act, which moves the responsibility for the planning, design and implementation of DSM programming to a new crown corporation called Efficiency Manitoba. The proclamation of the Act occurred in January 2018. The legislation also set minimum average annual targets over a 15-year period of 1.5% of the previous years' electricity load and 0.75% of the previous years' natural gas load. The electric and natural gas Demand Side Management activities of Efficiency Manitoba are to be funded by Manitoba Hydro.

With an official start date of April 1, 2020, Efficiency Manitoba has filed its first three-year plan with the Public Utilities Board for review. To accommodate Manitoba Hydro's overall longer-term business planning requirements, Efficiency Manitoba, in collaboration with Manitoba Hydro, prepared a longer term 20-year extrapolation of future DSM savings; for inclusion in the 2021 Electric Load Scenario. This future scenario adheres to the mandated minimum average annual targets over a 15-year period of 1.5% of the previous years' electricity load as outlined in the Efficiency Manitoba Act.

Demand Side Management energy and capacity savings are captured by way of efforts to affect change in codes & standards and through program-based DSM offerings.

Codes & Standards

Manitoba Hydro's historical efforts in conjunction with Efficiency Manitoba's future efforts to affect change in codes and standards involves being an aggressive and active participant and, in many cases, a driving force on several provincial and national energy efficiency building codes and performance standards committees. The electric load forecast reflects future DSM savings associated with existing and future Provincial building codes and improved equipment efficiency standards and regulations (Codes and Standards).

Program-based DSM

Projected energy and demand savings from program-based offerings are reported in the Load Forecast but are provided under a separate 15-year forecast as provided by Efficiency Manitoba. These savings are accounted for separately in Manitoba Hydro's Integrated Resource Planning function.

The following figures outline Gross Firm Energy and Gross Total Peak load scenarios after incorporating Demand Side Management activity:

Figure 1 – Gross Firm Energy

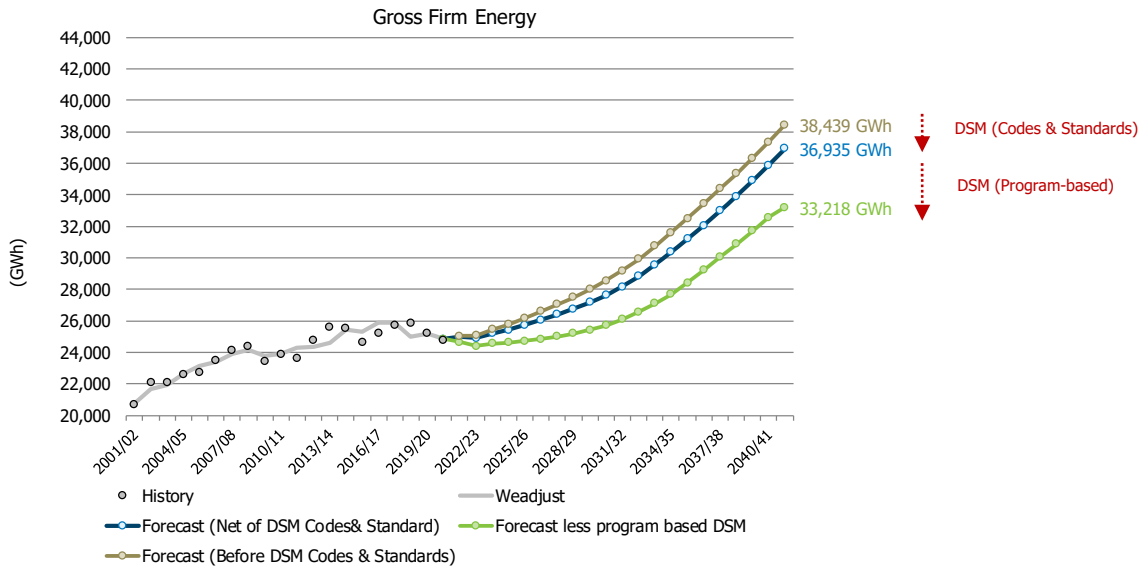
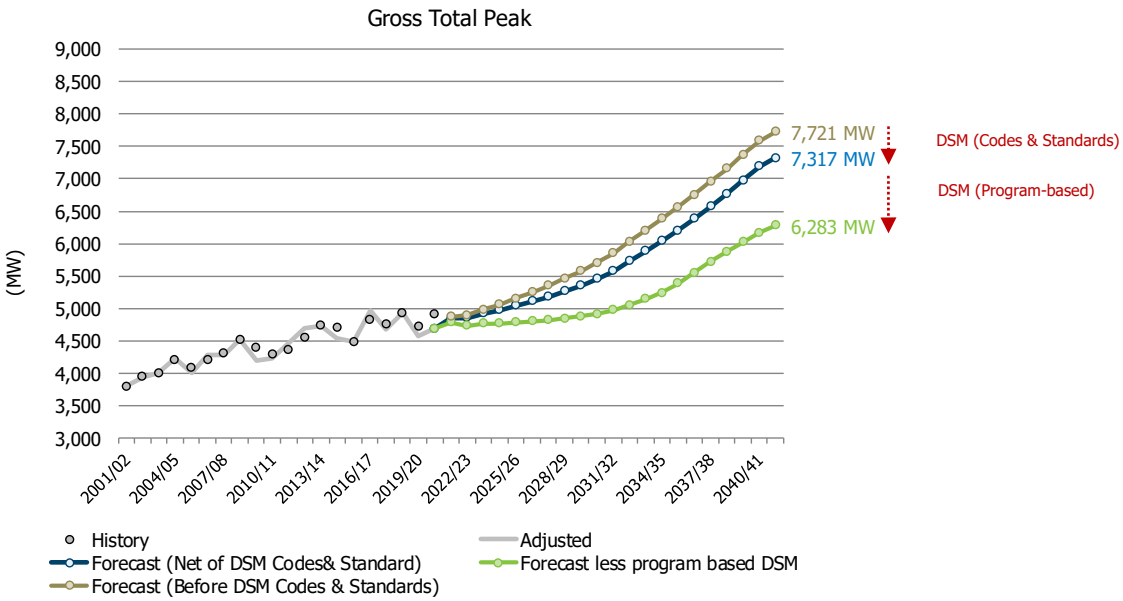


Figure 2 – Gross Total Peak



The following table outlines the impacts of incorporating program-based Demand Side Management activity:

Table 1 – Gross Firm Energy and Gross Total Peak (Including impacts of DSM)

Gross Firm Energy and Gross Total Peak Impacts of Demand Side Management 2022/23 - 2041/42						
	Gross Firm Energy (GWh)			Gross Total Peak (MW)		
Fiscal Year	Forecast	DSM (Program Based)	Forecast less DSM	Forecast	DSM (Program Based)	Forecast less DSM
2021/22 Wadj	25,136		25,136	4,737		4,737
2022/23	24,897	(481)	24,416	4,854	(115)	4,739
2023/24	25,201	(630)	24,571	4,921	(154)	4,767
2024/25	25,437	(825)	24,612	4,978	(206)	4,772
2025/26	25,740	(1,011)	24,729	5,041	(253)	4,789
2026/27	26,054	(1,194)	24,860	5,110	(306)	4,803
2027/28	26,403	(1,380)	25,023	5,187	(364)	4,823
2028/29	26,772	(1,558)	25,214	5,268	(418)	4,850
2029/30	27,172	(1,738)	25,433	5,358	(479)	4,879
2030/31	27,611	(1,916)	25,695	5,458	(540)	4,918
2031/32	28,163	(2,080)	26,083	5,579	(599)	4,980
10 Year Avg Gr.	303		95	84		24
Avg Gr.	1.1%		0.4%	1.6%		0.5%
2032/33	28,839	(2,273)	26,565	5,730	(674)	5,056
2033/34	29,580	(2,476)	27,104	5,884	(737)	5,147
2034/35	30,361	(2,681)	27,680	6,041	(797)	5,243
2035/36	31,188	(2,758)	28,430	6,209	(818)	5,391
2036/37	32,069	(2,836)	29,232	6,389	(836)	5,553
2037/38	32,979	(2,925)	30,054	6,577	(856)	5,721
2038/39	33,916	(3,039)	30,877	6,772	(896)	5,876
2039/40	34,893	(3,184)	31,709	6,976	(956)	6,020
2040/41	35,898	(3,325)	32,573	7,188	(1,016)	6,172
2041/42	36,935		33,218	7,317		6,283
20 Year Avg Gr.	590		404	129		77
Avg Gr.	1.9%		1.4%	2.2%		1.4%

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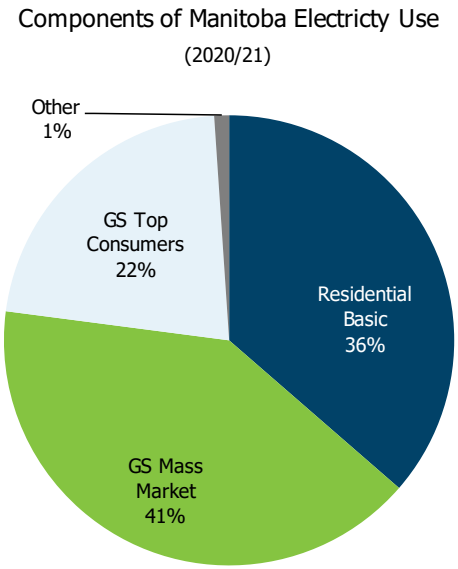
INTRODUCTION

The 2021 Electric Load Scenario was prepared for the 20-year planning horizon from 2020/21 to 2040/41 and all underlying models and assumptions are prepared until 2040/41. In keeping in concert with planning timelines consistent with Manitoba Hydro's submission to the Manitoba Public Utility Board for the 2023/24 & 2024/25 General Rate Application, the scenario assumes that 2021/22 is reflective of weather normalized actual consumption and energy consumption has been extrapolated an additional year (2041/42) to continue to reflect a 20-year planning horizon (2022/23 to 2041/42). Tables where the extrapolation process was performed can be found in Appendix A.

COMPONENTS OF MANITOBA'S ELECTRICITY USE–2020/21

General Consumers Sales (also referred to as Total Sales) includes the energy supplied to all of Manitoba Hydro's individually billed customers. During the 2020/21 fiscal year, Manitoba Hydro averaged 596,993 General Consumers Sales customers who consumed 21,762 GWh.

Figure 3 – Components of Manitoba Electricity Use



The major groups include:

i. **Residential Basic**, with 505,045 customers, who used 7,919 GWh or 36.4% of Total Sales are mostly residential structures that include single-family dwellings, multi-family dwellings and individually metered apartment suites.

ii. **General Service Mass Market**, with 69,764 customers who used 8,851 GWh or 40.7% of Total Sales are small to large Commercial and Industrial customers.

iii. **General Service Top Consumers**, with 26 customers who used 4,762 GWh or 21.9% of Total Sales are the 10 high-usage companies (some count as multiple customers) that are forecast individually.

In addition to the above major groups, there are four remaining group of customers who used 230 GWh or 1.1% of Total Sales:

i. Seasonal customers are those billed twice a year rather than on a monthly basis.

ii. Diesel customers are from four remote communities not connected to the integrated grid system.

iii. Flat Rate Water Heating customers.

iv. Area and Roadway Lighting sector which includes electricity sales for the Sentinel Lighting and Street Lighting groups.

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 2020/21, Common Bus was 23,063 GWh or about 6.0% more than Total Sales.

Gross Firm Energy is the total load needed to be generated for domestic firm load requirements on the Integrated System excluding Diesel customers. 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 2020/21, Gross Firm Energy was 24,786 GWh or about 13.9% over Total General Consumer Sales.

Table 2 – Components of Manitoba Electric Use

Components of Manitoba Electricity Use 2020/21 (Customers, Actual Consumption and Average Use)				
Forecast Group	Cust/Serv	GWh	% of Sales	kWh/cust
Residential Basic	505,045	7,919	36.4%	15,680
Residential Diesel	649	10	0.0%	15,374
Residential Seasonal	19,041	76	0.4%	4,002
Residential Flat Rate Water Heating	2,702 *	14	0.1%	5,068
Total Residential	524,734	8,019	36.8%	
GS Mass Market	69,764	8,851	40.7%	126,866
GS Top Consumers	26	4,762	21.9%	183,168,078
GS Diesel	181	8	0.0%	46,857
GS Seasonal	981	5	0.0%	5,304
GS Flat Rate Water Heat	315 *	5	0.0%	15,970
GS Surplus Energy Program	31	44	0.2%	1,412,796
Total General Service	70,983	13,676	62.8%	
Sentinal Flat Rate	21,020 *	11	0.1%	544
Sentinal Rental	26,065 *	-	0.0%	-
Street Lighting	1,276	56	0.3%	43,560
Total Lighting	1,276	67	0.3%	
Total General Consumer Sales	596,993	21,762	100.0%	
Less Diesel Sales		(18)	-0.1%	
Distribution Losses		1,256	5.8%	
Construction Power		63	0.3%	
Manitoba Load at Common Bus		23,063	106.0%	
Transmission Losses		1,643	7.6%	
Less Non-Firm Energy		(44)	-0.2%	
Station Service		124	0.6%	
Gross Firm Energy		24,786	113.9%	

* Flat rate and rental services do not count as customers

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FORECAST OVERVIEW

General Consumers Customer Forecast

In 2020/21, Manitoba Hydro had an average of 596,993 General Consumer Sales customers. These were made up of 505,045 Residential Basic customers, 69,764 General Service Mass Market customers, 26 General Service Top Consumers customers and 31 Surplus Energy Program (SEP), i.e. non-firm, customers, with the remaining customers being Diesel, Seasonal and Area and Roadway Lighting.

During the last 10 years, Residential Basic customers have grown at an average of 5,916 (1.3%) per year. Manitoba Hydro's Forecast of Key Economic and Financial Indicators provide the forecast of Residential Basic customers which is incorporated in the load forecast. Residential Basic customers are forecast to grow 5,881 (1.1%) customers per year over the next 10 years and 5,988 (1.1%) customers per year over the next 20 years.

General Service Mass Market customers have grown 457 (0.7%) per year over the last 10 years. The sector is forecast to grow 483 (0.7%) per year over the next 10 years and 499 (0.7%) per year over the next 20 years.

Residential Seasonal customers, mainly cottages with lower average energy use, experienced a reduction of customers over the past 10 years as higher energy consuming seasonal customers are transferred to the Residential Basic sector. The sector is forecast to decrease at 193 customers annually over the next 10 years and 190 customers annually over the next 20 years due to the continued transfer of higher usage seasonal customers to the Residential Basic sector.

Area and Roadway Lighting customers have grown 9 (0.7%) per year over the last 10 years. The sector is expected to grow at 14 (1.1%) customers annually over the next 10 years and 14 (1.0%) customers annually over the next 20 years.

Table 3 – General Consumers Sales Customers

General Consumer Sales (Average Customers) History and Forecast 2010/11 - 2040/41										
Fiscal	Residential			General Service					Lighting	Total
Year	Basic	Diesel	Seasonal	Mass Mkt	Top Cons	Diesel	Seasonal	SEP		Custs
2010/11	445,882	550	20,950	65,193	26	176	842	24	1,184	534,828
2011/12	450,748	568	20,844	65,546	32	174	847	26	1,155	539,939
2012/13	456,130	577	20,731	65,974	31	175	850	28	1,164	545,660
2013/14	462,274	583	20,757	66,569	31	179	861	28	1,157	552,438
2014/15	468,499	583	20,626	67,042	30	183	872	28	1,196	559,060
2015/16	474,153	583	20,176	67,395	32	184	882	30	1,208	564,643
2016/17	480,365	586	19,707	67,676	26	181	923	30	1,218	570,712
2017/18	486,317	587	19,507	68,105	26	180	957	31	1,228	576,937
2018/19	492,616	598	19,427	68,650	26	177	966	31	1,250	583,742
2019/20	498,395	625	19,286	69,247	26	177	969	31	1,263	590,018
2020/21	505,045	649	19,041	69,764	26	181	981	31	1,276	596,993
10 Year	5,916	10	-191	457	0	1	14	1	9	6,216
Avg Gr.	1.3%	1.7%	-1.0%	0.7%	0.0%	0.3%	1.5%	2.5%	0.7%	1.1%
2021/22	511,053	663	18,791	70,160	26	181	1004	31	1,294	603,203
2022/23	515,925	673	18,604	70,558	26	181	1018	31	1,308	608,324
2023/24	521,539	683	18,417	71,101	26	182	1032	31	1,322	614,333
2024/25	527,416	693	18,231	71,603	26	182	1046	31	1,335	620,563
2025/26	533,357	703	18,044	72,117	26	182	1060	31	1,349	626,870
2026/27	539,342	714	17,857	72,612	26	183	1074	31	1,362	633,201
2027/28	545,379	724	17,671	73,099	26	183	1088	31	1,376	639,576
2028/29	551,475	734	17,484	73,592	26	183	1102	31	1,390	646,017
2029/30	557,633	744	17,297	74,092	26	184	1116	31	1,403	652,527
2030/31	563,857	755	17,111	74,598	26	184	1130	31	1,417	659,107
10 Year	5,881	11	-193	483	0	0	15	0	14	6,211
Avg Gr.	1.1%	1.5%	-1.1%	0.7%	0.0%	0.2%	1.4%	-0.1%	1.1%	1.0%
2031/32	570,124	765	16,924	75,109	26	185	1144	31	1,430	665,737
2032/33	576,402	775	16,737	75,622	26	185	1158	31	1,444	672,380
2033/34	582,646	785	16,550	76,137	26	185	1172	31	1,458	678,990
2034/35	588,801	795	16,364	76,650	26	186	1186	31	1,471	685,510
2035/36	594,854	805	16,177	77,160	26	186	1200	31	1,485	691,924
2036/37	600,840	816	15,990	77,670	26	186	1214	31	1,498	698,271
2037/38	606,788	826	15,804	78,180	26	187	1228	31	1,512	704,581
2038/39	612,740	836	15,617	78,693	26	187	1242	31	1,526	710,898
2039/40	618,752	846	15,430	79,213	26	187	1256	31	1,539	717,281
2040/41	624,803	857	15,244	79,737	26	188	1270	31	1,553	723,707
20 Year	5,988	10	-190	499	0	0	14	0	14	6,336
Avg Gr.	1.1%	1.4%	-1.1%	0.7%	0.0%	0.2%	1.3%	0.0%	1.0%	1.0%

General Consumers Sales Forecast

During 2020/21, Total General Consumer Sales was 21,762 GWh. The fiscal billing year (using weather from March 16, 2020 to March 15, 2021) was slightly warmer than normal producing a weather adjustment for the year of 10 GWh. The resulting weather adjusted Total Sales value was 21,771 GWh.

Over the last 10 years, Total Sales have grown at 89 GWh (0.4%) per year. The growth was 1.3% per year in Residential Basic and 0.9% per year in General Service Mass Market, and a decline of 0.3% in General Service Top Consumers due to the economic downturn in 2009 and the loss of one Top Consumer customer. The historical growth also reflects the effect of past Demand Side Management (DSM) initiatives.

Total General Consumer Sales are forecast to grow at 300 GWh (1.3%) per year over the next 10 years and 537 GWh (2.0%) per year over the next 20 years before accounting for future market-based DSM programs.

Most of the growth is forecast to occur in Residential Basic at 234 GWh (2.3%) per year over the next 20 years, followed by General Service Mass Market, at 260 GWh (2.3%) per year with Top Consumers growing at 43 GWh (0.8%) per year. Starting in 2016/17, seven of the smallest Top Consumers, totaling 404 GWh, were moved to General Service Mass Market for forecasting purposes. The historical growth rates for the General Service Mass Market and Top Consumers are adjusted to reflect the migration between both sectors.

Table 4 – General Consumer Sales Energy

General Consumer Sales (GWh) History and Forecast 2010/11 - 2040/41												
Fiscal	Residential				General Service						Lighting	Total
Year	Basic	Diesel	Seasonal	FRWH	Mass Mkt	Top Cons	Diesel	Seasonal	FRWH	SEP		Sales
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
2016/17	7,158	9	66	17	8,956	5,685	6	5	6	26	92	22,025
2017/18	7,547	8	65	16	9,213	5,592	6	5	5	28	88	22,573
2018/19	7,904	9	73	15	9,468	5,258	6	5	5	28	75	22,848
2019/20	7,598	9	74	14	9,256	5,016	6	5	5	27	68	22,078
2020/21	7,919	10	76	14	8,851	4,762	8	5	5	44	67	21,762
Weather Adj.	18	0	0	0	-9	0	0	0	0	1	0	10
2020/21 Wadj	7,937	10	76	14	8,841	4,762	8	5	5	45	67	21,771
10 Year Wadj	93	0	0	-1	159	-16	0	0	0	2	-4	89
Avg Gr.	1.3%	2.7%	-0.1%	-5.0%	0.9%	-0.3%	4.7%	1.1%	-4.3%	6.4%	-4.2%	0.4%
2021/22	8,028	10	74	13	9,298	4,768	8	5	5	48	63	22,320
2022/23	7,984	10	73	12	9,498	4,599	8	5	5	48	64	22,306
2023/24	8,087	10	73	12	9,699	4,570	8	5	5	48	64	22,580
2024/25	8,214	11	72	11	9,832	4,520	8	6	4	48	64	22,789
2025/26	8,326	11	71	11	9,956	4,561	8	6	4	48	64	23,065
2026/27	8,454	11	71	10	10,096	4,580	8	6	4	48	64	23,352
2027/28	8,607	11	70	10	10,241	4,602	8	6	4	48	64	23,670
2028/29	8,763	11	69	9	10,396	4,627	8	6	4	48	64	24,006
2029/30	8,939	11	69	9	10,561	4,652	8	6	4	48	65	24,371
2030/31	9,138	12	68	8	10,741	4,677	8	6	4	48	65	24,774
10 Year	120	0	-1	-1	190	-9	0	0	0	0	0	300
Avg Gr.	1.4%	1.6%	-1.1%	-5.0%	2.0%	-0.2%	-1.0%	1.3%	-3.0%	0.7%	-0.4%	1.3%
2031/32	9,360	12	67	8	10,939	4,766	8	6	4	48	65	25,282
2032/33	9,632	12	67	7	11,198	4,856	8	6	3	48	65	25,903
2033/34	9,947	12	66	7	11,477	4,948	8	6	3	48	65	26,588
2034/35	10,283	12	66	7	11,774	5,040	8	6	3	48	65	27,312
2035/36	10,632	13	65	6	12,104	5,134	8	6	3	48	65	28,084
2036/37	11,007	13	64	6	12,457	5,230	8	6	3	48	65	28,907
2037/38	11,395	13	64	6	12,825	5,327	8	6	3	48	65	29,759
2038/39	11,795	13	63	5	13,207	5,425	8	7	3	48	65	30,639
2039/40	12,207	13	62	5	13,614	5,525	8	7	3	48	65	31,558
2040/41	12,624	13	62	5	14,043	5,626	8	7	3	48	65	32,503
20 Year	234	0	-1	0	260	43	0	0	0	0	0	537
Avg Gr.	2.3%	1.5%	-1.0%	-5.0%	2.3%	0.8%	-0.4%	1.2%	-3.0%	0.3%	-0.1%	2.0%

Manitoba Energy Forecast

The weather adjusted actual Gross Firm Energy was 24,851 GWh in 2020/21. Gross Firm Energy has increased 92 GWh (0.4%) per year for the past 10 years. This historical increase reflects the effect of past Demand Side Management (DSM) initiatives. Gross Firm Energy is forecast to grow to 35,898 GWh by 2040/41 at an average of 552 GWh (1.9%) per year. This does not reflect future program-based DSM initiatives.

Distribution Losses, which are the difference between Manitoba Hydro's substations and the customers' meters, have a wide variance from year to year. The differences have ranged between 3.5% and 5.9% of Total Sales. It is forecast to be between 5.4% and 5.6% of Sales for the entire forecast.

Transmission Losses, which are the difference between the generators and the substations, are forecast to be approximately between 4.6% and 6.0% of Total Sales throughout the entire forecast period. Starting in 2019/20, Transmission Losses reflect efficiency gains from the commissioning of Bipole III.

Distribution Losses and Transmission Losses, totaling almost 14% should be used to estimate load at generation when only load at the customer's meter is known. For example, to convert program- based DSM 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 6% value should be used.

Table 5 – Components of Manitoba Energy

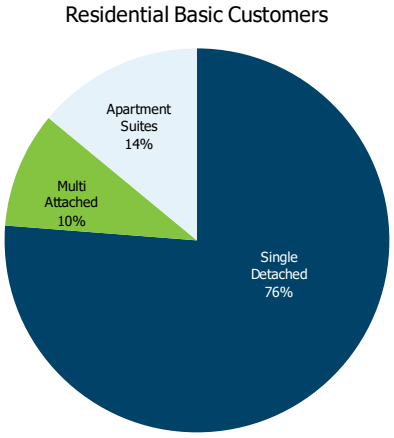
Manitoba Firm Energy (GWh) History and Forecast 2010/11 - 2040/41										
Fiscal Year	General Consumer Sales less Diesel	Dist. Losses	Dist. Loss %	Const. Power	Manitoba Load at Common Bus	Trans. Losses	Trans. Loss %	Less Non Firm Energy	Station Service	Gross Firm Energy
2010/11	20,773	947	4.6%	85	21,806	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	2,107	9.7%	25	123	24,665
2016/17	22,010	1,043	4.7%	62	23,115	2,014	9.2%	26	123	25,227
2017/18	22,560	1,155	5.1%	84	23,799	1,846	8.2%	28	125	25,742
2018/19	22,832	1,136	5.0%	85	24,053	1,697	7.4%	28	128	25,850
2019/20	22,063	1,300	5.9%	79	23,442	1,656	7.5%	29	123	25,192
2020/21	21,743	1,256	5.8%	63	23,063	1,643	7.6%	44	124	24,786
Weather Adj.	10	54		0	64	3		1	0	65
2020/21 Wadj	21,753	1,311	6.0%	63	23,126	1,646	7.6%	45	124	24,851
10 Year Wadj	89	43		-2	129	-33		2	-1	92
Avg Gr.	0.4%	4.0%		-3.0%	0.6%	-1.8%		6.3%	-0.8%	0.4%
2021/22	22,302	1,199	5.4%	60	23,561	1,330	6.0%	48	125	24,968
2022/23	22,288	1,206	5.4%	0	23,493	1,327	6.0%	48	125	24,897
2023/24	22,562	1,223	5.4%	0	23,785	1,340	5.9%	48	125	25,201
2024/25	22,771	1,240	5.4%	0	24,010	1,349	5.9%	48	125	25,437
2025/26	23,047	1,255	5.4%	0	24,301	1,362	5.9%	48	125	25,740
2026/27	23,333	1,271	5.4%	0	24,604	1,373	5.9%	48	125	26,054
2027/28	23,651	1,291	5.5%	0	24,942	1,384	5.9%	48	125	26,403
2028/29	23,987	1,311	5.5%	0	25,298	1,396	5.8%	48	125	26,772
2029/30	24,352	1,333	5.5%	0	25,685	1,409	5.8%	48	125	27,172
2030/31	24,754	1,359	5.5%	0	26,113	1,421	5.7%	48	125	27,611
10 Year	300	5		-6	299	-22		0	0	276
Avg Gr.	1.3%	0.4%		-100.0%	1.2%	-1.5%		0.6%	0.1%	1.1%
2031/32	25,262	1,388	5.5%	0	26,650	1,437	5.7%	48	125	28,163
2032/33	25,883	1,423	5.5%	0	27,306	1,455	5.6%	48	125	28,839
2033/34	26,568	1,463	5.5%	0	28,031	1,472	5.5%	48	125	29,580
2034/35	27,292	1,506	5.5%	0	28,798	1,485	5.4%	48	125	30,361
2035/36	28,064	1,553	5.5%	0	29,617	1,493	5.3%	48	125	31,188
2036/37	28,887	1,604	5.6%	0	30,490	1,501	5.2%	48	125	32,069
2037/38	29,738	1,657	5.6%	0	31,395	1,507	5.1%	48	125	32,979
2038/39	30,618	1,712	5.6%	0	32,329	1,510	4.9%	48	125	33,916
2039/40	31,537	1,770	5.6%	0	33,306	1,510	4.8%	48	125	34,893
2040/41	32,482	1,829	5.6%	0	34,311	1,510	4.6%	48	125	35,898
20 Year	536	26		-3	559	-7		0	0	552
Avg Gr.	2.0%	1.7%		-100.0%	2.0%	-0.4%		0.3%	0.0%	1.9%

FORECAST DETAILS

Residential Basic

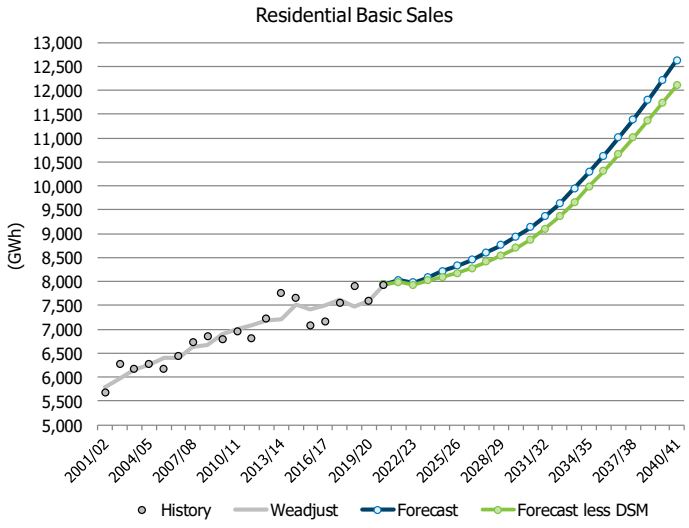
In 2020/21, there were 505,045 Residential Basic customers. Of these customers, 76% were single detached, 10% were multi-attached, and 14% were individually metered apartment suites. Of these customers, 54% in Winnipeg where natural gas is available, 29% are in natural gas available areas outside Winnipeg, and 17% are in areas where natural gas is not available.

Figure 4 – Residential Basic Customers



Residential Basic has grown 113 GWh (1.7%) per year for the past 20 years and 93 GWh per year (1.3%) for the past 10 years reflecting the effect of past Demand Side Management (DSM) initiatives. This sector is forecast to grow 120 GWh (1.4%) per year for the next 10 years and 234 GWh (2.3%) per year for the next 20 years, before future program-based DSM initiatives. Including program-based DSM, the sector is forecast to grow 208 GWh (2.1%) over the next 20 years. The primary driver of Residential Basic growth is population, which is forecast to grow 1.1% per year over the next 20 years.

Figure 5 – Residential Basic Sales



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The following table outlines historical and forecast details including the impacts of program-based Demand Side Management activity:

Table 6 – Residential Sales

Residential Basic Sales (GWh) Historical / Weather Adjustment			
Fiscal Year	Sales	Weather Adjust	Adjusted Sales
2001/02	5,674	113	5,787
2002/03	6,266	(282)	5,984
2003/04	6,170	(18)	6,152
2004/05	6,275	(6)	6,268
2005/06	6,171	234	6,405
2006/07	6,443	(38)	6,404
2007/08	6,736	(99)	6,637
2008/09	6,847	(176)	6,672
2009/10	6,786	112	6,898
2010/11	6,952	57	7,009
2011/12	6,818	275	7,093
2012/13	7,223	(39)	7,184
2013/14	7,767	(564)	7,203
2014/15	7,658	(144)	7,513
2015/16	7,074	338	7,413
2016/17	7,158	336	7,494
2017/18	7,547	85	7,632
2018/19	7,904	(423)	7,482
2019/20	7,598	11	7,609
2020/21	7,919	18	7,937
Forecast / Forecast less DSM			
Fiscal Year	Forecast	DSM (Program based)	Forecast less DSM
2021/22	8,028	(33)	7,994
2022/23	7,984	(61)	7,923
2023/24	8,087	(71)	8,016
2024/25	8,214	(120)	8,094
2025/26	8,326	(155)	8,171
2026/27	8,454	(179)	8,275
2027/28	8,607	(200)	8,407
2028/29	8,763	(216)	8,547
2029/30	8,939	(239)	8,700
2030/31	9,138	(258)	8,879
2031/32	9,360	(258)	9,101
2032/33	9,632	(272)	9,360
2033/34	9,947	(293)	9,654
2034/35	10,283	(298)	9,986
2035/36	10,632	(325)	10,307
2036/37	11,007	(352)	10,655
2037/38	11,395	(385)	11,009
2038/39	11,795	(424)	11,371
2039/40	12,207	(472)	11,735
2040/41	12,624	(522)	12,102

Table 7 – Residential Basic Sales

Residential Basic Sales History and Forecast 2020/21 - 2040/41											
Fiscal Year	Electric Heat Billed (1)			Non Electric Heat Billed (2)			Total Basic			% Elec Space Heat (3)	% Elec Water Heat (4)
	Custs	GWh	kWh/cust	Custs	GWh	kWh/cust	Custs	GWh	kWh/cust		
2020/21	202,141	4,734	23,421	302,903	3,185	10,515	505,045	7,919	15,680	40.0%	50.1%
2021/22	204,605	4,834	23,627	306,448	3,193	10,421	511,053	8,028	15,708	40.0%	50.3%
2022/23	206,652	4,824	23,343	309,273	3,160	10,217	515,925	7,984	15,475	40.1%	50.7%
2023/24	209,014	4,875	23,323	312,525	3,212	10,278	521,539	8,087	15,506	40.1%	51.1%
2024/25	211,456	4,935	23,340	315,961	3,279	10,376	527,416	8,214	15,574	40.1%	51.4%
2025/26	213,961	4,991	23,328	319,396	3,335	10,440	533,357	8,326	15,610	40.1%	51.6%
2026/27	216,647	5,057	23,341	322,696	3,397	10,528	539,342	8,454	15,675	40.2%	51.9%
2027/28	219,424	5,134	23,398	325,955	3,473	10,654	545,379	8,607	15,781	40.2%	52.1%
2028/29	222,235	5,213	23,459	329,240	3,550	10,782	551,475	8,763	15,891	40.3%	52.3%
2029/30	225,119	5,302	23,550	332,514	3,638	10,940	557,633	8,939	16,031	40.4%	52.4%
2030/31	228,095	5,401	23,677	335,762	3,737	11,130	563,857	9,138	16,206	40.5%	52.4%
2031/32	231,159	5,511	23,840	338,966	3,849	11,355	570,124	9,360	16,417	40.5%	52.5%
2032/33	234,267	5,643	24,087	342,135	3,989	11,660	576,402	9,632	16,711	40.6%	52.6%
2033/34	237,398	5,793	24,403	345,248	4,154	12,032	582,646	9,947	17,072	40.7%	52.6%
2034/35	240,519	5,953	24,751	348,282	4,330	12,433	588,801	10,283	17,465	40.8%	52.7%
2035/36	243,628	6,119	25,116	351,226	4,513	12,849	594,854	10,632	17,873	41.0%	52.7%
2036/37	246,717	6,296	25,521	354,124	4,711	13,302	600,840	11,007	18,320	41.1%	52.8%
2037/38	249,790	6,480	25,940	356,998	4,915	13,768	606,788	11,395	18,779	41.2%	52.8%
2038/39	252,870	6,669	26,372	359,870	5,126	14,245	612,740	11,795	19,249	41.3%	52.8%
2039/40	255,992	6,864	26,813	362,760	5,344	14,730	618,752	12,207	19,729	41.4%	52.8%
2040/41	259,137	7,060	27,245	365,666	5,564	15,216	624,803	12,624	20,205	41.5%	52.3%

Notes:

(1) Electric Heat Billed is defined as customers who have electric space heating included with the electric bill.

(2) Non-Electric Heat Billed is defined as customers who do not have electric space heating included with the electric bill.

(3) % Electric Space Heat represents the proportion of Total Res. Basic customers who are Electric Heat Billed.

(4) % Electric Water Heat represents the proportion of Total Res. Basic customers who have Electric Water Heaters.

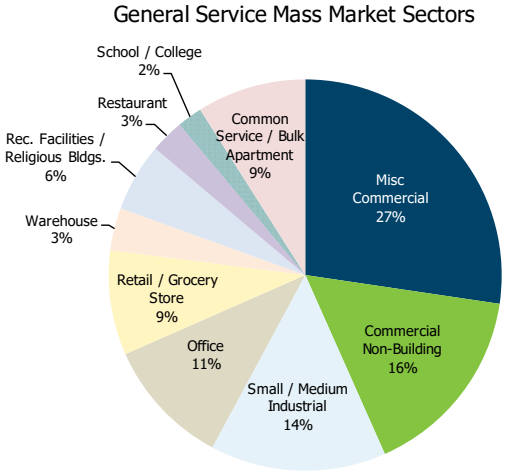
2020/21 GWh and kWh/cust values are not weather adjusted

The average use (kWh/customer) for Electric Heat Billed customers is increasing 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 increased use of electric water heating and miscellaneous end uses in dwellings.

General Service Mass Market

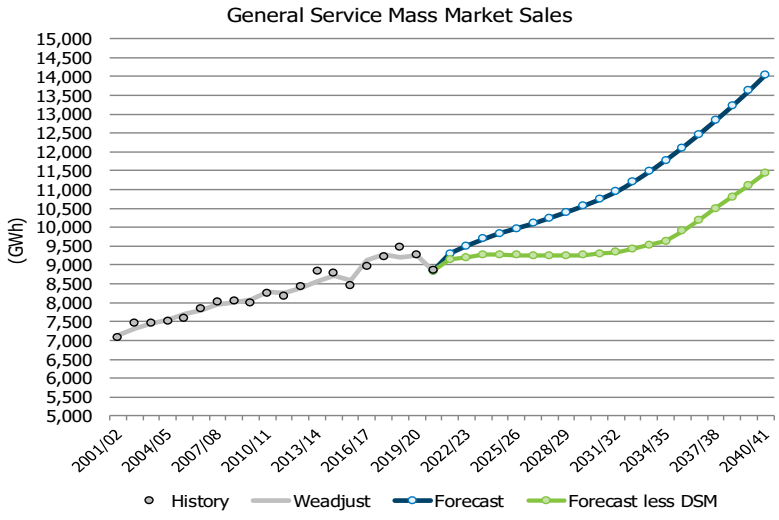
General Service Mass Market includes all commercial and industrial customers, excluding the General Service Top Consumers. There were 69,764 General Service Mass Market customers in 2020/21 with approximately 85% within the commercial sector and 15% within the industrial sector.

Figure 6 – General Service Mass Market Customers



GS Mass Market has grown 69 GWh (0.8%) per year for the past 20 years and 14 GWh per year (0.2%) for the past 10 years. This historical growth reflects the effect of past Demand Side Management (DSM) initiatives and includes the seven Top Consumers, totaling 404 GWh in 2015/16, who were moved into the Mass Market sector. The Mass Market Sector is forecast to grow 190 GWh (2.0%) per year for the next 10 years and 260 GWh (2.3%) per year for the next 20 years before program-based DSM initiatives. Including program-based DSM, the sector is forecast to grow 130 GWh (1.3%) over the next 20 years. The primary drivers for growth in the GS Mass Market are the population and the economy. Changes in the number of residential customers and the Manitoba Gross Domestic Product (GDP) are reflected in the GS Mass Market's electricity use.

Figure 7 – General Service Mass Market Sales



The following table outlines historical and forecast details including the impacts of program-based Demand Side Management activity:

Table 8 – General Service Mass Market

General Service Mass Market (GWh) Historical / Weather Adjustment			
Fiscal Year	Sales	Weather Adjust	Adjusted Sales
2001/02	7,084	44	7,128
2002/03	7,467	(144)	7,323
2003/04	7,460	(23)	7,437
2004/05	7,516	34	7,549
2005/06	7,587	108	7,695
2006/07	7,839	(47)	7,792
2007/08	8,006	(55)	7,951
2008/09	8,049	(53)	7,996
2009/10	7,985	85	8,070
2010/11	8,258	37	8,294
2011/12	8,162	96	8,259
2012/13	8,434	(47)	8,387
2013/14	8,839	(273)	8,566
2014/15	8,771	(65)	8,706
2015/16	8,442	157	8,599
2016/17	8,956	173	9,130
2017/18	9,213	71	9,284
2018/19	9,468	(268)	9,200
2019/20	9,256	5	9,260
2020/21	8,851	(9)	8,841
Forecast / Forecast less DSM			
Fiscal Year	Forecast	DSM (Program based)	Forecast less DSM
2021/22	9,298	(152)	9,146
2022/23	9,498	(297)	9,201
2023/24	9,699	(426)	9,273
2024/25	9,832	(557)	9,275
2025/26	9,956	(695)	9,261
2026/27	10,096	(843)	9,253
2027/28	10,241	(997)	9,244
2028/29	10,396	(1,149)	9,247
2029/30	10,561	(1,296)	9,264
2030/31	10,741	(1,447)	9,294
2031/32	10,939	(1,603)	9,335
2032/33	11,198	(1,774)	9,425
2033/34	11,477	(1,950)	9,528
2034/35	11,774	(2,146)	9,628
2035/36	12,104	(2,206)	9,898
2036/37	12,457	(2,266)	10,191
2037/38	12,825	(2,329)	10,496
2038/39	13,207	(2,409)	10,798
2039/40	13,614	(2,509)	11,105
2040/41	14,043	(2,602)	11,440

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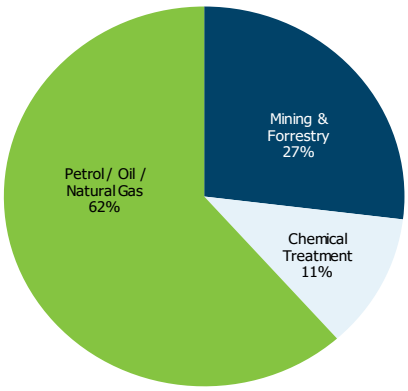
General Service Top Consumers

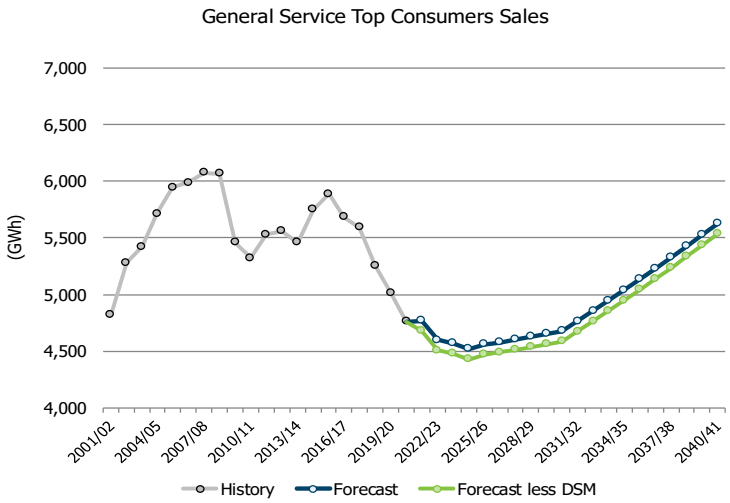
General Service Top Consumers represent the top energy consuming operations in Manitoba accounting for 22% of all General Consumers Sales. GS Top Consumers include 10 distinct companies that count as 26 customers in the Mining & Forestry, Chemical Treatment, Petrol/Oil/Natural Gas sectors.

Figure 8 – General Service Top Consumer Sectors



GS Top Consumers increased 18 GWh (0.4%) per year over the past 20 years and decreased 16 GWh per year (-0.3%) 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. The historical growth rates also reflect the shift of the seven smallest Top Consumers to the GS Mass Market Sector, totaling 404 GWh in 2015/16. These were moved because their usage patterns more closely mimic customers within the GS Mass Market sector. The Top Consumers sector is now forecast to decline at an average of 9 GWh (-0.2%) per year for the next 10 years and continue to grow at an average of 43 GWh (0.8%) per year for the next 20 years. Including program-based DSM, the sector is forecast to grow 39 GWh (0.8%) over the next 20 years. Short term reductions are expected in the Petro/Oil/Natural Gas and Chemical Treatment sectors.

Figure 9 – General Service Top Consumers Sales



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The following table outlines historical and forecast details including the impacts of program-based Demand Side Management activity:

Table 9 – General Service Top Consumers

General Service Top Consumers (GWh) Historical / Forecast / Fcst. With PLIL / Fcst. Less DSM							
Fiscal Year	Sales	Fiscal Year	Individual	PLIL	Total	DSM (Program based)	Forecast less DSM
2001/02	4,818	2021/22	4,768	0	4,768	(90)	4,678
2002/03	5,282	2022/23	4,599	0	4,599	(90)	4,509
2003/04	5,423	2023/24	4,570	0	4,570	(90)	4,480
2004/05	5,714	2024/25	4,520	0	4,520	(90)	4,430
2005/06	5,948	2025/26	4,561	0	4,561	(90)	4,471
2006/07	5,989	2026/27	4,561	19	4,580	(90)	4,490
2007/08	6,075	2027/28	4,561	41	4,602	(90)	4,512
2008/09	6,065	2028/29	4,561	66	4,627	(90)	4,537
2009/10	5,461	2029/30	4,561	91	4,652	(90)	4,562
2010/11	5,324	2030/31	4,561	116	4,677	(90)	4,587
2011/12	5,531	2031/32	4,561	205	4,766	(90)	4,676
2012/13	5,560	2032/33	4,561	295	4,856	(90)	4,766
2013/14	5,461	2033/34	4,561	387	4,948	(90)	4,858
2014/15	5,750	2034/35	4,561	479	5,040	(90)	4,950
2015/16	5,886	2035/36	4,561	573	5,134	(90)	5,044
2016/17	5,685	2036/37	4,561	669	5,230	(90)	5,140
2017/18	5,592	2037/38	4,561	766	5,327	(90)	5,237
2018/19	5,258	2038/39	4,561	864	5,425	(90)	5,335
2019/20	5,016	2039/40	4,561	964	5,525	(90)	5,435
2020/21	4,762	2040/41	4,561	1,065	5,626	(90)	5,536

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 five years of the forecast but exclude longer term plans that are uncommitted and subject to change.

For the long term, the growth of 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 and/or retraction of the ten companies that comprise the Top Consumers as well as one former Top Consumers customer that closed in 2009. These are large companies that both drive and help define the local, national and international economies. The historical data used for modeling PLIL includes company expansions, production increases and reductions due to planned and unplanned shutdowns, cutbacks and labor disruptions. Therefore, the long term 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 in the future. Future projections of GDP and price are used to forecast the long-term future increase in Top Consumer growth starting from the sixth year of the forecast.

The sum of the individual company forecasts is expected to decline from 4,762 GWh in 2020/21 to 4,561 GWh in 2025/26. After 2025/26, the individual forecasts for these customers are held constant and longer-term growth is considered to be included in PLIL.

PLIL is added starting in year six of the forecast. The econometric forecast for PLIL is based on an expected annual Manitoba/Canada/U.S. real GDP growth rate of 2.0%, leading to a forecast increase of 0.8% annually. Historically, the real GDP growth rate over the past 20 years was 1.7%, the Top Consumers sector growth averaged 0.4% annually.

The Top Consumers sector is expected to decline 201 GWh in the first five years based on individual customer short term plans, and then grow to 1,065 GWh from years 6 to 20 for PLIL.

Other Customers and Consumption

In addition to Residential Basic customers, General Service Mass Market commercial and industrial customers and General Service Top Consumers, the following represents the remaining group of customers who used 230 GWh or 1.1% of Total Sales in 2020/21:

Residential Diesel

There were 649 Residential Diesel customers that used 10 GWh in 2020/21 averaging 15,374 kWh per year per customer. Customers are only allowed 60-amp services which will 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 857 and usage is expected to increase 1.5% a year to 13 GWh by 2040/41. The assumption is that the communities will continue to be separate from the Integrated System.

Residential Seasonal

There were 19,041 Residential Seasonal customers that used 76 GWh in 2020/21, averaging 4,002 kWh per year per customer. The number of customers is expected to decrease 15,244 customers by 2040/41 due to transfers of higher using seasonal customers into the Residential Basic sector. Seasonal customers are billed only twice a year due to low usage, typically being a seasonal residence or cottage. The usage of Residential Seasonal customers is expected to decrease 1.0% a year to 62 GWh in 2040/41.

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 2,702 remaining services in 2020/21. The number of services and usage is expected to decrease 5.0% per year throughout the forecast period. Usage was 14 GWh in 2020/21 and that will decrease to 5 GWh by 2040/41.

General Service Diesel

In 2020/21, there were 181 General Service Diesel Full Cost customers using 8 GWh. The General Service Diesel sector is forecast to use 8 GWh by 2040/41.

General Service Seasonal

In 2020/21, there were 981 General Service Seasonal customers using 5 GWh. The General Service Seasonal sector is expected to grow to 7 GWh by 2040/41.

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 315 remaining services in 2020/21. The number of services is expected to decrease 3.0% per year throughout the forecast period. Consumption was 5 GWh in 2020/21 and that is forecast to decrease to 3 GWh by 2040/41.

General Service Surplus Energy Program

Participants in the Surplus Energy Program (SEP) consumed 44 GWh in 2020/21 and are expected to increase 48 GWh by 2040/41. 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.

Area & Roadway Lighting

The Area and Roadway Lighting sector represents 0.3% 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 and starting in 2016, the street lighting LED conversion program decreased energy consumption. Only Street Lights count as customers.

Due to past Demand Side Management impacts, the Area and Roadway Lighting sector was further reduced to reflect additional street lighting LED conversions. Including the effects of past Demand Side Management (DSM) initiatives, the Area and Roadway Lighting sector is forecast to be 65 GWh by 2040/41.

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, as a result, there is no weather effect.

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 the Keeyask Generating Station with an in-service data slated for late 2021.

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 125 GWh and Station Service peak is forecast to be 22 MW from 2021/22 to 2040/41.

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

Plug-In Electric Vehicles

Manitoba Plug-in Electric Vehicle Market

This forecast includes an estimate of the future adoption of Plug-In Electric Vehicles (PEVs) in the Manitoba Hydro service area. As of March 31st, 2022, there were 2,127 plug-in electric vehicles making up 0.22% of total road motor vehicle registrations in Manitoba. This market is comprised of the following two types:

i. **Battery Electric Vehicles (BEV)** which run only on electric battery power. As of March 31st, 2022 there were 1,288 BEVs registered in Manitoba accounting for 61% of the total Plug-in EV market with Tesla models representing 55% of the BEV market followed by the Nissan at 14%. In addition, the BEV market includes one electric transit bus.

ii. **Plug-In Hybrid Electric Vehicles (PHEVs)** which run on an electric battery but uses an internal combustion engine (ICE) or gasoline powered generator to extend the driving range when the battery charge runs low. As of March 31st, 2022 there were 839 PHEVs registered in Manitoba accounting for 39% of the total Plug-in EV market with vehicles from Toyota (Prius and RAV4) representing 17% of the PHEV market followed by the Mitsubishi with 16% of the market.

Figure 10 – Manitoba BEV Market

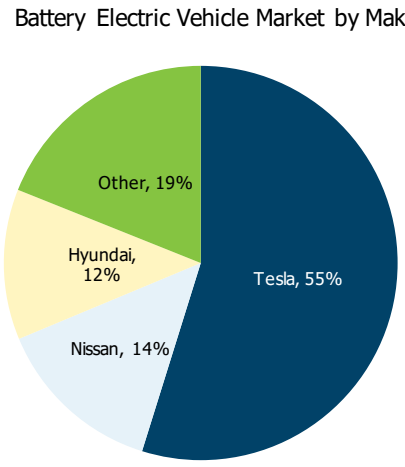
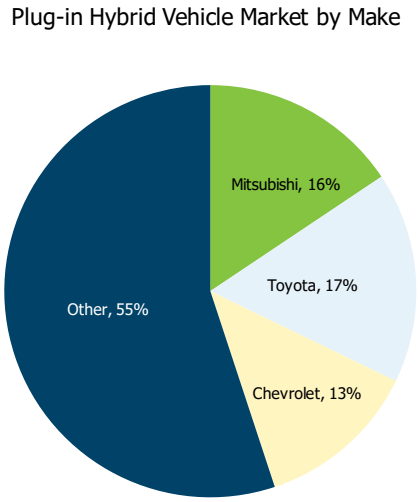


Figure 11 – Manitoba PHEV Market



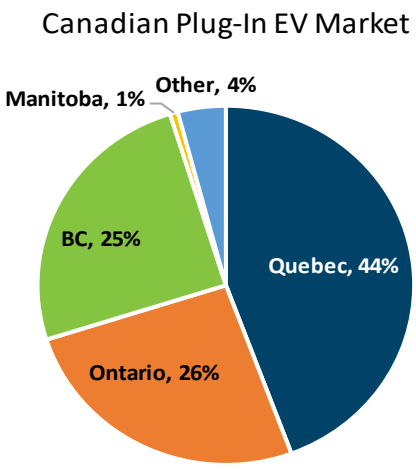
As of March 31st, 2022, there are a total of 10,054 Hybrid Electric Vehicles (HEVs) registered in Manitoba, representing 1.06% of all registered motor vehicles, of which 839 are plug-in and 9,215 are non-plug-in. The forecast of electric vehicles does not include non-plug-in HEVs. These vehicles, such as the non-plug-in Toyota Prius, have an internal combustion engine (ICE) 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.

National Plug-in Electric Vehicle Market

As of December 31st, 2021, according to Statistics Canada there were approximately 291,000 plug-in electric vehicles registered in Canada making up 1.18% of the total 25 million road motor vehicles registered in 2019.

Approximately 95% of all plug-in electric vehicles in Canada are registered in three provinces; Quebec, Ontario and British Columbia. Quebec is the leader in electric vehicles with 129,000 (44%), followed by Ontario with 75,000 (26%), and then British Columbia with 73,000 (25%). The remaining provinces and territories, including Manitoba, account for 14,000 (5%) of the national total.

Figure 12 – Canadian Plug-in EV Market



Federal Targets

The Government of Canada remains steadfast in its conviction that the electrification of transportation is key to decarbonizing the sector, transitioning to a low-carbon future and achieving a target of net zero emissions by 2050. Therefore, the Government of Canada has set a mandatory target for all new light-duty cars and passenger trucks to be zero-emission by 2035, accelerating Canada's previous goal of 100% sales by 2040.

Price of an electric vehicle in comparison to a similar internal combustion engine model continues to be a barrier in the adoption of electric vehicles in Manitoba, with the current price of an EV being on average $15,000 higher. Another barrier that is affecting the adoption of electric vehicles is supply/availability. It will be difficult to overcome supply issues in Manitoba if we do

not adopt any mandates, as manufacturers tend to prioritize deliveries of electric vehicles to areas that have them.

Federal Incentives

The federal government introduced the iZEV Program, which us managed by Transport Canada, to assist with the purchase of Zero Emission Vehicles in Canada. A short description of the program:

There are two levels of incentives:

- Battery-electric, hydrogen fuel cell, and longer-range plug-in hybrid vehicles are eligible for up to $5,000;
    - longer range plug-in vehicles have an electric range equal to or greater than 50 km.
- Shorter range plug-in hybrid electric vehicles are eligible for up to $2,500;
    - shorter range plug-in vehicles have an electric range under 50 km.

Transport Canada provides a list of the vehicles that are eligible for the incentive. The vehicle must meet the following criteria to be eligible:

- a passenger car, where the base model Manufacturer's Suggested Retail Price (MSRP) is less than $55,000; and
    - higher priced trims of these vehicles, up to a maximum MSRP of $65,000, will also be eligible for purchase incentives;

Or:

- a station wagon, pickup truck (light truck), sport utility vehicle (SUV), minivan, van, or special purpose vehicle, where the base model Manufacturer's Suggested Retail Price (MSRP) is less than $60,000; and
    - higher priced trims of these vehicles, up to a maximum MSRP of $70,000, will also be eligible for purchase incentives.

Currently, Manitoba Hydro offers Manitobans a loan of up to $3,000 to install a level 2 home charger. The federal iZEV program is stackable with the following additional provincial EV incentives and other promo offered in British Columbia, Québec, Nova Scotia, New Brunswick, Prince Edward Island, Newfoundland and Labrador, Northwest Territories and Yukon.

Provincial Incentives

The following section conveys the various incentives and other promotions available in other provinces:

Province	Incentive and other promotions
British Columbia	Electric vehicle purchase rebate up to $4,000 Rebate to remove high polluting vehicle for an electric vehicle Home charger rebate up to $600 Apartment / Condo EV charging rebates available Workplace rebates up to $2,000 per charger
Quebec	Electric vehicle purchase rebate up to $7,000 Home charger assistance up to $600 Multi-residential charging rebate available Workplace rebates available
Nova Scotia	Electric vehicle purchase rebate from $1,000 to $3,000
New Brunswick	Electric vehicle purchase rebate up to $5,000 Home charger rebate of $750
Prince Edward Island	Electric vehicle purchase rebate up to $5,000 Free home charging station with EV purchase
Newfoundland and Labrador	Electric vehicle purchase or lease rebate up to $2,500 Commercial EV charger rebate
Northwest Territories	Electric vehicle purchase rebate up to $5,000 Home charger rebate of $500
Yukon	Electric vehicle purchase rebate up to $5,000 Up to $750 on a home charger Municipal and First Nation government buildings charger rebate Multi-unit residential and commercial building charger rebate

The impacts to the market adoption of electric vehicles through the use of incentives are substantial. In the province of Ontario, sales of electric vehicles declined substantially the following year with the elimination of Ontario's Electric and Hydrogen Vehicle Incentive Program (EHVIP) in July 2018. In Manitoba, sales of electric vehicle have increased following the federal incentive offering that began on May 1st, 2019.

The Electric Vehicle Forecast

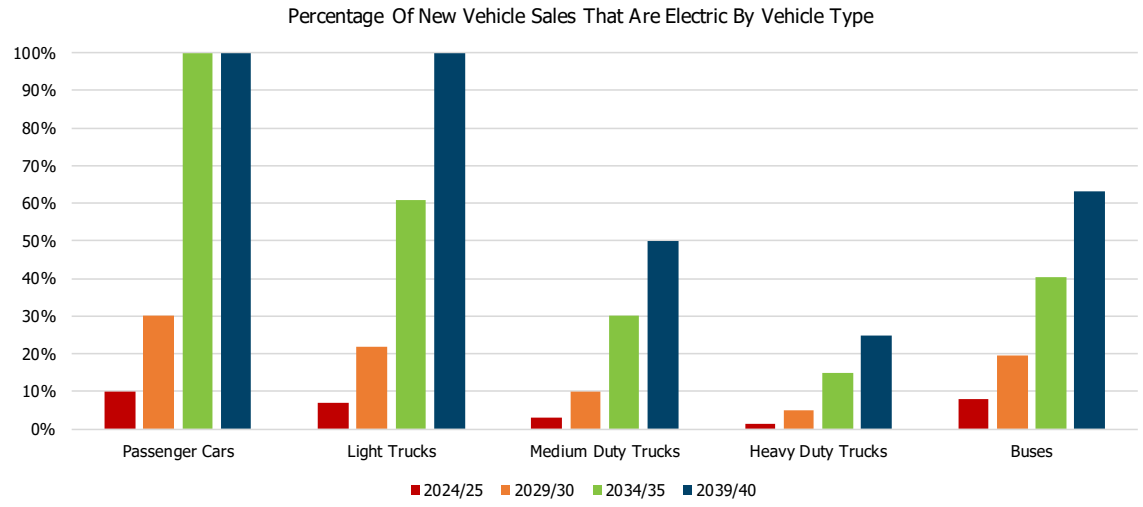
As of March 31st, 2021, there were a total of 1,241 plug-in electric vehicles, including 1 electric bus, registered in Manitoba. Manitoba Public Insurance Corporation provides the electric vehicle counts incorporated in the forecast for the fiscal year ending 2021.

Table 10 details the Manitoba actual and forecasted number of new vehicles purchased per year, the total number of vehicles each year, as well as the corresponding numbers for Plug-In Electric Vehicles. The forecast incorporates light duty vehicles (i.e., passenger and light duty trucks such as Sport Utility Vehicles (SUVs)), medium duty trucks, heavy duty trucks, and buses. A light duty passenger vehicle consumes approximately 3,200 kWh annually, similar to the use of one residential electric hot water tank, whereas it is forecasted that light trucks, medium-duty trucks, heavy-duty trucks, and electric transit buses consume 4,500, 7,800, 136,000, and 78,000 kWh respectively per year. To put that the values in perspective, a typical electrically heated home consumes approximately 25,000 kWh per year.

Note: Pull-trailers, motorboats and motorcycles are not included in the count

The following chart shows the percentage of new vehicles sold by sector at predetermined benchmarks. The light duty vehicle sectors (passenger cars and light trucks) will be the fastest to adopt with many manufacturers focusing on producing electric vehicles. The medium-duty and heavy-duty sectors will be slower to transform due to the type of vehicles in the categories and the infrastructure needed to make the transition successful.

Figure 13 – Percentage of New Vehicle Sales (Electric by Vehicle Type)



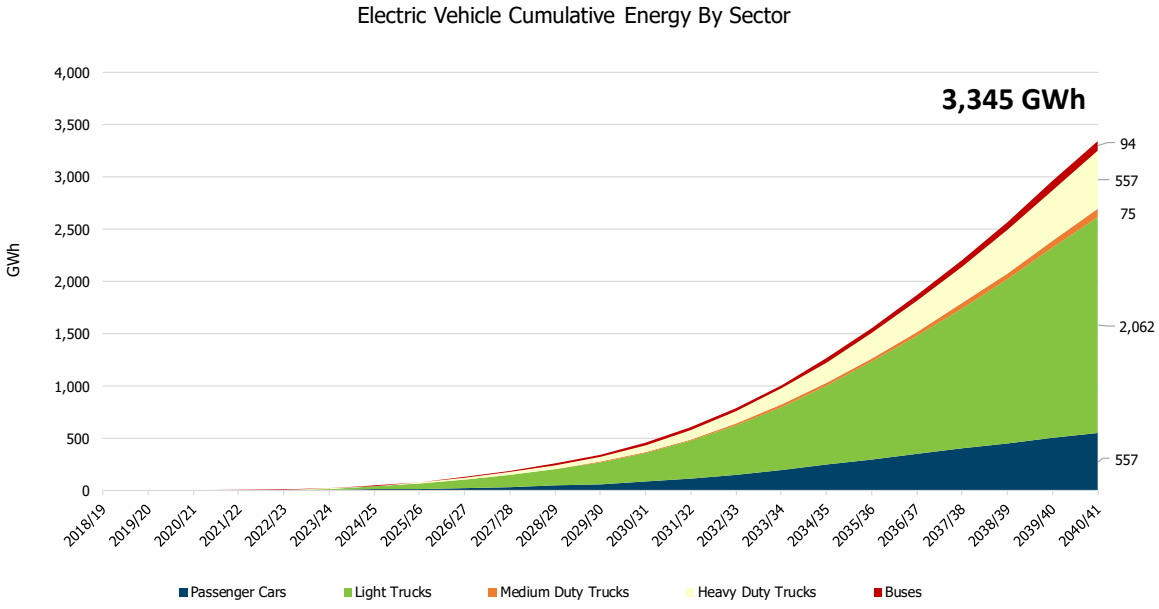
The number of new PEVs is expected to increase until it reaches about 96.6% of new vehicle sales or 81,000 units in 2040/41. The total number of PEVs on the road is forecasted to be 49% of total vehicle registrations or 649,000 units in 2040/41.

Table 10 – Plug-in Electric Vehicles

Plug-In Electric Vehicle Forecast History and Forecast 2010/11 - 2040/41								
Fiscal Year	New Vehicles Purchased	New PEV Purchased	New PEV %	Total Vehicles	Total PEV	Total % PEV	Cumulative Total PEV GWh	Total PEV MW
2010/11	46,475	1	0.00%	796,958	1	0.00%	0	0
2011/12	49,352	8	0.02%	812,995	9	0.00%	0	0
2012/13	52,448	28	0.05%	831,613	37	0.00%	0	0
2013/14	56,209	33	0.06%	844,111	70	0.01%	0	0
2014/15	58,376	32	0.05%	857,029	102	0.01%	1	0
2015/16	58,365	42	0.07%	870,589	144	0.02%	1	0
2016/17	58,359	60	0.10%	883,836	204	0.02%	1	0
2017/18	66,918	73	0.11%	896,133	277	0.03%	1	0
2018/19	66,312	198	0.30%	908,702	475	0.05%	2	0
2019/20	52,657	360	0.68%	912,760	835	0.09%	3	0
2020/21	48,956	406	0.83%	940,735	1,241	0.13%	5	1
2021/22	54,562	840	1.54%	954,917	2,081	0.22%	8	1
2022/23	62,755	1,234	1.97%	971,229	3,315	0.34%	14	2
2023/24	63,882	2,517	3.94%	987,834	5,831	0.59%	26	3
2024/25	65,025	4,797	7.38%	1,004,736	10,627	1.06%	51	6
2025/26	66,177	6,920	10.46%	1,021,938	17,538	1.72%	85	11
2026/27	67,337	9,173	13.62%	1,039,441	26,683	2.57%	134	17
2027/28	68,509	11,415	16.66%	1,057,248	38,066	3.60%	192	24
2028/29	69,692	13,781	19.77%	1,075,363	51,817	4.82%	263	33
2029/30	70,888	16,226	22.89%	1,093,789	68,002	6.22%	345	43
2030/31	72,096	22,877	31.73%	1,112,529	90,821	8.16%	460	58
2031/32	73,309	29,748	40.58%	1,131,584	120,495	10.65%	609	76
2032/33	74,521	36,833	49.43%	1,150,955	157,126	13.65%	793	99
2033/34	75,721	44,125	58.27%	1,170,637	200,891	17.16%	1,012	127
2034/35	76,899	51,615	67.12%	1,190,625	252,100	21.17%	1,269	159
2035/36	78,059	56,968	72.98%	1,210,915	308,228	25.45%	1,554	194
2036/37	79,212	62,451	78.84%	1,231,505	369,454	30.00%	1,869	234
2037/38	80,357	68,063	84.70%	1,252,392	435,000	34.73%	2,209	276
2038/39	81,511	73,817	90.56%	1,273,579	504,034	39.58%	2,571	321
2039/40	82,679	79,720	96.42%	1,295,070	576,848	44.54%	2,957	370
2040/41	83,849	81,003	96.61%	1,316,865	648,742	49.26%	3,345	418

As depicted in Figure 14, the total energy use for all Plug-In Vehicles in Manitoba is forecasted to be 3,345 GWh in 2040/41. Peak usage coincident to Manitoba Hydro's system peak is forecasted to be 418 MW in 2040/41.

Figure 14 – Plug-In Electric Vehicle GWh Forecast

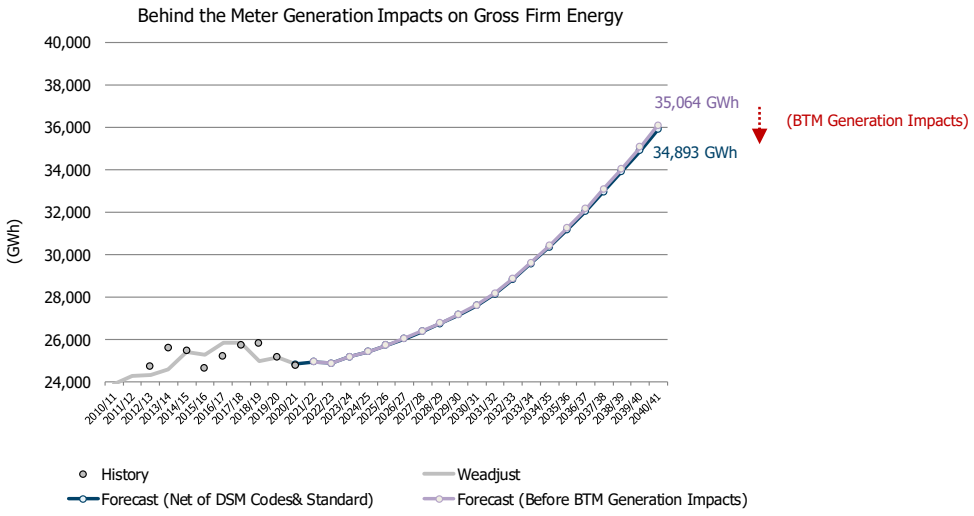


Behind the Meter (BTM) Generation

This forecast includes an estimate of the future adoption of Behind the Meter Generation relating to energy options that may not be from traditional sources. While Solar Photovoltaics (PV) is currently the prominent technology that could be implemented by Manitoba Hydro customers, the increase in BTM Generation is not limited to any specific technology. Under this scenario, BTM Solar PV energy produced in Manitoba results in a decrease in electric load consumption with the larger reduction occurring in the summer, when maximum solar production is achieved. In situations where customer's demand is less than what is produced, the energy produced is pushed back to the integrated system and sold to Manitoba Hydro. Manitoba Hydro assumes 25% of the energy generated by Solar PV installations will be sold back to the grid and not reduce domestic energy consumption. Manitoba's current peak demand occurs on a cold winter day, early in the morning or early evening, at times where solar resources are not available and as such, there are no impacts to Gross Total Peak Demand.

The adoption model of innovation assumes 10kW systems, which produce 11,700 kWh annually, to achieve 205 MW of installed Solar Capacity. The BTM Generation scenario results in a decrease in electric load consumption of 123 GWh for Residential customers and 82 GWh for General Service Mass Market Small & Medium customers by 2040/41.

Figure 15 – Behind the Meter Generation Impacts



Covid-19 Impacts

The global pandemic has impacted the energy consumption of Manitoba's major sectors and are forecasted to have an impact in both the short term and some permanent impacts throughout the forecast period. The General Service Mass Market and Top Consumers were the sector most negatively impacted by way of many closures and restrictions applied to the various commercial and industrial sectors. The General Service Mass Market and Top Consumers are forecast to see a reduction of 456 GWh in 2021/22, 330 GWh in 2022/23 and have a lasting impact of -341 GWh by 2040/41. The General Service reductions are partially offset by the Residential sector which has seen an increase in energy consumption with many Manitobans working remotely from home. The Residential sector is forecast to increase 146 GWh in 2021/22 and have a lasting impact of 45 GWh as certain industries opt to continue to operate in a remote environment.

Line Losses

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:

i. The offset between cycle billing (General Consumers Sales) and actual calendar month usage (Common Bus).

ii. Customer Accounting adjustments,

iii. Inaccuracies associated with estimated billing (including flat rate estimates),

iv. The metered but unbilled consumption of Manitoba Hydro offices, and

v. Energy lost due to theft.

Distribution Losses are forecast in 2021/22 to be 5.4% of the General Consumers Sales less Diesel and remain between 5.4% and 5.6% throughout the forecast.

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 and a reduction of transmission losses starting in 2018/19 result of efficiency gains from the commissioning of Bipole III as of July 2018.

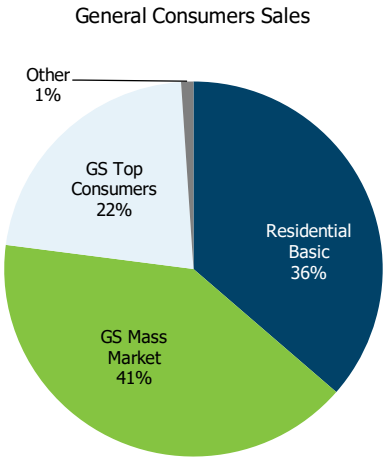
Transmission Losses are forecast to be approximately 6.0% of the General Consumers Sales less Diesel Sales and have been updated to reflect an updated methodology which incorporates transmission losses on the DC system and AC system separately using average water flow conditions for the forecast horizon.

REPORTING

Total General Consumer 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 remaining sectors are only 0.3% of all sales.

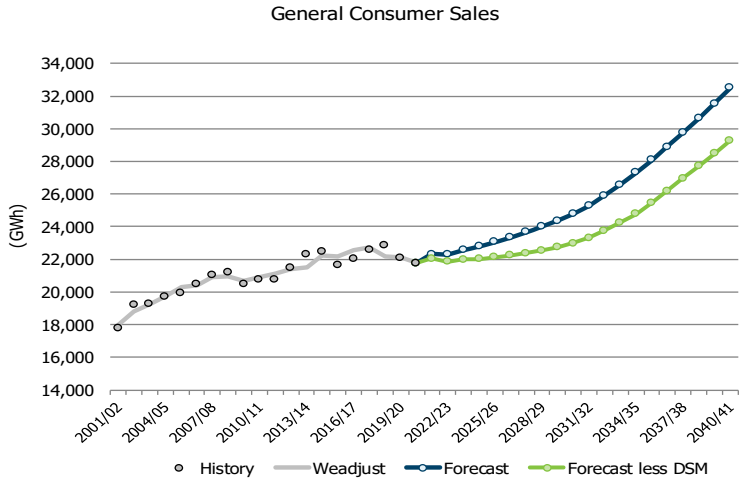
Figure 16 – General Consumers Sales



Note: Other category includes seasonal, flat rate water heating, area & roadway lighting, construction power and station service.

Weather adjusted General Consumers Sales has grown 200 GWh (1.0%) per year for the past 20 years and 89 GWh (0.4%) 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 300 GWh (1.3%) per year for the next 10 years and 537 GWh (2.0%) per year for the next 20 years before program-based DSM initiatives. Including program-based DSM, the forecast is expected to grow 376 GWh (1.5%) over the next 20 years.

Figure 17 – General Consumers Sales



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The following table outlines historical and forecast details including the impacts of program-based Demand Side Management activity:

Table 11 – General Consumers Sales

General Consumers Sales (GWh) Historical / Weather Adjustment			
Fiscal Year	Sales	Weather Adjust	Adjusted Sales
2001/02	17,805	158	17,963
2002/03	19,246	(426)	18,820
2003/04	19,280	(41)	19,239
2004/05	19,735	26	19,761
2005/06	19,935	343	20,278
2006/07	20,510	(85)	20,425
2007/08	21,061	(155)	20,906
2008/09	21,210	(230)	20,980
2009/10	20,486	197	20,683
2010/11	20,786	93	20,879
2011/12	20,771	374	21,144
2012/13	21,477	(85)	21,391
2013/14	22,338	(840)	21,498
2014/15	22,458	(211)	22,247
2015/16	21,654	497	22,151
2016/17	22,025	510	22,536
2017/18	22,573	155	22,728
2018/19	22,848	(691)	22,157
2019/20	22,078	16	22,093
2020/21	21,762	10	21,771
Forecast / Forecast less DSM			
Fiscal Year	Forecast	DSM (Program based)	Forecast less DSM
2021/22	22,320	(275)	22,045
2022/23	22,306	(448)	21,858
2023/24	22,580	(587)	21,993
2024/25	22,789	(767)	22,022
2025/26	23,065	(939)	22,126
2026/27	23,352	(1,111)	22,240
2027/28	23,670	(1,287)	22,383
2028/29	24,006	(1,455)	22,551
2029/30	24,371	(1,626)	22,745
2030/31	24,774	(1,795)	22,978
2031/32	25,282	(1,952)	23,330
2032/33	25,903	(2,136)	23,767
2033/34	26,588	(2,333)	24,255
2034/35	27,312	(2,533)	24,779
2035/36	28,084	(2,621)	25,464
2036/37	28,907	(2,708)	26,199
2037/38	29,759	(2,804)	26,955
2038/39	30,639	(2,923)	27,716
2039/40	31,558	(3,071)	28,486
2040/41	32,503	(3,214)	29,289

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 228 GWh (1.1%) per year for the past 20 years and 129 GWh (0.6%) 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 299 GWh (1.2%) per year for the next 10 years and 559 GWh (2.0%) per year for the next 20 years before program-based DSM initiatives.

Figure 18 – Manitoba Load at Common Bus

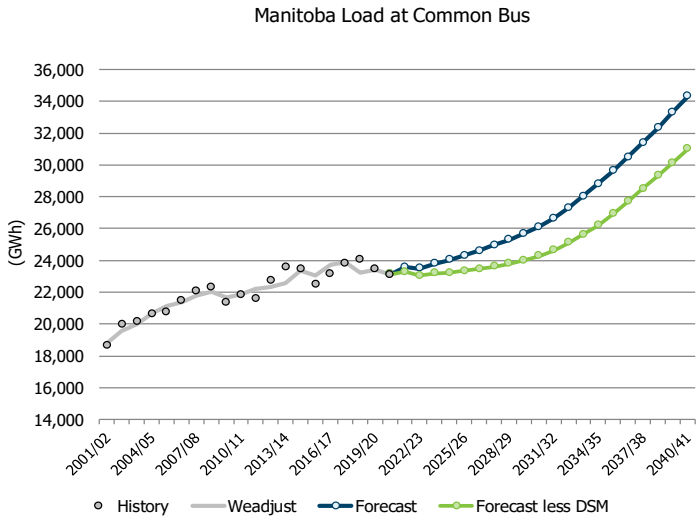


Table 12 – Manitoba Load at Common Bus

Manitoba Load at Common Bus Historical / Weather Adjustment			
Fiscal Year	Usage	Weather Adjust	Adjusted Sales
2001/02	18,655	133	18,788
2002/03	19,953	(385)	19,568
2003/04	20,116	(136)	19,980
2004/05	20,600	18	20,618
2005/06	20,761	378	21,139
2006/07	21,442	(67)	21,376
2007/08	22,036	(228)	21,808
2008/09	22,305	(252)	22,054
2009/10	21,361	330	21,691
2010/11	21,806	32	21,837
2011/12	21,560	626	22,185
2012/13	22,706	(389)	22,317
2013/14	23,541	(960)	22,581
2014/15	23,450	(80)	23,369
2015/16	22,460	586	23,046
2016/17	23,115	597	23,712
2017/18	23,799	105	23,904
2018/19	24,053	(806)	23,247
2019/20	23,442	(8)	23,434
2020/21	23,063	64	23,126
Forecast			
Fiscal Year	Forecast	DSM (Program based)	Forecast less DSM
2021/22	23,561	(282)	23,279
2022/23	23,493	(460)	23,033
2023/24	23,785	(604)	23,181
2024/25	24,010	(790)	23,220
2025/26	24,301	(968)	23,333
2026/27	24,604	(1,146)	23,458
2027/28	24,942	(1,327)	23,615
2028/29	25,298	(1,501)	23,797
2029/30	25,685	(1,678)	24,008
2030/31	26,113	(1,853)	24,260
2031/32	26,650	(2,015)	24,635
2032/33	27,306	(2,205)	25,101
2033/34	28,031	(2,409)	25,622
2034/35	28,798	(2,616)	26,183
2035/36	29,617	(2,706)	26,912
2036/37	30,490	(2,796)	27,694
2037/38	31,395	(2,896)	28,499
2038/39	32,329	(3,018)	29,311
2039/40	33,306	(3,172)	30,134
2040/41	34,311	(3,320)	30,991

The following tables outline historical and forecast details for Manitoba Load at Common Bus net of DSM:

Table 13 – Manitoba Load at Common Bus (GWh)

Manitoba Load at Common Bus (GWh) History and Forecast 2010/11 - 2040/41													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2010/11	1,549	1,550	1,470	1,564	1,544	1,481	1,605	1,933	2,338	2,469	2,135	2,168	21,806
2011/12	1,708	1,601	1,465	1,626	1,580	1,495	1,661	1,937	2,225	2,312	2,055	1,898	21,560
2012/13	1,659	1,552	1,534	1,697	1,573	1,469	1,782	2,081	2,445	2,553	2,162	2,199	22,706
2013/14	1,881	1,588	1,500	1,606	1,564	1,510	1,753	2,083	2,667	2,686	2,367	2,336	23,541
2014/15	1,875	1,680	1,534	1,628	1,609	1,557	1,758	2,238	2,437	2,572	2,405	2,157	23,450
2015/16	1,778	1,639	1,561	1,682	1,593	1,566	1,706	1,951	2,251	2,470	2,223	2,040	22,460
2016/17	1,827	1,584	1,564	1,653	1,643	1,571	1,822	1,913	2,573	2,521	2,165	2,281	23,115
2017/18	1,800	1,647	1,580	1,721	1,647	1,598	1,824	2,235	2,553	2,628	2,385	2,181	23,799
2018/19	1,912	1,682	1,645	1,684	1,634	1,582	1,927	2,258	2,368	2,678	2,464	2,219	24,053
2019/20	1,795	1,640	1,528	1,691	1,613	1,536	1,894	2,167	2,495	2,551	2,337	2,196	23,442
2020/21	1,830	1,608	1,570	1,697	1,609	1,504	1,881	2,099	2,355	2,413	2,412	2,085	23,063
20/21 Wadj	1,808	1,614	1,509	1,670	1,655	1,525	1,832	2,120	2,509	2,674	2,337	2,236	23,487
2021/22	1,783	1,601	1,508	1,682	1,627	1,532	1,805	2,106	2,479	2,627	2,303	2,225	23,279
2022/23	1,760	1,577	1,490	1,665	1,608	1,514	1,784	2,086	2,456	2,607	2,283	2,203	23,033
2023/24	1,771	1,585	1,497	1,674	1,617	1,521	1,794	2,100	2,475	2,627	2,301	2,219	23,181
2024/25	1,773	1,585	1,497	1,675	1,618	1,521	1,797	2,105	2,482	2,636	2,308	2,224	23,220
2025/26	1,780	1,591	1,503	1,682	1,624	1,527	1,805	2,117	2,495	2,651	2,321	2,236	23,333
2026/27	1,789	1,598	1,510	1,691	1,632	1,534	1,815	2,129	2,510	2,667	2,335	2,248	23,458
2027/28	1,801	1,608	1,519	1,702	1,643	1,543	1,826	2,144	2,528	2,686	2,352	2,264	23,615
2028/29	1,814	1,619	1,529	1,715	1,654	1,553	1,840	2,161	2,549	2,709	2,372	2,282	23,797
2029/30	1,829	1,631	1,541	1,730	1,668	1,566	1,856	2,181	2,573	2,735	2,394	2,303	24,008
2030/31	1,847	1,647	1,556	1,748	1,685	1,581	1,875	2,205	2,602	2,766	2,421	2,327	24,260
2031/32	1,875	1,671	1,579	1,774	1,710	1,604	1,904	2,240	2,644	2,810	2,459	2,364	24,635
2032/33	1,909	1,702	1,610	1,809	1,743	1,634	1,940	2,282	2,694	2,863	2,506	2,408	25,101
2033/34	1,948	1,737	1,643	1,847	1,780	1,667	1,980	2,330	2,751	2,924	2,558	2,458	25,622
2034/35	1,989	1,774	1,679	1,888	1,819	1,703	2,023	2,382	2,812	2,989	2,615	2,511	26,183
2035/36	2,044	1,824	1,727	1,943	1,872	1,752	2,079	2,448	2,889	3,070	2,686	2,579	26,912
2036/37	2,102	1,878	1,779	2,001	1,928	1,804	2,140	2,518	2,971	3,157	2,763	2,652	27,694
2037/38	2,163	1,933	1,833	2,062	1,987	1,858	2,203	2,591	3,056	3,246	2,841	2,727	28,499
2038/39	2,223	1,989	1,887	2,123	2,046	1,912	2,266	2,664	3,142	3,337	2,920	2,803	29,311
2039/40	2,284	2,046	1,942	2,186	2,107	1,967	2,330	2,738	3,228	3,427	2,999	2,879	30,134
2040/41	2,348	2,105	2,000	2,252	2,170	2,025	2,396	2,816	3,318	3,522	3,082	2,958	30,991

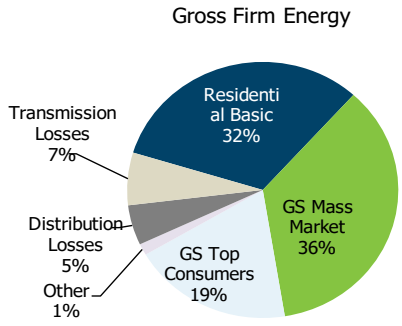
Table 14 – Manitoba Load at Common Bus (MW)

Manitoba Load at Common Bus (MW) History and Forecast 2010/11 - 2040/41													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
2010/11	2,608	2,566	2,533	2,678	2,842	2,457	2,793	3,518	3,822	3,945	3,903	3,838	3,945
2011/12	2,935	2,649	2,770	2,997	2,884	2,737	2,819	3,425	3,714	4,036	3,884	3,330	4,036
2012/13	2,983	2,490	2,830	2,954	2,877	2,575	3,014	3,711	4,020	4,198	4,187	3,699	4,198
2013/14	3,367	2,886	2,791	2,892	2,959	2,847	3,134	3,711	4,261	4,366	4,200	4,158	4,366
2014/15	3,464	2,687	2,665	2,773	2,865	2,670	3,068	4,073	4,187	4,348	4,227	4,068	4,348
2015/16	3,132	2,709	2,748	2,941	2,916	3,045	2,852	3,494	3,653	4,078	4,050	3,844	4,078
2016/17	3,291	2,679	2,791	2,991	2,831	2,710	2,936	3,330	4,326	4,452	4,128	4,088	4,452
2017/18	3,112	2,600	2,840	3,065	2,926	2,940	3,257	3,706	4,283	4,403	4,294	3,577	4,403
2018/19	3,709	2,897	2,980	2,890	2,968	2,674	3,138	3,827	4,021	4,590	4,336	3,932	4,590
2019/20	3,204	2,849	2,749	2,891	2,897	2,820	3,297	3,762	4,263	4,425	4,289	3,740	4,425
2020/21	3,268	2,619	3,076	3,035	2,965	2,529	3,237	3,556	4,075	4,366	4,552	4,141	4,552
20/21 Norm	3,223	2,639	2,704	2,927	2,892	2,724	3,064	3,651	4,101	4,378	4,314	3,875	4,421
2021/22	3,286	2,691	2,757	2,984	2,948	2,778	3,124	3,723	4,157	4,442	4,378	3,951	4,505
2022/23	3,255	2,656	2,727	2,960	2,919	2,754	3,098	3,693	4,112	4,402	4,335	3,923	4,464
2023/24	3,279	2,671	2,743	2,981	2,938	2,772	3,121	3,722	4,132	4,425	4,358	3,956	4,489
2024/25	3,289	2,674	2,746	2,990	2,945	2,778	3,133	3,735	4,132	4,429	4,361	3,973	4,494
2025/26	3,309	2,684	2,756	3,004	2,956	2,790	3,149	3,757	4,143	4,443	4,375	4,000	4,509
2026/27	3,328	2,696	2,769	3,021	2,971	2,804	3,169	3,778	4,151	4,455	4,387	4,025	4,523
2027/28	3,353	2,712	2,785	3,043	2,990	2,823	3,193	3,805	4,164	4,472	4,402	4,058	4,540
2028/29	3,383	2,729	2,803	3,067	3,010	2,843	3,219	3,838	4,182	4,495	4,425	4,096	4,565
2029/30	3,414	2,752	2,826	3,096	3,037	2,868	3,251	3,874	4,202	4,520	4,449	4,137	4,591
2030/31	3,454	2,778	2,853	3,129	3,067	2,897	3,287	3,919	4,230	4,554	4,481	4,188	4,627
2031/32	3,510	2,817	2,894	3,176	3,111	2,940	3,337	3,981	4,278	4,608	4,534	4,257	4,683
2032/33	3,577	2,869	2,947	3,238	3,169	2,996	3,404	4,058	4,336	4,674	4,599	4,341	4,751
2033/34	3,656	2,926	3,007	3,307	3,235	3,058	3,477	4,147	4,407	4,754	4,677	4,438	4,833
2034/35	3,739	2,987	3,071	3,381	3,305	3,124	3,554	4,241	4,481	4,838	4,759	4,541	4,920
2035/36	3,846	3,074	3,161	3,480	3,402	3,216	3,658	4,363	4,600	4,967	4,885	4,671	5,052
2036/37	3,963	3,165	3,256	3,585	3,506	3,312	3,766	4,495	4,730	5,108	5,024	4,811	5,196
2037/38	4,082	3,259	3,355	3,694	3,613	3,412	3,878	4,629	4,862	5,252	5,164	4,955	5,343
2038/39	4,204	3,354	3,455	3,805	3,721	3,514	3,992	4,767	4,993	5,395	5,305	5,102	5,490
2039/40	4,328	3,451	3,557	3,918	3,832	3,617	4,108	4,906	5,121	5,535	5,442	5,251	5,634
2040/41	4,459	3,550	3,662	4,036	3,947	3,724	4,227	5,052	5,256	5,684	5,587	5,408	5,786

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.

Figure 19 - Gross Firm Energy

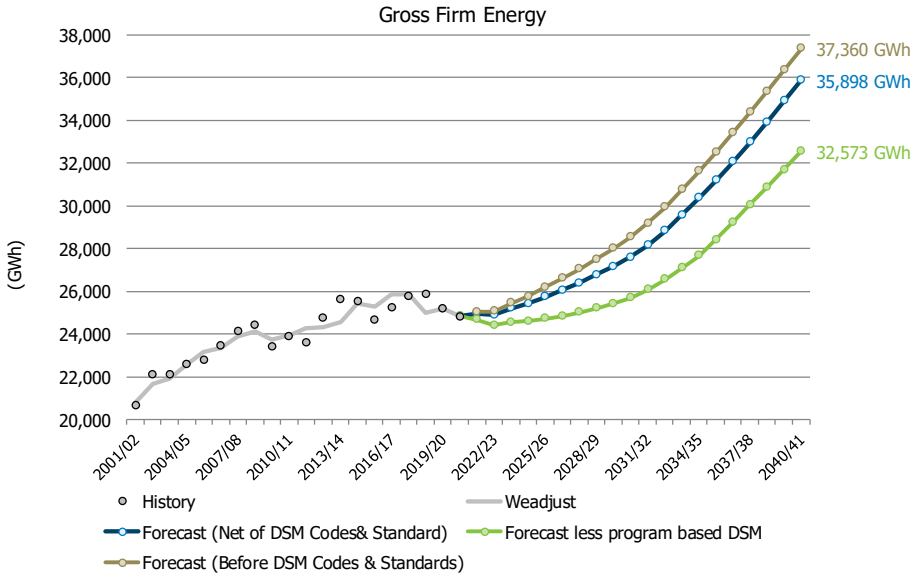


Note: Other category includes seasonal, flat rate water heating, area & roadway lighting, construction power and station service.

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 213 GWh (0.9%) per year for the past 20 years and 92 GWh (0.4%) per year during the past 10 years reflecting the recent 2008 global economic downturn. This historical growth includes the effect of past Demand Side Management (DSM) initiatives. Energy is forecast to grow 276 GWh (1.1%) per year for the next 10 years and 552 GWh (1.9%) per year for the next 20 years before program-based DSM initiatives. Including program-based DSM, the forecast is expected to grow 386 GWh (1.4%) over the next 20 years.

Figure 20 - Gross Firm Energy



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The following table outlines historical and forecast details including the impacts of program-based Demand Side Management activity:

Table 15 - Gross Firm Energy

Gross Firm Energy (GWh)			
Historical / Weather Adjustment			
Fiscal Year	Sales	Weather Adjust	Adjusted Sales
2001/02	20,656	146	20,802
2002/03	22,110	(423)	21,688
2003/04	22,069	(151)	21,919
2004/05	22,589	21	22,609
2005/06	22,757	410	23,167
2006/07	23,464	(72)	23,392
2007/08	24,122	(246)	23,876
2008/09	24,417	(271)	24,146
2009/10	23,412	360	23,772
2010/11	23,892	37	23,929
2011/12	23,605	678	24,283
2012/13	24,750	(423)	24,326
2013/14	25,625	(1,033)	24,592
2014/15	25,505	(86)	25,419
2015/16	24,665	639	25,304
2016/17	25,227	650	25,877
2017/18	25,742	116	25,858
2018/19	25,850	(862)	24,987
2019/20	25,192	(8)	25,184
2020/21	24,786	65	24,851
Forecast / Forecast less DSM			
Fiscal Year	Forecast	DSM (Program based)	Forecast less DSM
2021/22	24,968	(294)	24,674
2022/23	24,897	(481)	24,416
2023/24	25,201	(630)	24,571
2024/25	25,437	(825)	24,612
2025/26	25,740	(1,011)	24,729
2026/27	26,054	(1,194)	24,860
2027/28	26,403	(1,380)	25,023
2028/29	26,772	(1,558)	25,214
2029/30	27,172	(1,738)	25,433
2030/31	27,611	(1,916)	25,695
2031/32	28,163	(2,080)	26,083
2032/33	28,839	(2,273)	26,565
2033/34	29,580	(2,476)	27,104
2034/35	30,361	(2,681)	27,680
2035/36	31,188	(2,758)	28,430
2036/37	32,069	(2,836)	29,232
2037/38	32,979	(2,925)	30,054
2038/39	33,916	(3,039)	30,877
2039/40	34,893	(3,184)	31,709
2040/41	35,898	(3,325)	32,573

Table 16 – Monthly Gross Firm Energy

Monthly Gross Firm Energy (GWh) History and Forecast 2010/11 - 2040/41													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
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	1,873	2,137	2,469	2,695	2,418	2,239	24,665
2016/17	2,007	1,741	1,726	1,826	1,809	1,720	1,986	2,093	2,754	2,740	2,350	2,472	25,227
2017/18	1,946	1,774	1,733	1,874	1,804	1,741	1,963	2,399	2,759	2,822	2,569	2,357	25,742
2018/19	2,070	1,835	1,793	1,840	1,770	1,707	2,061	2,406	2,540	2,838	2,624	2,367	25,850
2019/20	1,928	1,771	1,661	1,829	1,760	1,661	2,024	2,312	2,664	2,728	2,504	2,351	25,192
2020/21	1,961	1,730	1,708	1,844	1,746	1,621	2,021	2,247	2,528	2,577	2,571	2,231	24,786
20/21 Wadj	1,885	1,656	1,614	1,795	1,732	1,639	1,893	2,277	2,690	2,778	2,451	2,443	24,851
2021/22	1,891	1,699	1,600	1,783	1,726	1,626	1,916	2,233	2,624	2,779	2,440	2,357	24,674
2022/23	1,867	1,673	1,582	1,765	1,706	1,607	1,894	2,211	2,600	2,758	2,419	2,335	24,416
2023/24	1,877	1,681	1,589	1,775	1,715	1,615	1,905	2,227	2,620	2,780	2,438	2,351	24,571
2024/25	1,879	1,681	1,589	1,776	1,716	1,615	1,907	2,232	2,627	2,789	2,445	2,356	24,612
2025/26	1,888	1,688	1,595	1,784	1,723	1,621	1,917	2,244	2,642	2,804	2,459	2,368	24,729
2026/27	1,897	1,695	1,602	1,793	1,731	1,628	1,926	2,256	2,657	2,821	2,473	2,380	24,860
2027/28	1,909	1,705	1,611	1,804	1,742	1,637	1,939	2,272	2,676	2,841	2,491	2,396	25,023
2028/29	1,922	1,717	1,622	1,818	1,754	1,648	1,953	2,290	2,698	2,865	2,512	2,414	25,214
2029/30	1,938	1,730	1,635	1,833	1,769	1,661	1,970	2,311	2,723	2,892	2,535	2,435	25,433
2030/31	1,957	1,747	1,651	1,852	1,787	1,677	1,990	2,336	2,753	2,923	2,563	2,459	25,695
2031/32	1,986	1,772	1,675	1,880	1,813	1,701	2,020	2,372	2,797	2,968	2,604	2,496	26,083
2032/33	2,023	1,805	1,707	1,916	1,848	1,732	2,058	2,415	2,850	3,021	2,652	2,540	26,565
2033/34	2,063	1,841	1,742	1,956	1,886	1,767	2,100	2,462	2,908	3,081	2,707	2,590	27,104
2034/35	2,106	1,880	1,779	1,999	1,927	1,805	2,145	2,514	2,970	3,146	2,767	2,643	27,680
2035/36	2,164	1,932	1,830	2,057	1,982	1,856	2,204	2,580	3,046	3,227	2,841	2,711	28,430
2036/37	2,225	1,989	1,885	2,117	2,041	1,910	2,268	2,650	3,129	3,314	2,920	2,784	29,232
2037/38	2,288	2,047	1,941	2,177	2,103	1,967	2,333	2,723	3,214	3,404	2,998	2,859	30,054
2038/39	2,350	2,105	1,998	2,239	2,165	2,022	2,397	2,796	3,300	3,494	3,077	2,935	30,877
2039/40	2,411	2,165	2,056	2,302	2,228	2,078	2,461	2,870	3,386	3,585	3,157	3,011	31,709
2040/41	2,475	2,226	2,116	2,367	2,294	2,135	2,528	2,948	3,475	3,679	3,240	3,090	32,573

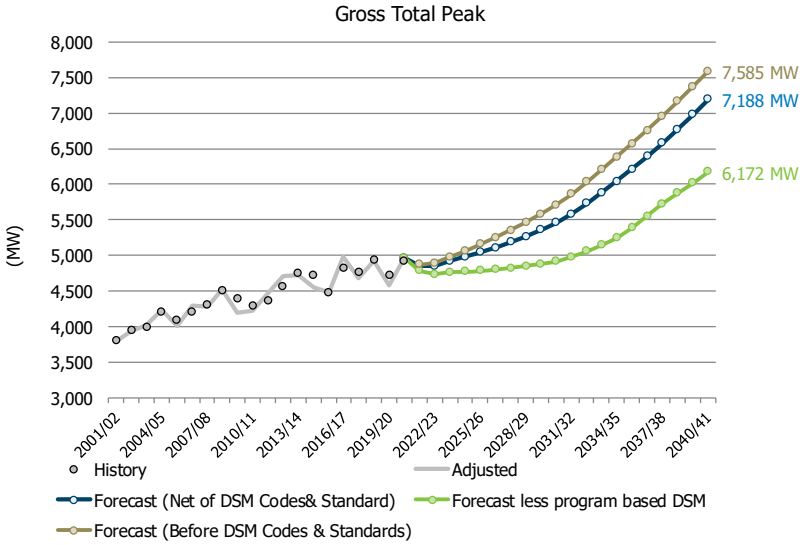
Gross Total Peak

Gross Total Peak is the maximum integrated 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 3,802 MW in 2001/02 to 4,693 MW in 2020/21 at an average growth of 47 MW or 1.1% per year. It is forecast to grow to 7,188 MW at 125 MW (2.2%) per year by 2040/41 years before program-based DSM initiatives. Including program-based DSM, the forecast is expected to grow 74 MW (1.4%) over the next 20 years.

Figure 21 - Gross Total Peak



The following table outlines historical and forecast details including the impacts of program-based Demand Side Management activity:

Table 17 – Gross Total Peak

Gross Total Peak (MW) Historical / Weather Adjustment			
Fiscal Year	Peak	Adjustment	Adjusted Peak
2001/02	3,797	5	3,802
2002/03	3,948	(4)	3,944
2003/04	3,994	24	4,019
2004/05	4,201	31	4,232
2005/06	4,085	(72)	4,012
2006/07	4,208	84	4,292
2007/08	4,304	(26)	4,277
2008/09	4,509	21	4,530
2009/10	4,393	(195)	4,198
2010/11	4,286	(56)	4,230
2011/12	4,367	106	4,473
2012/13	4,559	146	4,705
2013/14	4,743	(13)	4,730
2014/15	4,713	(165)	4,548
2015/16	4,479	10	4,489
2016/17	4,822	155	4,977
2017/18	4,755	(71)	4,684
2018/19	4,936	(4)	4,932
2019/20	4,715	(137)	4,578
2020/21	4,912	(220)	4,693
Forecast / Forecast less DSM			
Fiscal Year	Forecast	DSM (Program based)	Forecast less DSM
2021/22	4,851	(67)	4,784
2022/23	4,854	(115)	4,739
2023/24	4,921	(154)	4,767
2024/25	4,978	(206)	4,772
2025/26	5,041	(253)	4,789
2026/27	5,110	(306)	4,803
2027/28	5,187	(364)	4,823
2028/29	5,268	(418)	4,850
2029/30	5,358	(479)	4,879
2030/31	5,458	(540)	4,918
2031/32	5,579	(599)	4,980
2032/33	5,730	(674)	5,056
2033/34	5,884	(737)	5,147
2034/35	6,041	(797)	5,243
2035/36	6,209	(818)	5,391
2036/37	6,389	(836)	5,553
2037/38	6,577	(856)	5,721
2038/39	6,772	(896)	5,876
2039/40	6,976	(956)	6,020
2040/41	7,188	(1,016)	6,172

Table 18 – Monthly Gross Total Peak

Monthly Gross Total Peak (MW) History and Forecast 2010/11 - 2040/41													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
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
2016/17	3,663	2,934	3,103	3,333	3,132	2,958	3,228	3,622	4,616	4,822	4,469	4,435	4,822
2017/18	3,348	2,780	3,121	3,319	3,177	3,242	3,534	4,041	4,666	4,755	4,740	3,915	4,755
2018/19	4,059	3,154	3,268	3,284	3,267	2,868	3,407	4,095	4,269	4,936	4,619	4,212	4,936
2019/20	3,400	3,100	3,059	3,165	3,182	3,039	3,539	4,002	4,566	4,715	4,585	4,074	4,715
2020/21	3,664	2,843	3,348	3,350	3,242	2,730	3,510	3,842	4,398	4,673	4,912	4,464	4,912
20/21 Norm	3,419	2,799	2,856	3,090	3,053	2,885	3,240	3,867	4,318	4,626	4,555	4,109	4,693
2021/22	3,486	2,853	2,912	3,150	3,113	2,942	3,303	3,943	4,403	4,716	4,644	4,190	4,784
2022/23	3,453	2,817	2,881	3,125	3,082	2,916	3,275	3,911	4,353	4,672	4,597	4,160	4,739
2023/24	3,479	2,832	2,898	3,147	3,102	2,935	3,299	3,942	4,374	4,698	4,623	4,196	4,767
2024/25	3,489	2,836	2,902	3,156	3,109	2,942	3,312	3,956	4,374	4,702	4,626	4,215	4,772
2025/26	3,511	2,846	2,912	3,171	3,121	2,955	3,329	3,980	4,385	4,717	4,640	4,243	4,789
2026/27	3,531	2,859	2,925	3,189	3,136	2,970	3,350	4,002	4,393	4,730	4,653	4,271	4,803
2027/28	3,557	2,875	2,942	3,212	3,156	2,989	3,375	4,032	4,406	4,748	4,670	4,306	4,823
2028/29	3,589	2,894	2,961	3,237	3,178	3,010	3,403	4,068	4,425	4,773	4,694	4,348	4,850
2029/30	3,623	2,917	2,985	3,268	3,205	3,037	3,436	4,106	4,446	4,801	4,720	4,392	4,879
2030/31	3,666	2,944	3,013	3,303	3,237	3,067	3,475	4,154	4,475	4,837	4,755	4,448	4,918
2031/32	3,725	2,985	3,055	3,352	3,284	3,112	3,528	4,222	4,525	4,896	4,812	4,523	4,980
2032/33	3,797	3,040	3,111	3,417	3,345	3,171	3,599	4,305	4,585	4,969	4,881	4,615	5,056
2033/34	3,883	3,100	3,175	3,491	3,415	3,237	3,677	4,403	4,673	5,069	4,981	4,722	5,147
2034/35	3,972	3,165	3,242	3,569	3,489	3,307	3,759	4,505	4,776	5,162	5,081	4,835	5,243
2035/36	4,088	3,256	3,336	3,675	3,592	3,404	3,870	4,639	4,933	5,307	5,224	4,980	5,391
2036/37	4,215	3,352	3,437	3,787	3,703	3,507	3,986	4,784	5,086	5,467	5,381	5,135	5,553
2037/38	4,345	3,452	3,542	3,904	3,817	3,613	4,107	4,932	5,239	5,631	5,542	5,296	5,721
2038/39	4,479	3,554	3,648	4,023	3,933	3,722	4,230	5,085	5,378	5,783	5,691	5,463	5,876
2039/40	4,615	3,657	3,757	4,146	4,053	3,833	4,357	5,240	5,506	5,923	5,828	5,634	6,020
2040/41	4,760	3,764	3,870	4,273	4,177	3,948	4,486	5,405	5,641	6,072	5,973	5,792	6,172

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 on-peak 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%

ASSUMPTIONS

Economic Assumptions

Economic forecast assumptions are taken from the economic variables that become part of Manitoba Hydro's Forecast of Key Economic and Financial Indicators and Energy Price Forecast.

Residential Customers - The number of Residential Basic customers in Manitoba is forecast to increase by 1.2% or 6,008 units in 2021/22 and averages 1.1% per year over the forecast period. This compares to a historical average increase of 1.3% per year over the past 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 nominal electricity price is forecast to increase annually by 3.5% from 2023/24 to 2029/30 and then reduce to a 2% for the remaining years of the forecast. In real terms, this will translate to an annual increase between 1.3% and 1.5% from 2023/24 to 2029/30, and then reduce to 0% for the remaining 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 natural gas price to electric price is used in the Residential Basic forecast.

Manitoba Disposable Income - Real Manitoba disposable income per Residential Basic customer grew on average 1.3% over the past 20 years and 0.8% over the past 10 years. It is forecast to grow 0.3% annually for the next 20 years. Manitoba disposable income is used in the Residential Basic forecast.

Gross Domestic Product (GDP) - Real economic growth in Manitoba averaged 1.8% annually for the past 20 years and 1.3% annually for the past 10 years. Real Manitoba GDP is expected to increase 4.2% in 2021/22 and average 1.7% annually for the next 20 years. Real economic growth in Canada averaged 1.7% annually for the past 20 years and 1.5% annually for the past 10 years. It is forecast to increase 5.3% in 2021/22 and average 2.0% annually for the next 20 years. Real economic growth in US averaged 1.7% annually for the past 20 years and 1.6% annually for the past 10 years. It is forecast to increase 5.4% in 2021/22 and average 2.2% annually for the next 20 years. GDP is used in the GS Mass Market and GS Top Consumer forecasts.

Price / Income / GDP Elasticity

The economic effects of price, income and GDP have been incorporated into the 2021 forecast. The elasticity of each has been estimated from econometric modeling. A summary of the elasticities found is:

	Price Elasticity	Real Income Elasticity	Real GDP Elasticity
Residential Basic	-0.26	0.32	-
GS Mass Mkt Small/Medium	-0.13	-	0.55
GS Mass Mkt Large	-0.52	-	0.26
GS Top Consumers	-0.71	-	0.76
Gross Firm Energy	-0.35	0.12	0.36

See the Methodology section for more details.

Normal Weather Assumptions

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.

Demand Side Management (DSM) in the Forecast

Prior to 2019, the forecast of Demand Side Management (DSM) savings was provided under a 15-year forecast coordinated by the Manitoba Hydro's DSM Planning & Evaluation Department. The forecast was developed through an intensive planning process which built on the Corporation's experience and continuous involvement in demand side management since 1989.

In June 2017, the Government of Manitoba passed legislation, The Efficiency Manitoba Act, which moves the responsibility for the planning, design and implementation of DSM programming to a new crown corporation called Efficiency Manitoba. The proclamation of the Act occurred in January 2018. The legislation also set minimum average annual targets over a 15-year period of 1.5% of the previous years' electricity load and 0.75% of the previous years' natural gas load. The electric and natural gas Demand Side Management activities of Efficiency Manitoba are to be funded by Manitoba Hydro.

With an official start date of April 1, 2020, Efficiency Manitoba has filed its first three-year plan with the Public Utilities Board for review. To accommodate Manitoba Hydro's overall longer-term business planning requirements, Efficiency Manitoba, in collaboration with Manitoba Hydro, prepared a longer term 20-year extrapolation of future DSM savings; for inclusion in the 2021 Electric Load Scenario. This future scenario adheres to the mandated minimum average annual targets over a 15-year period of 1.5% of the previous years' electricity load as outlined in the Efficiency Manitoba Act. Demand Side Management energy and capacity savings are captured by way of efforts to affect change in codes & standards and through program-based DSM offerings.

Codes & Standards

Manitoba Hydro's historical efforts in conjunction with Efficiency Manitoba's future efforts to affect change in codes and standards involves being an aggressive and active participant and, in many cases, a driving force on several provincial and national energy efficiency building codes and performance standards committees. The electric load forecast reflects future DSM savings associated with existing and future Provincial building codes and improved equipment efficiency standards and regulations (Codes and Standards).

Program-based DSM

Projected energy and demand savings from program-based offerings are reported in the Load Forecast but are provided under a separate 15-year forecast as provided by Efficiency Manitoba. These savings are accounted for separately in Manitoba Hydro's Integrated Resource Planning function.

The program-based DSM has a significant impact on the projected future load growth expected in Manitoba. Program-based DSM reduces the Gross Firm Energy in 2040/41 from 35,898 GWh to 32,573 GWh, lowering the average growth of 552 GWh or 1.9% per year to an average growth of 386 GWh or 1.4% per year.

Program-based DSM reduces the Gross Total Peak in 2040/41 from 7,188 MW to 6,172 MW, lowering the average growth of 125 MW or 2.2% per year to an average growth of 74 GWh or 1.4% per year.

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:

i. **Forecast Residential Dwellings** - The forecast of Manitoba residential customers in Manitoba Hydro's Forecast of Key Economic and Financial Indicators was used for the total number of Residential Basic customers for the 2021/22 to 2040/41 period. The customer forecast was based on the average of several Manitoba population forecasts from various external agencies. The customer forecast was reduced by about 0.5% to account for customers with multiple services to obtain the forecast of individual dwellings.

ii. **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.

iii. **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 based on the 2017 Residential Energy Use Survey.

iv. **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 by region as follows:

Model: **Single Detached, Winnipeg**

Equation: Logit (Percentage of New Dwellings (t)) = -5.97 + 2.25 * T + 3.01 * PGEFF (lag(t))

Results:

Model R-Squared	Variable	Coefficient	t-stat
76.9%	Constant	-5.97	-14.12
	Trend	2.25	9.27
	PGEFF	3.01	4.97

Model: **Single Detached, Gas Available**

Equation: Logit (Percentage of New Dwellings (t)) = -2.50 + 0.68 * T + 3.52 * PGEFF (lag(t))

Results:

Model R-Squared	Variable	Coefficient	t-stat
83.2%	Constant	-2.50	-11.68
	Trend	0.68	5.57
	PGEFF	3.52	11.47

Model: **Multi Attached, Winnipeg**

Equation: Logit (Percentage of New Dwellings (t)) = -7.17 + 4.78 * T + 6.30 * PGEFF (lag(t))

Results:

Model R-Squared	Variable	Coefficient	t-stat
50.5%	Constant	-7.17	-4.43
	Trend	4.78	5.15
	PGEFF	6.30	2.71

Model: **Multi Attached, Gas Available**

Equation: Logit (Percentage of New Dwellings (t)) = -2.51 + 1.12 * T + 4.61 * PGEFF (lag(t))

Results:

Model R-Squared	Variable	Coefficient	t-stat
64.9%	Constant	-2.51	-5.29
	Trend	1.12	4.13
	PGEFF	4.61	6.77

Term definitions:

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 (41%, 6%, 6%, 46%) of the 1,3,4 and 5-year lags

The 2017 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 across Winnipeg, Gas Available and No Gas Available areas into specific furnace types.

i. **Forecast of Space Heating Systems in Existing Dwellings** – The average age of heating systems in existing dwellings was determined from the 2017 Residential Energy Use Survey. The number of annual replacements was estimated using a Weibull distribution based on the average age of each furnace type. Fuel switching was estimated using survey respondents in older dwellings with newer heating systems. Comparing 2017 Residential Energy Use Survey with survey results in 2014, a movement from electric heating systems to natural gas heating systems was recognized and taken into consideration when forecasting future numbers of space heating systems.

ii. **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 2017 Residential Energy Use Surveys. The number of annual 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.

iii. **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 2017 Residential Energy Use Survey.

iv. **Determine Overall Average Use** – An econometric 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 2020/21 was modeled. The resulting model and parameters are:

Model: **Overall Average Use**

Equation: Ln (Total Usage + DSM programs + C&S savings) / Customers

= 6.03 + 1.16 x Saturation – 0.26 x Ln (Price) + 0.32 x Ln (Income) + 0.01 x T(t)

Results:

Model R-Squared	Variable	Coefficient	t-stat
99.5%	Constant	6.03	8.38
	Saturation	1.16	2.48
	Price	-0.26	-4.73
	Income	0.32	4.73
	Trend	0.01	5.35

Term definitions:

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

v. **Appliance Use and Balancing** – Conditional Demand Analysis using the 2017 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 iv. results to ensure reasonableness.

vi. **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 Efficiency Manitoba's 3 year plan were subtracted. Additional energy savings due to the higher adoption of LED lights, and the future adoption of Electric Vehicles and Behind the Meter Generation in the Residential sector were included. The end result was the forecast of Residential Basic customer total energy use. Excluded are savings attributable to future Demand Side Management initiatives.

General Service Mass Market Methodology

i. **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 2020/21.

The resulting model and parameters are as follows:

Model: **GS Mass Market Customer Forecast (Small ND, Small Demand and Medium)**

Equation: Number of Customers at yearend (t) = 32,955 + 0.15 x MGDP + 0.05 x RES

Results:

Model R-Squared	Variable	Coefficient	t-stat
99.6%	Constant	32,955	24.53
	MGDP	0.15	7.86
	RES	0.05	9.63

Term definitions:

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

General Service Mass Market customer growth was assigned to Small Non Demand, Small Demand and Medium classes by using their 3 year average use 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 2020/21. The resulting model and parameters are as follows:

Model: **GS Mass Market Customer Forecast (Large)**

Equation: Number of Customers at yearend (t) = -361 + 0.006 x CrGDP + 0.001 x RES

Results:

Model R-Squared	Variable	Coefficient	t-stat
99.1%	Constant	-361	-10.77
	CrGDP	0.006	3.10
	RES	0.001	10.95

Term definitions:

CrGDP - Manitoba / Canada / U.S. Blended Real Gross Domestic Product
RES - Year end number of Residential Basic Customers lagged 2 years

ii. **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 regression model that included Electricity Price and Manitoba GDP. Historical data from 1989/90 to 2020/21 was used.

The resulting model and parameters are as follows:

Model: **GS Mass Market Average Use Forecast (Small ND, Small Demand and Medium)**

Equation: Ln Average Use per GS SND, SD and Medium

= 5.90 – 0.13 x Ln (Elec Price) + 0.55 x Ln (MGDP) + 0.04 x Dummy

Results:

Model R-Squared	Variable	Coefficient	t-stat
99.0%	Constant	5.90	24.25
	Elec Price	-0.13	-4.48
	MGDP	0.55	27.15
	Dummy	0.04	4.96

Term definitions:

Elec Price - SND, SD and Medium Average Real Electricity Price lagged 2 years
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

The Average Use for Large Mass Market customers was forecast in an econometric regression model that used Electricity Price and a blended Manitoba, Canadian, and U.S Real GDP as explanatory variables. Historical data from 1989/90 to 2020/21 was modeled.

The resulting model and parameters are as follows:

Model: **GS Mass Market Average Use Forecast (Large)**

Equation: Ln Average Use per GS Large

= 14.27 – 0.52 x Ln (Elec Price) + 0.26 x Ln (CrGDP) + 0.06 x Dummy

Results:

Model R-Squared	Variable	Coefficient	t-stat
95.8%	Constant	14.27	49.05
	Elec Price	-0.52	-8.45
	CrGDP	0.26	11.29
	Dummy	0.06	5.22

Term definitions:

Elec Price - GS Large Average Real Electricity Price lagged 2 years
CrGDP - Manitoba / 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

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.

iii. **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 Efficiency Manitoba's 3 year plan were subtracted, and the future adoption of Electric Vehicles and Behind the Meter Generation in the GS Mass Market sector were included.

General Service Top Consumers Methodology

There are 10 companies counting as 26 customers in the Top Consumers category, covering four industry sectors. Each customer is forecasted individually based on information collected on individual operating plans, including short-term expansion or contraction plans. The sources of information are derived from industry news and publications, company prospectuses, and from Manitoba Hydro's Key and Major Account Advisors. The information collected is used in the preparation of company specific short-term forecasts for committed projects. The short-term plans are forecasted to occur within the first five years. For the long-term beyond year five, the energy in year six of each customer is held constant for the remainder of the forecast period.

To account for unexpected load increases or decreases for the current Top Consumers beyond year five, the Potential Large Industrial Loads (PLIL) category was created. PLIL is as an alternative to attempting long-term forecasts for individual Top Consumers. It is based on analyzing the historical changes in energy of the Top Consumers as a group rather than on focusing on individual customers. PLIL endeavors to account for long-term future growth or contraction, including unexpected major expansions, contractions, or potential loss of existing Top Consumer customers.

PLIL is forecast using an econometric model of Top Consumers historical energy activity from 1984/85 to 2020/21. The model fits the energy to the specific Top Consumers Electricity Price and to a blended Manitoba, Canadian, and U.S Real GDP.

The resulting model and parameters are as follows:

Model: **GS Top Consumer Forecast (PLIL)**

Equation: Ln Total Load = 2.78 – 0.71 x Ln (Top Price) + 0.76 x Ln (CrGDP)

Results:

Model R-Squared	Variable	Coefficient	t-stat
	Constant	2.78	6.06
96.2%	Top Price	-0.71	-6.41
	CrGDP	0.76	19.60

Term definitions:

Top Price - Manitoba Top Consumers Real Electricity Price lagged 1 year
CrGDP - Manitoba / Canada / U.S. Blended Real Gross Domestic Product

The forecasted growth from this model was used in years 6 through 20 as PLIL.

Electric Vehicles

The methodology for forecasting Electric Vehicles uses historical data supplied by Statistics Canada and Manitoba Public Insurance on automobile purchases and registrations per year in Manitoba. To help estimate future trends, appropriate assumptions from recent relevant literature were applied to Manitoba's situation.

The 2021 Electric Vehicle forecast assumes that Manitoba will meet the federal mandate targets that have been set for zero-emission vehicles (ZEV) effective June 29th, 2021, for passenger vehicles reaching 100% of new passenger vehicles sales by 2035.

The 2021 Electric Vehicle forecast also assumes that Manitoba will partially meet the federal targets that have been set for zero-emission vehicles (ZEV) effective May 1st, 2019, for light trucks reaching 100% by 2040. The original targets were 10% of new light-duty vehicles sales by 2025, 30% by 2030 and 100% by 2040.

Behind the Meter Generation

Behind the Meter (BTM) Generation has been modeled using grid connected Solar Photovoltaic (PV) technology. BTM Solar PV technology are customer installed solutions that generate electricity that is consumed by the customer instead of using electricity from Manitoba Hydro. In situations where customer's demand is less than what is produced, the energy produced is pushed back to the integrated system and sold to Manitoba Hydro. The scenario assumes that 75% of the generated electricity is consumed by customers to reduce their own electric consumption with the remaining 25% being sold back the Manitoba Hydro integrated grid system.

The methodology for forecasting Solar PV adoption throughout the forecast period is leveraging a Bass Diffusion model to project the future uptake of Solar PV installations in Manitoba. The model is used in the adoption of innovation and accounts for market capacity, adoption rates as well as other internal and external influences.

It is assumed that future Solar PV system sizes in Manitoba are projected to be on average 10kW which would each generate 11,700 kWh per year.

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 GWh to get the monthly forecasts.

Transmission Losses

Transmission losses represent the energy that is lost transporting the energy from the generating stations (primarily in northern Manitoba) to the sub stations that are generally located closer to where the energy is consumed by customers (primarily in southern Manitoba). Manitoba Hydro utilized a new software, GSPRO, to model the integrated system operations, accounting for domestic load (at Common Bus), export loads (at Manitoba border) as well as generation and imports at a sub-monthly resolution. Transmission losses in the model are determined using a calibrated transmission loss function which considers the load on the DC transmission lines. Losses on the AC system are added to the total losses outside the model. Using these modelled results of transmission losses, a seasonal relationship between load and transmission losses was derived for the average of all water flow conditions. The resulting transmission losses vary depending on the volume of generation required in the specific block of hours to serve all domestic and export loads. The relationship separates the total losses resulting from Manitoba domestic load from the losses resulting from export load.

The model of transmission losses includes existing generation and transmission assets to determine losses for the entire time horizon. As new generation resources become required to meet increasing demand in the later years of the planning horizon, there is a likelihood that the new generation resource options would be developed in the southern part of the province closer to most of the domestic load. These new generation options would significantly reduce the amount of forecasted transmission losses as the energy produced would not be flowing across the DC system. To ensure that transmission losses derived solely on load were not overestimated in the later years of the forecast, a monthly limit on maximum losses was developed using insights from the modelling data. This limit on transmission losses varies month by month in order to limit the over-estimate of transmission losses in the later years of the forecast period.

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.

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. A customer is not equivalent to a building structure. One building can have multiple electric services and may count as more than one customer. Likewise, multiple buildings may have only one service and will count as only 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.

Coincident Peak Load - The highest load requirement during a time period is defined 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 defined 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 1.0 MW is approximately the coincident peak requirement of 600 typical dwellings not using electricity for heating.

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.

Electric Consumption - Electric consumption is read at the meter level in units of kilowatt-hours (kWh). 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. A residential dwelling not using electricity for heating uses approximately 10,000 kWh per year.

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.

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.

APPENDIX A - GENERAL RATE APPLICATION EXTENSION

In keeping in concert with planning timelines consistent with Manitoba Hydro's submission to the Manitoba Public Utility Board for the 2023/24 & 2024/25 General Rate Application, the scenario assumes that 2021/22 is reflective of weather normalized actual consumption and has been extrapolated an additional year (2041/42) to continue to reflect a 20-year planning horizon (2022/23 to 2041/42).

The following section reflects tables where the scenario was extended an additional year to 2041/42:

Table 19 – General Consumer Sales Energy (Extrapolated)

General Consumer Sales (GWh) History and Forecast 2011/12 - 2041/42												
Fiscal	Residential				General Service						Lighting	Total
Year	Basic	Diesel	Seasonal	FRWH	Mass Mkt	Top Cons	Diesel	Seasonal	FRWH	SEP		Sales
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
2016/17	7,158	9	66	17	8,956	5,685	6	5	6	26	92	22,025
2017/18	7,547	8	65	16	9,213	5,592	6	5	5	28	88	22,573
2018/19	7,904	9	73	15	9,468	5,258	6	5	5	28	75	22,848
2019/20	7,598	9	74	14	9,256	5,016	6	5	5	27	68	22,078
2020/21	7,919	10	76	14	8,851	4,762	8	5	5	44	67	21,762
2021/22	8,120	11	81	13	9,284	4,955	7	5	5	47	66	22,596
Weather Adj.	-240	0	0	0	-143	0	0	0	0	0	0	-383
2021/22 Wadj	7,880	11	81	13	9,141	4,955	7	5	5	47	66	22,213
10 Year Wadj	93	0	0	-1	159	-17	0	0	0	2	-4	135
Avg Gr.	1.3%	3.5%	-0.2%	-5.2%	0.9%	-0.3%	2.7%	0.7%	-4.4%	6.4%	-4.4%	0.6%
2022/23	7,984	10	73	12	9,498	4,599	8	5	5	48	64	22,306
2023/24	8,087	10	73	12	9,699	4,570	8	5	5	48	64	22,580
2024/25	8,214	11	72	11	9,832	4,520	8	6	4	48	64	22,789
2025/26	8,326	11	71	11	9,956	4,561	8	6	4	48	64	23,065
2026/27	8,454	11	71	10	10,096	4,580	8	6	4	48	64	23,352
2027/28	8,607	11	70	10	10,241	4,602	8	6	4	48	64	23,670
2028/29	8,763	11	69	9	10,396	4,627	8	6	4	48	64	24,006
2029/30	8,939	11	69	9	10,561	4,652	8	6	4	48	65	24,371
2030/31	9,138	12	68	8	10,741	4,677	8	6	4	48	65	24,774
2031/32	9,360	12	67	8	10,939	4,766	8	6	4	48	65	25,282
10 Year	148	0	-1	-1	180	-19	0	0	0	0	0	307
Avg Gr.	1.7%	0.6%	-1.9%	-4.9%	1.8%	-0.4%	0.7%	1.5%	-2.9%	0.2%	-0.2%	1.3%
2032/33	9,632	12	67	7	11,198	4,856	8	6	3	48	65	25,903
2033/34	9,947	12	66	7	11,477	4,948	8	6	3	48	65	26,588
2034/35	10,283	12	66	7	11,774	5,040	8	6	3	48	65	27,312
2035/36	10,632	13	65	6	12,104	5,134	8	6	3	48	65	28,084
2036/37	11,007	13	64	6	12,457	5,230	8	6	3	48	65	28,907
2037/38	11,395	13	64	6	12,825	5,327	8	6	3	48	65	29,759
2038/39	11,795	13	63	5	13,207	5,425	8	7	3	48	65	30,639
2039/40	12,207	13	62	5	13,614	5,525	8	7	3	48	65	31,558
2040/41	12,624	13	62	5	14,043	5,626	8	7	3	48	65	32,503
2041/42	13,011	14	61	4	14,422	5,722	8	7	3	48	65	33,364
20 Year	257	0	-1	0	264	38	0	0	0	0	0	558
Avg Gr.	2.5%	1.0%	-1.4%	-5.7%	2.3%	0.7%	0.5%	1.3%	-2.9%	0.1%	0.0%	2.1%

Table 20 – Components of Manitoba Energy (Extrapolated)

Manitoba Firm Energy (GWh) History and Forecast 2011/12 - 2041/42										
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
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	2,107	9.7%	25	123	24,665
2016/17	22,010	1,043	4.7%	62	23,115	2,014	9.2%	26	123	25,227
2017/18	22,560	1,155	5.1%	84	23,799	1,846	8.2%	28	125	25,742
2018/19	22,832	1,136	5.0%	85	24,053	1,697	7.4%	28	128	25,850
2019/20	22,063	1,300	5.9%	79	23,442	1,656	7.5%	29	123	25,192
2020/21	21,743	1,256	5.8%	63	23,063	1,643	7.6%	44	124	24,786
2021/22	22,577	1,413	6.3%	25	24,015	1,696	7.5%	47	139	25,803
Weather Adj.	-383	-240		0	-623	-44		0	0	-667
2021/22 Wadj	22,194	1,173	5.3%	25	23,392	1,652	7.4%	47	139	25,136
10 Year Wadj	134	50		-4	180	-29		2	1	149
Avg Gr.	0.6%	5.7%		-9.4%	0.8%	-1.6%		6.6%	0.6%	1.3%
2022/23	22,288	1,206	5.4%	0	23,493	1,327	6.0%	48	125	24,897
2023/24	22,562	1,223	5.4%	0	23,785	1,340	5.9%	48	125	25,201
2024/25	22,771	1,240	5.4%	0	24,010	1,349	5.9%	48	125	25,437
2025/26	23,047	1,255	5.4%	0	24,301	1,362	5.9%	48	125	25,740
2026/27	23,333	1,271	5.4%	0	24,604	1,373	5.9%	48	125	26,054
2027/28	23,651	1,291	5.5%	0	24,942	1,384	5.9%	48	125	26,403
2028/29	23,987	1,311	5.5%	0	25,298	1,396	5.8%	48	125	26,772
2029/30	24,352	1,333	5.5%	0	25,685	1,409	5.8%	48	125	27,172
2030/31	24,754	1,359	5.5%	0	26,113	1,421	5.7%	48	125	27,611
2031/32	25,262	1,388	5.5%	0	26,650	1,437	5.7%	48	125	28,163
10 Year	307	21		-3	326	-22		0	-1	303
Avg Gr.	1.3%	1.7%		-100.0%	1.3%	-1.4%		0.1%	-1.0%	1.1%
2032/33	25,883	1,423	5.5%	0	27,306	1,455	5.6%	48	125	28,839
2033/34	26,568	1,463	5.5%	0	28,031	1,472	5.5%	48	125	29,580
2034/35	27,292	1,506	5.5%	0	28,798	1,485	5.4%	48	125	30,361
2035/36	28,064	1,553	5.5%	0	29,617	1,493	5.3%	48	125	31,188
2036/37	28,887	1,604	5.6%	0	30,490	1,501	5.2%	48	125	32,069
2037/38	29,738	1,657	5.6%	0	31,395	1,507	5.1%	48	125	32,979
2038/39	30,618	1,712	5.6%	0	32,329	1,510	4.9%	48	125	33,916
2039/40	31,537	1,770	5.6%	0	33,306	1,510	4.8%	48	125	34,893
2040/41	32,482	1,829	5.6%	0	34,311	1,510	4.6%	48	125	35,898
2041/42	33,343	1,878	5.6%	0	35,220	1,637	4.9%	48	125	36,935
20 Year	557	35		-1	591	-1		0	-1	590
Avg Gr.	2.1%	2.4%		-100.0%	2.1%	0.0%		0.1%	-0.5%	1.9%

Table 21 – Manitoba Load at Common Bus (GWh) (Extrapolated)

Manitoba Load at Common Bus (GWh) History and Forecast 2011/12 - 2041/42													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2011/12	1,708	1,601	1,465	1,626	1,580	1,495	1,661	1,937	2,225	2,312	2,055	1,898	21,560
2012/13	1,659	1,552	1,534	1,697	1,573	1,469	1,782	2,081	2,445	2,553	2,162	2,199	22,706
2013/14	1,881	1,588	1,500	1,606	1,564	1,510	1,753	2,083	2,667	2,686	2,367	2,336	23,541
2014/15	1,875	1,680	1,534	1,628	1,609	1,557	1,758	2,238	2,437	2,572	2,405	2,157	23,450
2015/16	1,778	1,639	1,561	1,682	1,593	1,566	1,706	1,951	2,251	2,470	2,223	2,040	22,460
2016/17	1,827	1,584	1,564	1,653	1,643	1,571	1,822	1,913	2,573	2,521	2,165	2,281	23,115
2017/18	1,800	1,647	1,580	1,721	1,647	1,598	1,824	2,235	2,553	2,628	2,385	2,181	23,799
2018/19	1,912	1,682	1,645	1,684	1,634	1,582	1,927	2,258	2,368	2,678	2,464	2,219	24,053
2019/20	1,795	1,640	1,528	1,691	1,613	1,536	1,894	2,167	2,495	2,551	2,337	2,196	23,442
2020/21	1,830	1,608	1,570	1,697	1,609	1,504	1,881	2,099	2,355	2,413	2,412	2,085	23,063
2021/22	1,808	1,637	1,642	1,770	1,633	1,537	1,715	2,107	2,583	2,787	2,503	2,293	24,015
21/22 Wadj	1,790	1,602	1,541	1,610	1,597	1,572	1,793	2,156	2,551	2,648	2,327	2,203	23,392
2022/23	1,760	1,577	1,490	1,665	1,608	1,514	1,784	2,086	2,456	2,607	2,283	2,203	23,033
2023/24	1,771	1,585	1,497	1,674	1,617	1,521	1,794	2,100	2,475	2,627	2,301	2,219	23,181
2024/25	1,773	1,585	1,497	1,675	1,618	1,521	1,797	2,105	2,482	2,636	2,308	2,224	23,220
2025/26	1,780	1,591	1,503	1,682	1,624	1,527	1,805	2,117	2,495	2,651	2,321	2,236	23,333
2026/27	1,789	1,598	1,510	1,691	1,632	1,534	1,815	2,129	2,510	2,667	2,335	2,248	23,458
2027/28	1,801	1,608	1,519	1,702	1,643	1,543	1,826	2,144	2,528	2,686	2,352	2,264	23,615
2028/29	1,814	1,619	1,529	1,715	1,654	1,553	1,840	2,161	2,549	2,709	2,372	2,282	23,797
2029/30	1,829	1,631	1,541	1,730	1,668	1,566	1,856	2,181	2,573	2,735	2,394	2,303	24,008
2030/31	1,847	1,647	1,556	1,748	1,685	1,581	1,875	2,205	2,602	2,766	2,421	2,327	24,260
2031/32	1,875	1,671	1,579	1,774	1,710	1,604	1,904	2,240	2,644	2,810	2,459	2,364	24,635
2032/33	1,909	1,702	1,610	1,809	1,743	1,634	1,940	2,282	2,694	2,863	2,506	2,408	25,101
2033/34	1,948	1,737	1,643	1,847	1,780	1,667	1,980	2,330	2,751	2,924	2,558	2,458	25,622
2034/35	1,989	1,774	1,679	1,888	1,819	1,703	2,023	2,382	2,812	2,989	2,615	2,511	26,183
2035/36	2,044	1,824	1,727	1,943	1,872	1,752	2,079	2,448	2,889	3,070	2,686	2,579	26,912
2036/37	2,102	1,878	1,779	2,001	1,928	1,804	2,140	2,518	2,971	3,157	2,763	2,652	27,694
2037/38	2,163	1,933	1,833	2,062	1,987	1,858	2,203	2,591	3,056	3,246	2,841	2,727	28,499
2038/39	2,223	1,989	1,887	2,123	2,046	1,912	2,266	2,664	3,142	3,337	2,920	2,803	29,311
2039/40	2,284	2,046	1,942	2,186	2,107	1,967	2,330	2,738	3,228	3,427	2,999	2,879	30,134
2040/41	2,348	2,105	2,000	2,252	2,170	2,025	2,396	2,816	3,318	3,522	3,082	2,958	30,991
2041/42	2,399	2,151	2,044	2,301	2,217	2,069	2,449	2,877	3,390	3,599	3,149	3,023	31,668

Table 22 – Manitoba Load at Common Bus (MW) (Extrapolated)

Manitoba Load at Common Bus (MW) History and Forecast 2011/12 - 2041/42													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
2011/12	2,935	2,649	2,770	2,997	2,884	2,737	2,819	3,425	3,714	4,036	3,884	3,330	4,036
2012/13	2,983	2,490	2,830	2,954	2,877	2,575	3,014	3,711	4,020	4,198	4,187	3,699	4,198
2013/14	3,367	2,886	2,791	2,892	2,959	2,847	3,134	3,711	4,261	4,366	4,200	4,158	4,366
2014/15	3,464	2,687	2,665	2,773	2,865	2,670	3,068	4,073	4,187	4,348	4,227	4,068	4,348
2015/16	3,132	2,709	2,748	2,941	2,916	3,045	2,852	3,494	3,653	4,078	4,050	3,844	4,078
2016/17	3,291	2,679	2,791	2,991	2,831	2,710	2,936	3,330	4,326	4,452	4,128	4,088	4,452
2017/18	3,112	2,600	2,840	3,065	2,926	2,940	3,257	3,706	4,283	4,403	4,294	3,577	4,403
2018/19	3,709	2,897	2,980	2,890	2,968	2,674	3,138	3,827	4,021	4,590	4,336	3,932	4,590
2019/20	3,204	2,849	2,749	2,891	2,897	2,820	3,297	3,762	4,263	4,425	4,289	3,740	4,425
2020/21	3,268	2,619	3,076	3,035	2,965	2,529	3,237	3,556	4,075	4,366	4,552	4,141	4,552
2021/22	3,092	2,693	3,068	3,110	3,062	2,749	2,925	3,929	4,386	4,519	4,503	4,076	4,519
21/22 Norm	3,253	2,655	2,726	2,958	2,918	2,752	3,096	3,691	4,153	4,440	4,371	3,921	4,465
2022/23	3,255	2,656	2,727	2,960	2,919	2,754	3,098	3,693	4,112	4,402	4,335	3,923	4,464
2023/24	3,279	2,671	2,743	2,981	2,938	2,772	3,121	3,722	4,132	4,425	4,358	3,956	4,489
2024/25	3,289	2,674	2,746	2,990	2,945	2,778	3,133	3,735	4,132	4,429	4,361	3,973	4,494
2025/26	3,309	2,684	2,756	3,004	2,956	2,790	3,149	3,757	4,143	4,443	4,375	4,000	4,509
2026/27	3,328	2,696	2,769	3,021	2,971	2,804	3,169	3,778	4,151	4,455	4,387	4,025	4,523
2027/28	3,353	2,712	2,785	3,043	2,990	2,823	3,193	3,805	4,164	4,472	4,402	4,058	4,540
2028/29	3,383	2,729	2,803	3,067	3,010	2,843	3,219	3,838	4,182	4,495	4,425	4,096	4,565
2029/30	3,414	2,752	2,826	3,096	3,037	2,868	3,251	3,874	4,202	4,520	4,449	4,137	4,591
2030/31	3,454	2,778	2,853	3,129	3,067	2,897	3,287	3,919	4,230	4,554	4,481	4,188	4,627
2031/32	3,510	2,817	2,894	3,176	3,111	2,940	3,337	3,981	4,278	4,608	4,534	4,257	4,683
2032/33	3,577	2,869	2,947	3,238	3,169	2,996	3,404	4,058	4,336	4,674	4,599	4,341	4,751
2033/34	3,656	2,926	3,007	3,307	3,235	3,058	3,477	4,147	4,407	4,754	4,677	4,438	4,833
2034/35	3,739	2,987	3,071	3,381	3,305	3,124	3,554	4,241	4,481	4,838	4,759	4,541	4,920
2035/36	3,846	3,074	3,161	3,480	3,402	3,216	3,658	4,363	4,600	4,967	4,885	4,671	5,052
2036/37	3,963	3,165	3,256	3,585	3,506	3,312	3,766	4,495	4,730	5,108	5,024	4,811	5,196
2037/38	4,082	3,259	3,355	3,694	3,613	3,412	3,878	4,629	4,862	5,252	5,164	4,955	5,343
2038/39	4,204	3,354	3,455	3,805	3,721	3,514	3,992	4,767	4,993	5,395	5,305	5,102	5,490
2039/40	4,328	3,451	3,557	3,918	3,832	3,617	4,108	4,906	5,121	5,535	5,442	5,251	5,634
2040/41	4,459	3,550	3,662	4,036	3,947	3,724	4,227	5,052	5,256	5,684	5,587	5,408	5,786
2041/42	4,592	3,656	3,771	4,156	4,065	3,835	4,353	5,202	5,412	5,853	5,754	5,569	5,958

Table 23– Monthly Gross Firm Energy (Extrapolated)

Monthly Gross Firm Energy (GWh) History and Forecast 2011/12 - 2041/42													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
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	1,873	2,137	2,469	2,695	2,418	2,239	24,665
2016/17	2,007	1,741	1,726	1,826	1,809	1,720	1,986	2,093	2,754	2,740	2,350	2,472	25,227
2017/18	1,946	1,774	1,733	1,874	1,804	1,741	1,963	2,399	2,759	2,822	2,569	2,357	25,742
2018/19	2,070	1,835	1,793	1,840	1,770	1,707	2,061	2,406	2,540	2,838	2,624	2,367	25,850
2019/20	1,928	1,771	1,661	1,829	1,760	1,661	2,024	2,312	2,664	2,728	2,504	2,351	25,192
2020/21	1,961	1,730	1,708	1,844	1,746	1,621	2,021	2,247	2,528	2,577	2,571	2,231	24,786
2021/22	1,945	1,778	1,792	1,921	1,756	1,652	1,847	2,267	2,771	2,962	2,668	2,445	25,803
21/22 Wadj	1,926	1,740	1,682	1,748	1,718	1,689	1,931	2,319	2,736	2,816	2,482	2,349	25,136
2022/23	1,867	1,673	1,582	1,765	1,706	1,607	1,894	2,211	2,600	2,758	2,419	2,335	24,416
2023/24	1,877	1,681	1,589	1,775	1,715	1,615	1,905	2,227	2,620	2,780	2,438	2,351	24,571
2024/25	1,879	1,681	1,589	1,776	1,716	1,615	1,907	2,232	2,627	2,789	2,445	2,356	24,612
2025/26	1,888	1,688	1,595	1,784	1,723	1,621	1,917	2,244	2,642	2,804	2,459	2,368	24,729
2026/27	1,897	1,695	1,602	1,793	1,731	1,628	1,926	2,256	2,657	2,821	2,473	2,380	24,860
2027/28	1,909	1,705	1,611	1,804	1,742	1,637	1,939	2,272	2,676	2,841	2,491	2,396	25,023
2028/29	1,922	1,717	1,622	1,818	1,754	1,648	1,953	2,290	2,698	2,865	2,512	2,414	25,214
2029/30	1,938	1,730	1,635	1,833	1,769	1,661	1,970	2,311	2,723	2,892	2,535	2,435	25,433
2030/31	1,957	1,747	1,651	1,852	1,787	1,677	1,990	2,336	2,753	2,923	2,563	2,459	25,695
2031/32	1,986	1,772	1,675	1,880	1,813	1,701	2,020	2,372	2,797	2,968	2,604	2,496	26,083
2032/33	2,023	1,805	1,707	1,916	1,848	1,732	2,058	2,415	2,850	3,021	2,652	2,540	26,565
2033/34	2,063	1,841	1,742	1,956	1,886	1,767	2,100	2,462	2,908	3,081	2,707	2,590	27,104
2034/35	2,106	1,880	1,779	1,999	1,927	1,805	2,145	2,514	2,970	3,146	2,767	2,643	27,680
2035/36	2,164	1,932	1,830	2,057	1,982	1,856	2,204	2,580	3,046	3,227	2,841	2,711	28,430
2036/37	2,225	1,989	1,885	2,117	2,041	1,910	2,268	2,650	3,129	3,314	2,920	2,784	29,232
2037/38	2,288	2,047	1,941	2,177	2,103	1,967	2,333	2,723	3,214	3,404	2,998	2,859	30,054
2038/39	2,350	2,105	1,998	2,239	2,165	2,022	2,397	2,796	3,300	3,494	3,077	2,935	30,877
2039/40	2,411	2,165	2,056	2,302	2,228	2,078	2,461	2,870	3,386	3,585	3,157	3,011	31,709
2040/41	2,475	2,226	2,116	2,367	2,294	2,135	2,528	2,948	3,475	3,679	3,240	3,090	32,573
2041/42	2,524	2,270	2,158	2,414	2,340	2,177	2,578	3,006	3,544	3,752	3,304	3,151	33,218

Table 24 – Monthly Gross Total Peak (Extrapolated)

Monthly Gross Total Peak (MW) History and Forecast 2011/12 - 2041/42													
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
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
2016/17	3,663	2,934	3,103	3,333	3,132	2,958	3,228	3,622	4,616	4,822	4,469	4,435	4,822
2017/18	3,348	2,780	3,121	3,319	3,177	3,242	3,534	4,041	4,666	4,755	4,740	3,915	4,755
2018/19	4,059	3,154	3,268	3,284	3,267	2,868	3,407	4,095	4,269	4,936	4,619	4,212	4,936
2019/20	3,400	3,100	3,059	3,165	3,182	3,039	3,539	4,002	4,566	4,715	4,585	4,074	4,715
2020/21	3,664	2,843	3,348	3,350	3,242	2,730	3,510	3,842	4,398	4,673	4,912	4,464	4,912
2021/22	3,372	2,945	3,402	3,471	3,370	3,099	3,274	4,276	4,745	4,798	4,805	4,401	4,805
21/22 Norm	3,451	2,815	2,880	3,123	3,081	2,915	3,273	3,909	4,395	4,710	4,634	4,158	4,737
2022/23	3,453	2,817	2,881	3,125	3,082	2,916	3,275	3,911	4,353	4,672	4,597	4,160	4,739
2023/24	3,479	2,832	2,898	3,147	3,102	2,935	3,299	3,942	4,374	4,698	4,623	4,196	4,767
2024/25	3,489	2,836	2,902	3,156	3,109	2,942	3,312	3,956	4,374	4,702	4,626	4,215	4,772
2025/26	3,511	2,846	2,912	3,171	3,121	2,955	3,329	3,980	4,385	4,717	4,640	4,243	4,789
2026/27	3,531	2,859	2,925	3,189	3,136	2,970	3,350	4,002	4,393	4,730	4,653	4,271	4,803
2027/28	3,557	2,875	2,942	3,212	3,156	2,989	3,375	4,032	4,406	4,748	4,670	4,306	4,823
2028/29	3,589	2,894	2,961	3,237	3,178	3,010	3,403	4,068	4,425	4,773	4,694	4,348	4,850
2029/30	3,623	2,917	2,985	3,268	3,205	3,037	3,436	4,106	4,446	4,801	4,720	4,392	4,879
2030/31	3,666	2,944	3,013	3,303	3,237	3,067	3,475	4,154	4,475	4,837	4,755	4,448	4,918
2031/32	3,725	2,985	3,055	3,352	3,284	3,112	3,528	4,222	4,525	4,896	4,812	4,523	4,980
2032/33	3,797	3,040	3,111	3,417	3,345	3,171	3,599	4,305	4,585	4,969	4,881	4,615	5,056
2033/34	3,883	3,100	3,175	3,491	3,415	3,237	3,677	4,403	4,673	5,069	4,981	4,722	5,147
2034/35	3,972	3,165	3,242	3,569	3,489	3,307	3,759	4,505	4,776	5,162	5,081	4,835	5,243
2035/36	4,088	3,256	3,336	3,675	3,592	3,404	3,870	4,639	4,933	5,307	5,224	4,980	5,391
2036/37	4,215	3,352	3,437	3,787	3,703	3,507	3,986	4,784	5,086	5,467	5,381	5,135	5,553
2037/38	4,345	3,452	3,542	3,904	3,817	3,613	4,107	4,932	5,239	5,631	5,542	5,296	5,721
2038/39	4,479	3,554	3,648	4,023	3,933	3,722	4,230	5,085	5,378	5,783	5,691	5,463	5,876
2039/40	4,615	3,657	3,757	4,146	4,053	3,833	4,357	5,240	5,506	5,923	5,828	5,634	6,020
2040/41	4,760	3,764	3,870	4,273	4,177	3,948	4,486	5,405	5,641	6,072	5,973	5,792	6,172
2041/42	4,846	3,832	3,939	4,350	4,252	4,019	4,567	5,502	5,743	6,181	6,081	5,896	6,283

2021 Electric Load Scenario

for all major rate classes paid by Manitoba customers with those of other major Canadian utilities.

Figure 8.7 below demonstrates that the monthly bills of Manitoba Hydro customers will continue to be the lowest or among the lowest in 2023/24 and 2024/25 even when comparing bills that reflect the 2.0% proposed rate increases for Manitoba Hydro while keeping the average rates of all other utilities at those in effect as of April 1, 2022.

Figure 8.7 Comparison of Monthly Bills in Major Canadian Cities (Revised)

Rates in effect April 1, 2022 including proposed rate increases for Manitoba Hydro in both 2023/24 & 2024/25

	Residential	Residential	Small Power			Medium Power			Large Power	
Power Demand			14 kW	40 kW	100 kW	1,000 kW	1,000 kW	2,500 kW	5,000 kW	50,000 kW
Consumption	1,000 kWh	2,000 kWh	2,000 kWh	10,000 kWh	25,000 kWh	200,000 kWh	400,000 kWh	1,170,000 kWh	3,060,000 kWh	30,600,000 kWh
Load Factor			20%	35%	35%	28%	56%	65%	85%	85%
Winnipeg	$107	$205	$215	$989	$2,744	$22,961	$32,326	$79,692	$188,073	$1,586,307
Calgary	$199	$371	$386	$1,825	$4,187	$39,574	$59,862	$163,539	$402,713	$4,020,116
Charlottetown	$178	$331	$399	$1,849	$4,516	$38,321	$63,141	$178,843	$311,180	$3,111,800
Edmonton	$195	$361	$400	$1,928	$5,324	$43,592	$69,364	$191,298	$430,871	$3,746,692
Halifax	$173	$335	$310	$1,636	$4,091	$36,137	$55,219	$147,638	$348,719	$3,487,219
Moncton	$139	$255	$304	$1,441	$3,596	$30,974	$50,744	$143,759	$258,412	$2,465,040
Montreal	$76	$166	$219	$1,042	$2,822	$25,348	$33,495	$83,102	$163,059	$1,543,554
Ottawa	$129	$233	$268	$1,269	$3,501	$28,708	$46,699	$134,155	$299,324	$2,856,156
Regina	$165	$307	$305	$1,398	$3,650	$32,680	$48,028	$117,239	$274,788	$2,312,973
St. John's	$138	$260	$295	$1,276	$3,173	$24,655	$41,256	$114,174	$285,130	$2,013,256
Toronto	$139	$245	$299	$1,365	$3,766	$32,140	$50,904	$139,023	$398,525	$2,946,264
Vancouver	$114	$252	$256	$1,169	$2,910	$23,979	$35,856	$97,617	$237,343	$1,976,723

Lowest rate
Second lowest rate

Figure 8.8 Comparison of Average Electricity Prices in Major Canadian Cities reflecting Manitoba Hydro's Proposed Rate Increases for 2023/24 and 2024/25

In addition, for rates effective April 1, 2024, Manitoba Hydro is proposing to adjust the billing demand definition as described in Section 8.8.2. The impact of this change results in an increase to the demand rate of $0.10 shown in Figure 8.28.

Figure 8.28 Impact of Billing Demand Definition Change – GSL 30-100 kV

Large 30-100 kV	Rate	Billing Determinants	Revenue
Monthly Demand Charge per kVA	$ 9.11 (1)	3,702,874 (2)	$33,733,182 (4) = (1) X (2)
Adjustment		98.9% (3)	
On Peak Billing Demand	$ 9.11 (1)	3,662,143 (5) = (2) X (3)	$33,362,123 (6) = (1) X (5)
Revenue Reduction			$371,059 (7) = (4) - (6)
Revenue Neutral Increase to Demand Rate	$ 0.10 (8) = (7) / (5)		
Total Demand Rate	$ 9.21 (9) = (1) +(8)		$33,733,182 (10) = (9) X (5)
Check			$0 (11) = (4) - (10)

As explained in Section 8.8.2 this above change is expected to have a negligible bill impact as the increase in billing demand charge will be predominantly offset by a reduction in measured demand for most customers.

8.8.6 Proposed Rate Changes for the General Service Large >100 kV Class

Manitoba Hydro is proposing to use the same approach for rates in the GSL >100 kV class as described for the GSL 750V-30 kV and 30-100 kV classes. An overall 1.5% increase in each of the test years applied entirely to the demand charge consistent with the priorities discussed in Section 8.8.1 to rebalance energy and demand charges. For the GSL >100 kV class this requires a 5.8%, and 5.5% increase to the demand charge effective in both September 1, 2023 and April 1, 2024 and reflected in Figure 8.29.

Figure 8.29 Proposed Rate Changes – GSL >100kV Class

	Approved Jan 2022 Rates	Proposed Sep 2023 Rates	Proposed Apr 2024 Rates
Energy Charge (per kWh)	$0.03766	$0.03766	$0.03766
Demand Charge (per kVA)	$7.36	$7.79	$8.31*

*The $8.31 proposed rate includes the 5.5% increase to the demand charge as well as the $0.09 rate impact related to the billing demand definition change described in Figure 8.31.

AREA AND ROADWAY LIGHTING

OUTDOOR LIGHTING RATE - *TARIFF NO. 2023-80:*

Watts		Rate Per Month	
		Shared Pole/Luminaire	Exclusive Pole/Luminaire
10 LED	(1 - 30 W)	-	$ 2.41
40 LED	(> 30 - 50 W)	$ 8.21	$ 14.21
40 LED 24 hr	(> 30 – 50 W)	-	$ 16.14
60 LED	(> 50 – 80 W)	$ 8.38	$ 14.85
90 LED	(> 80 – 120 W)	$ 10.04	$ 16.40
150 LED	(> 120 – 180 W)	$ 11.95	$ 17.82
150 LED 1/100'			$ 48.66
150 LED 2/100'	(>120 – 180)	-	$ 30.31
150 LED 3/100'			$ 24.19
150 LED 4/100'	(>120 – 180)	-	$ 21.13
250 LED	(> 180 – 280 W)	$ 12.13	$ 24.00
250 LED 1/100'			$ 67.62
250 LED 2/100'	(> 180 – 280 W)	-	$ 42.14
250 LED 3/100'			$ 33.64
250 LED 4/100'	(> 180 – 280 W)	-	$ 29.39
300 LED	(> 280 – 370 W)	-	$ 31.89
300 LED 1/100'			$ 62.58
300 LED 2/100'	(> 280 – 370 W)	-	$ 44.16
300 LED 3/100'			$ 38.02
300 LED 4/100'	(> 280 – 370 W)	-	$ 34.95
400 LED	(> 370 – 460 W)	-	$ 33.16
500 LED	(> 460 – 550 W)	-	$ 35.37
600 LED	(> 550 – 640 W)	-	$ 37.12

Applicability:

The Area and Roadway rate is available throughout the Province of Manitoba and applies to area and roadway lighting installed by agreement for public authorities.

AREA AND ROADWAY LIGHTING

DECORATIVE LIGHTING - *TARIFF NO. 2023-85*

Connected load @ $1.080/kW per night of scheduled use:

Minimum Monthly Bill: $ 22.13

Applicability:

The Decorative Lighting rate is applicable for new and existing unmetered municipally-owned decorative lights on frames or modules mounted on roadway lighting poles or ornamental standards and/or Christmas trees. The customer is required to advise the Corporation prior to any change in the nights contracted for operation and\or the connected lighting kilowatts.

Applicability:

The Area and Roadway rate is available throughout the Province of Manitoba and applies to area and roadway lighting installed by agreement for public authorities

AREA AND ROADWAY LIGHTING

OUTDOOR LIGHTING RATE - *TARIFF NO. 2024-80:*

Watts		Rate Per Month	
		Shared Pole/Luminaire	Exclusive Pole/Luminaire
10 LED	(1 - 30 W)	-	$ 2.43
40 LED	(> 30 - 50 W)	$ 8.37	$ 14.35
40 LED 24 hr	(> 30 – 50 W)	-	$ 16.30
60 LED	(> 50 – 80 W)	$ 8.55	$ 14.99
90 LED	(> 80 – 120 W)	$ 10.24	$ 16.56
150 LED	(> 120 – 180 W)	$ 12.19	$ 17.99
150 LED 1/100'			$ 51.58
150 LED 2/100'	(>120 – 180)	-	$ 32.13
150 LED 3/100'			$ 25.64
150 LED 4/100'	(>120 – 180)	-	$ 22.40
250 LED	(> 180 – 280 W)	$ 12.37	$ 24.23
250 LED 1/100'			$ 71.68
250 LED 2/100'	(> 180 – 280 W)	-	$ 44.67
250 LED 3/100'			$ 35.66
250 LED 4/100'	(> 180 – 280 W)	-	$ 31.15
300 LED	(> 280 – 370 W)	-	$ 32.20
300 LED 1/100'			$ 66.33
300 LED 2/100'	(> 280 – 370 W)	-	$ 46.81
300 LED 3/100'			$ 40.30
300 LED 4/100'	(> 280 – 370 W)	-	$ 37.05
400 LED	(> 370 – 460 W)	-	$ 33.48
500 LED	(> 460 – 550 W)	-	$ 35.71
600 LED	(> 550 – 640 W)	-	$ 37.48

Applicability:

The Area and Roadway rate is available throughout the Province of Manitoba and applies to area and roadway lighting installed by agreement for public authorities.

Response to PUB Directive 13 of Order 59/18

Manitoba Hydro file with the next GRA details of its actual Operating & Administrative expenditures dating back 10 years through to the date of the filing, along with forecast Operative & Administrative expenditures by cost element and business unit, including the details of the Utility's pension liability related to the reduced staffing levels. The actual Operating & Administrative expenditures are to include the compound annual growth both before and after accounting changes.

Figure 1 provides the O&A expenditures by cost element for 2012/13 to 2021/22 actuals, 2022/23 Forecast and 2023/24 to 2024/25 Preliminary Budget, along with compounded annual growth rates.

Figure 2 provides the O&A expenditures by business unit for 2012/13 to 2021/22 actuals, 2022/23 Forecast and 2023/24 to 2024/25 Preliminary Budget, along with compounded annual growth rates.

Manitoba Hydro was previously tracking International Financial Reporting Standards (IFRS) accounting changes to ensure the impacts of IFRS were understood and accounted for correctly before and when the transition was taking place. Since the implementation of IFRS in 2015/16, Manitoba Hydro has not been tracking the impacts of the accounting changes, the corporation is fully compliant with IFRS and is obtaining clean audit reports from its auditors. Manitoba Hydro is therefore unable to provide O&A before and after accounting changes and attempting to create this comparison would be very challenging.

Further to the PUB's request for details of the Utility's pension liability related to the reduced staffing levels, Manitoba Hydro can advise that there have been no updates to the pension information that was filed as part of the 2019/20 Electric Rate Application (filed as "Section 2.4.7 Impacts of VDP on Pension" of the Electric Rate Application). Manitoba Hydro is no longer tracking the impacts of the VDP on the pension liability as this is not part of Manitoba Hydro's standard actuarial valuation process.

Figure 1 Operating and Administrative Costs by Cost Element

MANITOBA HYDRO
OPERATING AND ADMINISTRATIVE COSTS BY COST ELEMENT

(C$000s unless otherwise stated)	2012/13 Actual	2013/14 Actual	2014/15 Actual	2015/16 Actual	2016/17 Actual	2017/18 Actual	2018/19 Actual	2019/20 Actual	2020/21 Actual	2021/22 Actual	Compound Annual Growth 2012/13-2021/22	2022/23 Forecast	2023/24 Preliminary Budget	2024/25 Preliminary Budget	Compound Annual Growth 2021/22-2024/25
Employee Related Expenditures															
Wages & salaries	$ 466 165	$ 480 511	$ 493 346	$ 506 811	$ 517 311	$ 493 691	$ 456 796	$ 458 039	$ 440 808	$ 448 464	-0.4%	$ 458 803	$ 482 838	$ 505 009	4.00%
Overtime	61 031	62 365	69 541	67 982	72 256	75 095	68 395	75 516	58 423	63 139	0.4%	62 639	64 480	66 256	1.60%
Employee benefits	130 886	157 143	166 854	159 363	165 924	156 884	140 888	123 853	176 121	154 625	1.9%	152 528	158 807	165 998	2.40%
Employee Training & Safety	4 463	4 596	5 041	5 177	4 181	3 629	3 658	3 479	3 011	3 720	-2.0%	4 887	6 128	6 597	21.00%
Travel Expenses	31 194	31 915	29 625	28 732	28 854	26 058	25 452	24 982	18 880	20 227	-4.7%	25 768	28 625	30 393	14.50%
Motor Vehicles	29 516	29 670	30 452	28 220	30 133	30 096	31 843	34 471	30 104	31 791	0.8%	34 676	39 984	40 534	8.40%
Office Expenses	8 335	9 207	7 950	8 703	8 776	8 450	8 598	7 924	6 502	6 487	-2.7%	7 366	7 851	7 842	6.50%
Other	73 508	75 388	73 067	70 832	71 943	68 233	69 550	70 855	58 498	62 225	-1.8%	72 699	82 588	85 366	11.10%
Total Employee Related Expenditures	731 590	775 407	802 809	804 988	827 435	793 904	735 630	728 263	733 850	728 453	0.0%	746 668	788 713	822 630	4.10%
Less: Capitalized Labor & Overhead	(304 638)	(340 459)	(313 931)	(322 144)	(345 763)	(336 400)	(289 495)	(286 851)	(267 522)	(239 491)	-2.6%	(247 909)	(256 238)	(266 683)	3.60%
Operational Employee Related Expenditures	426 952	434 948	488 877	482 844	481 672	457 504	446 134	441 411	466 328	488 962	1.5%	498 759	532 475	555 947	4.40%
External services and materials	114 274	123 412	126 850	127 711	126 024	122 843	130 338	135 132	132 421	158 598	3.7%	171 968	211 162	221 014	11.70%
Donations, sponsorships & grants	4 349	3 646	2 804	2 592	2 134	2 434	2 000	2 069	1 062	1 292	-12.6%	1 756	1 712	1 712	9.80%
Uncollectible accounts	4 261	3 125	4 890	5 748	4 266	12 375	3 496	6 291	7 473	14 758	14.8%	9 170	9 170	9 170	-14.70%
Other	749	205	452	6 230	2 821	1 200	2 658	(375)	662	3 602	19.1%	(713)	(1 192)	(508)	-152.00%
Cost recoveries	(23 897)	(17 808)	(15 115)	(15 789)	(15 706)	(16 387)	(15 244)	(14 605)	(12 218)	(18 044)	-3.1%	(21 939)	(19 026)	(19 335)	2.30%
O&A charged to gas operations	(63 735)	(66 810)	(70 355)	(66 607)	(65 384)	(63 113)	(61 420)	(57 961)	(61 815)	(70 441)	1.1%	(70 000)	(77 100)	(80 600)	4.60%
Operating & Administrative Expenses	**$ 462 952**	**$ 480 717**	**$ 538 404**	**$ 542 729**	**$ 535 826**	**$ 516 855**	**$ 507 961**	**$ 511 961**	**$ 533 913**	**$ 578 728**	2.50%	**$ 589 000**	**$ 657 200**	**$ 687 400**	5.90%
$ Increase		$ 17 765	$ 57 686	$ 4 326	$ (6 904)	$ (18 970)	$ (8 894)	$ 4 000	$ 21 952	$ 44 815		$ 10 272	$ 68 200	$ 30 200	
% Increase		3.8%	12.0%	0.8%	-1.3%	-3.5%	-1.7%	0.8%	4.3%	8.4%		1.8%	11.6%	4.6%	

Figure 2 Operating and Administrative Costs by Business Unit

MANITOBA HYDRO
OPERATING AND ADMINISTRATIVE COSTS BY BUSINESS UNIT

(C$000s unless otherwise stated)	2012/13 Actual	2013/14 Actual	2014/15 Actual	2015/16 Actual	2016/17 Actual	2017/18 Actual	2018/19 Actual	2019/20 Actual	2020/21 Actual	2021/22 Actual	Compound Annual Growth 2012/13-2021/22	2022/23 Forecast	2023/24 Preliminary Budget	2024/25 Preliminary Budget	Compound Annual Growth 2021/22-2024/25
President & CEO	$ 6 835	$ 5 515	$ 5 865	$ 4 664	$ 3 946	$ 3 394	$ 3 227	$ 3 128	$ 3 315	$ 3 539	-7.10%	$ 5 297	$ 5 581	$ 5 639	16.80%
Customer Solutions & Experience	53 515	56 733	58 327	59 769	57 471	60 853	47 636	50 717	46 935	54 787	0.30%	53 650	$ 55 517	56 326	0.90%
Asset Planning & Delivery	171 714	184 714	194 521	206 756	221 784	223 187	203 942	199 700	172 526	167 470	-0.30%	179 123	$ 186 258	195 055	5.20%
Operations	325 475	322 566	330 560	327 087	327 400	311 855	308 738	319 047	299 100	328 830	0.10%	343 659	$ 363 195	377 488	4.70%
Digital & Technology	38 564	39 466	41 048	41 763	41 518	40 876	39 166	42 057	42 213	54 962	4.00%	52 273	$ 81 440	87 830	16.90%
HR & Safety, Health and Environment	13 445	18 234	16 999	18 358	18 621	18 054	16 771	17 736	16 496	18 728	3.80%	19 269	$ 22 042	24 459	9.30%
Chief Financial Officer	58 382	59 143	60 641	62 780	62 723	57 837	53 165	54 250	52 090	55 902	-0.50%	60 215	$ 63 593	66 032	5.70%
External & Indigenous Relations and Comm	15 565	18 670	17 904	17 895	17 027	16 468	16 288	16 557	14 367	15 676	0.10%	20 015	$ 20 807	21 481	11.10%
Subtotal	**683 494**	**705 043**	**725 865**	**739 072**	**750 490**	**732 523**	**688 933**	**703 192**	**647 042**	**699 894**	0.30%	**733 501**	**798 433**	**834 310**	6.00%
Employee Benefits	130 886	157 143	166 854	159 363	165 924	156 884	140 888	123 853	176 121	154 625	1.90%	152 528	$ 158 807	165 998	2.40%
Motor Vehicles	29 516	29 670	30 452	28 220	30 136	30 096	31 843	34 471	30 104	31 791	0.80%	34 676	$ 39 984	40 534	8.40%
Capitalized Labour and Overhead	(304 638)	(340 462)	(313 931)	(322 144)	(345 763)	(336 397)	(289 495)	(286 851)	(267 522)	(239 491)	-2.60%	(247 909)	$ (256 238)	(266 683)	3.60%
Corporate Accruals & Adjustments	(12 572)	(3 867)	(481)	4 825	423	(3 138)	(2 787)	(4 741)	9 983	2 350	-183.00%	(13 796)	$ (6 686)	(6 159)	-237.90%
Operating & Administration Charged to Gas Operations	(63 735)	(66 810)	(70 355)	(66 607)	(65 384)	(63 112)	(61 420)	(57 961)	(61 815)	(70 441)	1.10%	(70 000)	$ (77 100)	(80 600)	4.60%
O&A Costs Attributable to Electric Operations	**$ 462 952**	**$ 480 717**	**$ 538 404**	**$ 542 729**	**$ 535 826**	**$ 516 855**	**$ 507 961**	**$ 511 961**	**$ 533 913**	**$ 578 728**	2.50%	**$ 589 000**	**$ 657 200**	**$ 687 400**	5.90%
$ Increase		$ 17 765	$ 57 687	$ 4 326	$ (6 904)	$ (18 971)	$ (8 893)	$ 4 000	$ 21 952	$ 44 815		$ 10 272	$ 68 200	$ 30 200	
% Increase		3.8%	12.0%	0.8%	-1.3%	-3.5%	-1.7%	0.8%	4.3%	8.4%		1.8%	11.6%	4.6%	

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Prior references

Capital Expenditures

For all completed capital projects in excess of $10 million since 2018, a table showing the actual project costs and final pre-construction budgets.

Please see Figure 1 below for a table showing the actual project costs and final pre-construction budgets for all completed capital projects in excess of $10 million since 2018.

Figure 1. Completed Capital Projects in Excess of $10 million since 2018

Project *$ in millions*	Final Project Costs	Final Pre-Construction Budgets
Rural District Office A Renovation	17	10
Gillam Recreation Center Refurbishment	38	38
Enterprise Asset Management - Phase 2	34	17
Grand Rapids Unit Transformers Replacement	23	19
Pine Falls GS Units 1-4 Major Overhauls	86	33
Great Falls Unit 4 Overhaul	53	20
McArthur Falls/Pine Falls Breaker Replacement Program	15	11
Pointe du Bois Units 1-15 Major Overhaul	22	133
Kettle Transformers Replacements	45	36
Slave Falls Seven Bay Sluiceway	18	19
Slave Falls Creek Spillway Rehabilitation	16	26
Selkirk Generating Station Environmental Enhancements	15	14
Water Licenses & Renewals	86	41
Generation & Wholesale Remote Control & Monitoring	12	4
Generation North Physical Security Upgrades	11	10
Gillam Housing Retrofit Program	10	11
Gillam Redevelopment & Expansion Program Phase 1A	24	26
Generation South Physical Security Upgrade	12	15
Gillam Apartment Rehabilitation	12	6
Gillam 2017 Municipal Road Upgrade	10	10
Gillam Trailer Court Sewer Linear Infrastructure	11	11
Transmission Line Re-Rating Upgrades	30	24
BiPole I&II Spacer Damper Replacement	30	31
Southern Air Conditioning System Breaker Replacements	13	15
Virden West & Reston 66kV Capacitors	10	11
Stanley Station 2nd Bank & S60L Sectionalization	14	16
Winnipeg - Brandon Transmission System Improvements	14	43
Lake Winnipeg East System Improvements	83	65
HVDC System Transformer & Reactor Fire Prevention	10	10
HVDC Circuit Breaker Operating Mechanisms Replacement	13	9
Mobile Radio System Modernization	25	31
Heaslip Distribution Supply Centre and 8-25kV Conversion	13	13
Madison Station - 115/24kV	82	66
Harrow Station Bank Addition	10	25
Mohawk Station Bank Addition	15	20
McPhillips Station - 115kV/24kV	33	47
St. Vital Station - 115/24kV	39	51
York Station-Bank 1,3,5 & Switchgear Addition	11	11
Adelaide Station - 66/12kV	67	62
Rover 4kV Interchange Station and Conversion	12	13
Martin Station-New 66-4/12kV Station	34	28
Advanced Information Management	11	11
Winnipeg North West Phase 2	26	31
Kettle Units 1-4 Stator Replacement	106	104
Bipole III - Transmission Line	1 733	1 655
Bipole III - Converter Stations	2 586	2 675
Bipole III - Collector Lines	221	260
Bipole III - Community Development Initiative	56	62
Pointe du Bois Spillway Replacement	567	818
Kelsey Re-runnering	321	184