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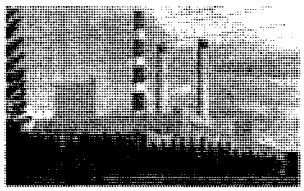
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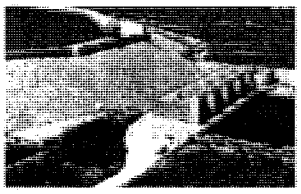
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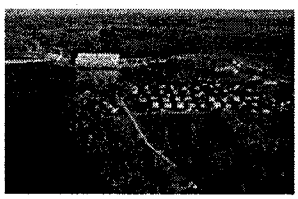
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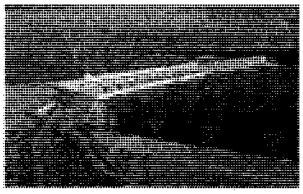
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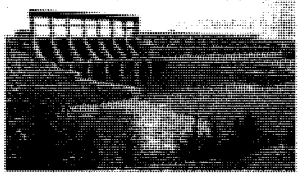
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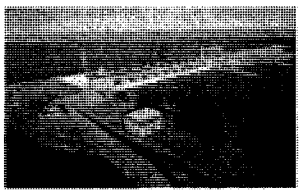
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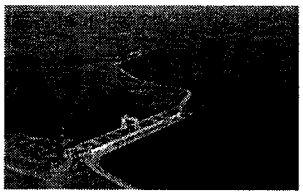
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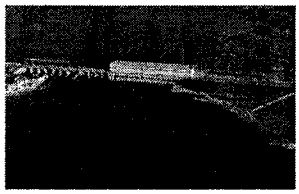
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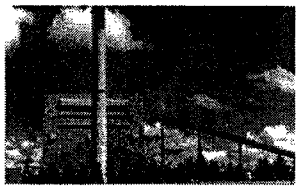
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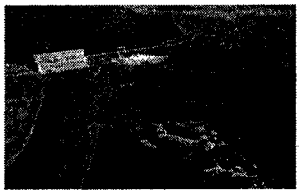
Seven Sisters

SYSTEM LOAD FORECAST
2002/03 TO 2022/23

MARKET FORECAST
MAY, 2002

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Table 1

MANITOBA HYDRO NET SYSTEM LOAD FORECAST
2001/02 - 2022/23

Fiscal Year	Net Firm Energy (GW.h)	%	Net Total Peak (MW)	%	Load Factor %
2001/02 Actual	20525	2.2%	3760	1.5%	62.3%
Weather	213		9		
2001/02 Adjusted	20738	4.0%	3769	4.6%	62.8%
2002/03	21260	2.5%	3794	0.7%	64.0%
2003/04	21504	1.1%	3828	0.9%	64.1%
2004/05	21708	0.9%	3850	0.6%	64.4%
2005/06	21975	1.2%	3882	0.8%	64.6%
2006/07	22251	1.3%	3914	0.8%	64.9%
2007/08	22515	1.2%	3945	0.8%	65.2%
2008/09	22774	1.2%	3975	0.8%	65.4%
2009/10	23031	1.1%	4005	0.8%	65.6%
2010/11	23322	1.3%	4041	0.9%	65.9%
2011/12	23630	1.3%	4080	1.0%	66.1%
10 Year Avg.		1.3%		0.8%	
2012/13	23928	1.3%	4126	1.1%	66.2%
2013/14	24215	1.2%	4170	1.1%	66.3%
2014/15	24464	1.0%	4210	1.0%	66.3%
2015/16	24705	1.0%	4248	0.9%	66.4%
2016/17	24985	1.1%	4293	1.1%	66.4%
2017/18	25255	1.1%	4336	1.0%	66.5%
2018/19	25517	1.0%	4378	1.0%	66.5%
2019/20	25776	1.0%	4419	0.9%	66.6%
2020/21	25949	0.7%	4446	0.6%	66.6%
2021/22	26158	0.8%	4478	0.7%	66.7%
2022/23	26381	0.9%	4513	0.8%	66.7%
21 Year Avg.		1.2%		0.9%	

- See the Glossary of Terms for a definition of Net Firm Energy and Net Total Peak.

Table 2

ENERGY SALES TO MANITOBA HYDRO CUSTOMERS
2001/02 - 2022/23 (GW.h)
(Base Forecast)

Fiscal Year	Residential	General Service	Area & Roadway Lighting	Manitoba Hydro Sales Incl Diesel		Total Diesel	Manitoba Hydro Sales Excl Diesel
2001/02 Actual	5206	10190	68	15463	1.6%	11	15452
2002/03	5361	10749	68	16178	4.6%	12	16166
2003/04	5408	10901	68	16377	1.2%	13	16364
2004/05	5450	11075	69	16595	1.3%	14	16581
2005/06	5483	11274	70	16826	1.4%	16	16810
2006/07	5515	11481	70	17067	1.4%	17	17050
2007/08	5547	11679	71	17297	1.3%	18	17279
2008/09	5579	11872	72	17522	1.3%	19	17503
2009/10	5613	12061	72	17746	1.3%	20	17726
2010/11	5648	12277	73	17997	1.4%	21	17976
2011/12	5685	12505	74	18263	1.5%	23	18240
2012/13	5723	12718	74	18515	1.4%	24	18491
2013/14	5762	12921	75	18759	1.3%	25	18734
2014/15	5803	13090	76	18968	1.1%	26	18942
2015/16	5839	13256	76	19171	1.1%	27	19144
2016/17	5876	13422	77	19375	1.1%	28	19347
2017/18	5914	13589	77	19581	1.1%	29	19552
2018/19	5953	13758	78	19788	1.1%	30	19758
2019/20	5992	13927	79	19998	1.1%	31	19967
2020/21	6032	14099	79	20210	1.1%	32	20178
2021/22	6072	14271	80	20424	1.1%	34	20390
2022/23	6113	14447	81	20641	1.1%	35	20606

Table 3

NET FIRM ENERGY
2001/02 - 2022/23 (GW.h)
(Base Forecast)

Fiscal Year	Dist. Losses	Man. Hydro Const.	MHCB	WHCB	MLCB	Trans. Losses & Stn Service	Gross Total Energy	Non Firm	Station Service	Net Firm Energy
2001/02 Actual	716	42	16210	2444	18655	2057	20711	25	162	20525
2002/03	760	43	16968	2454	19422	2045	21466	26	181	21260
2003/04	769	43	17176	2457	19633	2080	21713	26	183	21504
2004/05	779	43	17402	2459	19861	2032	21893	0	185	21708
2005/06	790	43	17643	2462	20105	2057	22162	0	187	21975
2006/07	801	43	17894	2464	20358	2082	22440	0	189	22251
2007/08	812	43	18134	2466	20599	2107	22706	0	191	22515
2008/09	823	43	18368	2467	20836	2132	22967	0	194	22774
2009/10	833	43	18601	2470	21071	2156	23227	0	196	23031
2010/11	845	43	18863	2474	21337	2183	23520	0	198	23322
2011/12	857	43	19140	2479	21619	2212	23831	0	201	23630
2012/13	869	48	19408	2484	21892	2240	24132	0	203	23928
2013/14	880	53	19667	2488	22155	2266	24421	0	206	24215
2014/15	890	58	19890	2492	22382	2290	24672	0	208	24464
2015/16	900	63	20107	2496	22603	2313	24915	0	210	24705
2016/17	909	103	20359	2500	22859	2339	25198	0	212	24985
2017/18	919	133	20603	2503	23106	2364	25470	0	215	25255
2018/19	929	153	20839	2507	23346	2388	25734	0	217	25517
2019/20	938	168	21072	2510	23583	2413	25996	0	219	25776
2020/21	948	103	21228	2513	23741	2429	26170	0	221	25949
2021/22	958	68	21416	2516	23932	2449	26381	0	222	26158
2022/23	968	43	21617	2519	24136	2470	26606	0	224	26381

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

EXECUTIVE SUMMARY

Recommendation

It is recommended that the Corporation approve this report as Manitoba Hydro's best estimate of Net Firm Energy and Net Total Peak requirements in Manitoba for the 2002/03 to 2022/23 period.

Demand Side Management in the Forecast

This forecast is based on historical billing data and therefore includes the Demand Side Management (DSM) savings achieved to date because DSM savings are inherently contained within the customers' billing records. The cumulative savings by the end of 2001/02 for all Residential, Commercial, Industrial and Street Lighting DSM programs (excluding the Curtailable Rates Program) is estimated to be 81 MW and 380 GW.h at the customers' meter. Including the reduction to T&D losses, the cumulative savings at generation are estimated to be 90 MW and 426 GW.h.

This forecast contains a reduction for future DSM savings associated with the Basic Customer Information and Service. This DSM level is the minimum amount of DSM services and activity that Manitoba Hydro will provide to customers in the future. All other DSM options are analyzed on an incremental basis to this level. Beyond 2001/02, the incremental savings associated with other DSM options are treated as supply side resources and therefore are not included in this forecast. By 2022/23, the Basic Customer Option is estimated to result in a total of 149 MW and 623 GW.h of savings at the customers' meter. These savings are expected to occur in the Residential sector (101 MW and 427 GW.h), in the General Service sector (40 MW and 166 GW.h) and in the Winnipeg Hydro service area (8 MW and 30 GW.h). Adding another 10-14% savings due to reduced T & D losses, the total savings at generation will be 170 MW and 708 GW.h by 2022/23.

Summary of Forecast Changes

Substantial revision to the format of the forecast document was undertaken last year. The new format provides more complete information. The forecast contains historical information on all sectors since 1981/82. Weather adjustments have been added to the sectors that are weather-sensitive. Sections were added for Manitoba Hydro Sales (General Consumers), Distribution Losses, Construction, Manitoba Hydro at Common Bus, Manitoba Load at Common Bus, Transmission Losses, Station Service, Net Firm Energy and Net Total Peak. The report presents results in an more organized and complete fashion.

The General Service > 10 MW category was changed and renamed Top Consumers to better reflect the type of customer represented. The General Service < 10 MW category was changed and renamed Mass Market. This change involved the removal of Isobord, Canadian Agra, Namew and Black Hawk Mining (formerly Keystone Gold) from the GS > 10 MW to the Mass Market category. Midwest Foods and McCain Foods were moved from the GS < 10 MW to the Top Consumers category. The Top Consumers category now contains all the major energy consumers in the Manitoba Hydro service area. The Mass Market contains all other Commercial and Industrial businesses.

The chart below shows the change from the previous forecast for the five, ten and twenty year intervals into the future. The changes are reported for each sector. The reasons causing the load changes are explained afterwards.

CHANGE FROM PREVIOUS FORECAST				
		Fiscal Year		
Sector		2006/07	2011/12	2021/22
Residential	GW.h	(8)	(43)	(88)
General Service	GW.h	(308)	(431)	(377)
Area & Roadway Lighting	GW.h	(2)	(2)	(4)
Distribution Losses	GW.h	2	(4)	(1)
Construction Power	GW.h	(1)	(1)	24
Winnipeg Hydro at Common Bus	GW.h	(58)	(114)	(119)
Transmission Losses	GW.h	(16)	(35)	(30)
Station Service	GW.h	(15)	(18)	(19)
Net Firm Energy	GW.h	(391)	(630)	(595)
Net Total Peak	MW	(4)	(61)	(57)

Residential - The Residential forecast was lowered as a result of fewer housing additions and lower all-electric average use. The all-electric average use was lowered to reflect revised estimates for electric space heating in new homes.

General Service - The General Service forecast was lowered to reflect lower energy consumption expectations in the primary metals and oil/petroleum sectors. The General Service Mass market econometric model was revised to include the real price of electricity and real gross domestic product (GDP). The previous model did not include real GDP.

Area and Roadway Lighting - Consumption has not changed significantly.

Distribution Losses - The distribution loss percentage was raised from 4.6% to 4.7%. This was offset by a reduction in overall sales.

Construction - Consumption has not changed significantly for the 2006/07 and 2011/12 time frames. The construction forecast increased in 2021/22 due to advancement of the in-service date for the Gull generating station.

Winnipeg Hydro at Common Bus - The Winnipeg Hydro forecast was lowered due to revisions associated with the Winnipeg Hydro econometric forecasting model. The model was revised to include the real price of electricity and population. The previous model did not include population.

Transmission Losses - The transmission loss percentage was raised from 9.2% to 9.3%, but lower Residential and General Service sales caused the transmission losses to decline slightly.

Station Service - The station service percentage was lowered from 1.0% to 0.9%.

Net Firm Energy - All of the sectors listed before this category will influence Net Firm Energy. The decrease is mainly due to lower expected loads in the Residential, General Service, Winnipeg Hydro, Station Service and Transmission Losses classifications.

Net Total Peak - The Net Total Peak decreased as a result of lower growth levels for Net Firm Energy. The peak does not change much by 2006/07 because the initial starting point is much higher, reflecting the significant peak load growth experienced in 2001/02. This growth is reflected in the parameters of the Hourly Load Model.

Table 4

NET FIRM ENERGY AND NET TOTAL PEAK
CHANGE FROM PREVIOUS FORECAST

	NET FIRM ENERGY			NET TOTAL PEAK		
Fiscal Year	Forecast Prepared May 2002 (GW.h)	Forecast Prepared May 2001 (GW.h)	Difference (GW.h)	Forecast Prepared May 2002 (MW)	Forecast Prepared May 2001 (MW)	Difference (MW)
2002/03	21260	21117	143	3794	3727	67
2003/04	21504	21618	-114	3828	3797	31
2004/05	21708	21968	-260	3850	3836	14
2005/06	21975	22310	-335	3882	3878	4
2006/07	22251	22642	-391	3914	3918	-4
2007/08	22515	22935	-420	3945	3955	-10
2008/09	22774	23245	-471	3975	3995	-20
2009/10	23031	23576	-545	4005	4039	-34
2010/11	23322	23924	-602	4041	4087	-46
2011/12	23630	24260	-630	4080	4141	-61
2012/13	23928	24575	-647	4126	4192	-66
2013/14	24215	24875	-660	4170	4240	-70
2014/15	24464	25158	-694	4210	4286	-76
2015/16	24705	25420	-715	4248	4327	-79
2016/17	24985	25679	-694	4293	4368	-75
2017/18	25255	25948	-693	4336	4411	-75
2018/19	25517	26173	-656	4378	4446	-68
2019/20	25776	26389	-613	4419	4480	-61
2020/21	25949	26564	-615	4446	4506	-60
2021/22	26158	26753	-595	4478	4535	-57

* See the Glossary of Terms for a definition of Net Firm Energy and Net Total Peak.

METHODOLOGY

The Base Forecast, Medium-Low and Medium-High scenarios were prepared to analyze the sensitivity towards changes in economic and demographic assumptions. These forecasts were prepared using a combination of forecasting techniques. Detailed explanations of the forecast models are contained in the Residential, General Service, Winnipeg Hydro and Net Total Peak sections of this report. A brief summary of the methods used is described below:

Residential - Econometric and end-use analysis were performed and equations were developed to explain the relationship of Residential electricity consumption to various economic and demographic factors. The Residential Forecast is calculated using a detailed multi-step, end-use approach. Econometrics are used to forecast the total number of Residential customers and to separate the customers into Standard (non-electric primary space heat) and All-Electric (electric primary space heat) categories. The 1998 Residential Survey provided an update for appliance saturation rates. This information was combined with previous survey results to prepare a forecast of future appliance saturation rates. Conditional Demand Analysis was performed on the appliance survey data to update unit energy consumption (UEC) for each appliance type. Energy Management staff provided estimates for appliance lifetimes and for future unit energy consumption of each major appliance. The information is used to calculate an energy forecast for each end-use.

General Service - The energy use requirements of our Top Consumers were reviewed individually. Regression equations were developed to predict the electricity consumption for the Mass Market of all other General Service customers. Estimates of the load reduction associated with Commercial lighting standards were then deducted from the regression output. The total General Service load was then broken down into nine Industrial and fourteen Commercial sub-groups, as defined by their business function (ie. Primary Metals, Pulp/Paper, School, Hospital, etc). The forecast has been modified to reflect any major customers' plans as well as applications for service from new customers.

Area and Roadway Lighting - Trends in the historical average use and number of customers were derived and extrapolated for the sentinel and street lighting classifications.

Winnipeg Hydro - Regression analysis was used to estimate the future energy demand for Winnipeg Hydro. Estimates of load reductions due to Commercial lighting standards were deducted.

Net Total Peak - Annual energy is distributed to all 8 760 hours of the year using the base load, heating slope and cooling slope as calculated by the Hourly Load Model.

ASSUMPTIONS

Forecast assumptions for energy prices, real economic growth, population and housing are taken from the 2002 Economic Outlook and the 2002 Energy Price Outlook. The following is a general overview of the System Load Forecast assumptions:

Electricity - The electricity price forecast is based on CPI and rate increase projections contained in the Integrated Financial Forecast. After ten years the CPI is forecast to increase 2.0% per year and the electricity price increases are assumed to be 1.0% per year. The real price of electricity is forecast to decrease 17% throughout the forecast period..

Natural Gas - The real price of natural gas is expected to drop 20% over the next three years of the forecast. In the short term, customers whose furnaces and water tanks expire, will consider the lower capital cost and price stability associated with the electric option. In the longer term, natural gas prices are expected to return to more normal levels and continue to dominate the space heating market. By 2021/22, electric space heat is expected to reach a market saturation of 38.0%, which is only 0.2% higher than last year's forecast.

Oil - This forecast assumes that new customers in no-gas available areas will choose to install an electric heating system rather than an oil heating system. The real price of oil is expected to decrease in 2002/03 and then remain relatively constant throughout the forecast period. In 2001/02, electricity had a 63% price advantage over oil and is expected to maintain a significant price advantage throughout the forecast period.

Economic Activity - The forecast for real economic growth in Manitoba is 1.8% in 2002/03, 2.7% in 2003/04, decreasing slightly each year until stabilizing at 1.6% per year by 2013/14. The real economic growth rate averages 1.8% throughout the forecast period.

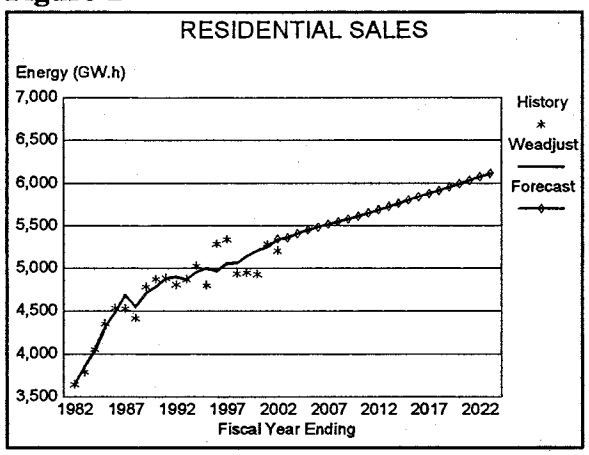
Population - The population of Manitoba is forecast to increase by 3 130 per year, compared to a historical average increase of 4 050 per year over the last ten years.

Housing - The number of homes in the Manitoba Hydro service area is forecast to increase 2 018 per year, compared to a historical average of 2 757 homes per year over the last decade.

RESIDENTIAL

The Residential sector represents 33.7% of all sales within the Manitoba Hydro service area. It includes electricity sales to individually-metered Residential and Farm customers for non-business operations. The Residential sector is comprised of four forecast groups - Basic, Seasonal, Water Heating and Diesel. The last three groups represent only 1.3% of all Residential sales. These groups are forecasted separately because they have unique rates, distinct usage patterns or different billing periods. The adjacent graph shows that the load grew rapidly in the 80's due to conversions of oil to electric space heating systems.

Figure 1



The Residential sector is forecast to increase from a weather-adjusted base of 5 343 GW.h in 2001/02 to 6 113 GW.h by 2022/23. This represents an average growth of 37 GW.h per year, which is slightly lower than the ten year annual growth rate of 44 GW.h. The decrease in annual growth is primarily due to a lower number of forecasted housing starts and lower space heating requirements for new all-electric homes.

RESIDENTIAL
HISTORICAL/WEATHER ADJUSTMENT/FORECAST

Fiscal Year	Sales	Adjustment	Adjusted Sales	Fiscal Year	Forecast Sales
1981/82	3644	-1	3643	2002/03	5361
1982/83	3788	66	3854	2003/04	5408
1983/84	4055	-16	4039	2004/05	5450
1984/85	4355	-43	4312	2005/06	5483
1985/86	4535	-51	4484	2006/07	5515
1986/87	4527	158	4685	2007/08	5547
1987/88	4416	136	4552	2008/09	5579
1988/89	4785	-77	4708	2009/10	5613
1989/90	4873	-86	4787	2010/11	5648
1990/91	4882	-1	4881	2011/12	5685
1991/92	4807	94	4901	2012/13	5723
1992/93	4868	-2	4866	2013/14	5762
1993/94	5027	-73	4954	2014/15	5803
1994/95	4800	198	4998	2015/16	5839
1995/96	5288	-321	4967	2016/17	5876
1996/97	5340	-283	5057	2017/18	5914
1997/98	4937	126	5063	2018/19	5953
1998/99	4947	196	5143	2019/20	5992
1999/00	4928	281	5209	2020/21	6032
2000/01	5282	-33	5249	2021/22	6072
2001/02	5206	137	5343	2022/23	6113

RESIDENTIAL BASIC METHODOLOGY

The Basic category represents 98.7% of the total Residential sales. This category is separated in two distinct groups - Basic Standard and Basic All-Electric. The Standard classification includes all Residential customers that are incapable of heating the premises with electricity. The All-Electric classification includes all Residential customers that are capable of heating the premises with electricity. This distinction is very important because the average Standard customer uses around 10,000 kW.h per year and the average All-electric customer uses around 25,000 kW.h per year. Electric space heating is the dominant end-use in the Residential sector, representing approximately 36% of all Residential consumption.

Residential Basic Customer Forecast - Economic Analysis prepares a Residential customer growth forecast. The Residential Basic category is forecast to increase 2 018 customers per year compared to the ten year annual of 2 757 customers. The number of housing starts is expected to be lower due to lower population growth rates and an aging population.

Standard and All-Electric customer data (1989-2001) is collected from the Customer Information Data Base (CIDB) by combination of town and zone. There are 654 town and zone combinations in Manitoba. The Residential Basic Customer Forecast is then allocated into these areas based on historical growth patterns. The area of the province in which a new home is built is a determining factor as to whether the house will use electric space heat. Homes built in natural gas available areas tend to use natural gas space as their space heating fuel; whereas homes built in areas where natural gas is not available tend to use electricity as their primary space heating fuel. This information is input to the Market Share Model.

Market Share Model -This model predicts the proportion of customers that will install electric heat in each of the forecast areas. This proportion is called the market share of electricity (MSE). It is calculated by dividing the number of All-Electric Basic customers by the number of total (Standard and All-Electric) Basic customers. This model employs an econometric equation that predicts the future MSE in each area based on the previous market share and the relative prices of oil and natural gas compared to electricity. Our analysis incorporates a dynamic logit model which assumes that the market shares will grow in the shape of an "S" or saturation curve. Our model produces the following results (with t statistics shown above):

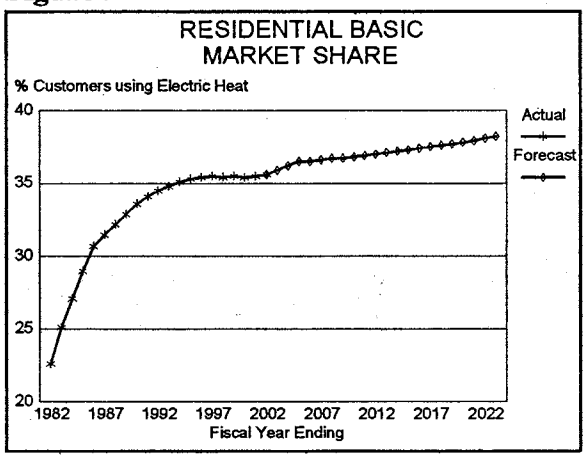
$$\underset{}{LOGIT} = \underset{(149.9)}{(.931 \times LOGIT1)} + \underset{(10.0)}{(.080 \times Price)} + \underset{(-2.7)}{(-.126 \times MHSK)} - \underset{(-4.5)}{.05001}$$

$$R^2 = 98.2\% \qquad DF = 7691$$

LOGIT - Logit of the market share of electricity (MSE)
LOGIT1 - Logit of the market share of electricity for the previous year
MHSK - Percentage of new additions to total housing stock
Price - Relative price of natural gas compared to electricity if natural gas is available or Relative price of oil compared to electricity if natural gas is not available

The adjacent graph shows that the MSE grew rapidly in the 1980's due to the Canadian Oil Substitution Program (COSP), the instability of oil and natural gas prices, the perception of fossil fuel shortages and the expectation of high price increases. The saturation of electric space heating is expected to increase due to the relatively high natural gas prices, taper off as natural gas prices decrease, returning to more normal historic levels. In the last fifteen years of the forecast, the MSE increases marginally as real fuel prices stabilize.

Figure 2



The Market Share Model is used to separate the Residential Basic Customer Forecast into Standard and All-Electric customer groups. All-Electric customers are calculated by multiplying the number of customers by the MSE. Standard customers are calculated by multiplying by (1-MSE).

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

a) Appliance Saturations - Historical appliance saturation data was collected from previous Manitoba Hydro Residential Surveys. Appliance saturations were forecast using a combination of historical appliance saturation information and professional judgement.

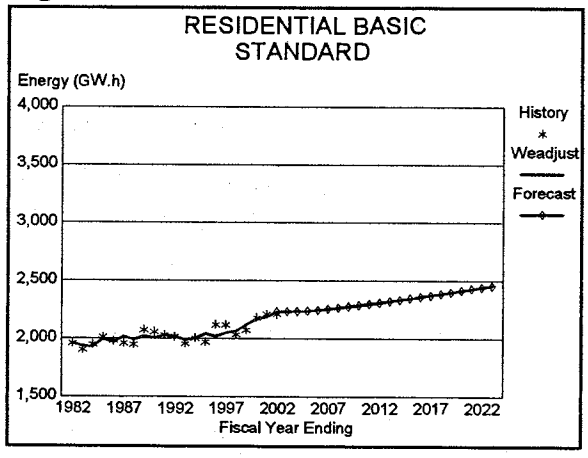
b) Appliance Usage - The current estimates of appliance usage or unit energy consumption (UEC) were calculated using 1998 Residential Survey information and Conditional Demand Analysis techniques. The survey results were screened for consumption records and survey completeness. Missing values for the size of home, people per household and income questions were imputed. Degree days heating/cooling and demographic factors such as income, people per household and size of household were added to help explain usage variations. The forecast specifies over thirty end-uses, including details of space heating by building type.

c) Efficiency Improvements - New appliances are much more efficient than existing appliance stock. The average use per appliance will decline due to the amount of efficiency improvement and the rate that older, inefficient stock is replaced. The future consumption levels of each end-use were analyzed and forecasted independently based on literature, contact with other utilities and professional judgment. Some end-uses such as fridges and freezers were forecasted to become significantly more efficient. The number of replacement appliances were calculated using a modified Weibull distribution with estimated appliance lifetimes.

The Residential Basic End Use Forecast is divided into Basic Standard and Basic All-Electric groups. The electric space heating end-uses are added to the All-Electric classification. The other end-uses are proportioned into the Standard and All-Electric classifications, resulting in the following forecasts:

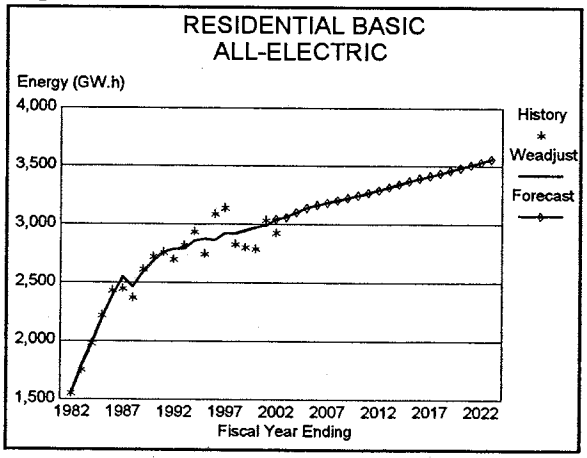
The Residential Basic Standard energy use remained quite constant during the 80's because many rural oil heated customers switched to electric space heat. The effect of appliance efficiency standards limited load growth in the early 90's. This sector has grown in the last five years. The forecast contains limited growth in the next few years as customers react to relatively high natural gas prices. The forecast assumes that most new homes will install electric water heaters.

Figure 3



The Residential Basic All-Electric energy grew rapidly in the 1980's as rural customers switched from oil to electric space heating. This sector continued to grow because most new homes in rural areas installed electric water and space heat. Many of the new, all-electric homes are being built in First Nations communities that do not have access to natural gas. This category will continue to grow due to new housing construction in rural areas.

Figure 4



RESIDENTIAL - OTHER

This category includes the four Residential groups that represent only 1.3% of all Residential sales. These groups are forecasted separately because they have unique rates, distinct usage patterns or different billing periods. These groups have a very minor effect on the overall load forecast and are not discussed in detail in this report. These groups are forecasted using trend analysis and extrapolation techniques.

Seasonal

There were 13 171 Residential Seasonal Standard customers by the end of the 2001/02 fiscal year. The number of customers is expected to decrease 100 per year throughout the forecast period. Average use was 1 961 kW.h per customer in 2001/02 and is forecast to be 2 000 kW.h per customer in 2002/03 and grow 50 kW.h per year. There were 7 059 Residential Seasonal All-Electric customers by the end of the 2001/02 fiscal year. The number of customers is expected to increase 50 per year throughout the forecast period. Average use was 3 282 kW.h per customer in 2001/02 and is forecast to be 3 300 kW.h per customer in 2002/03 and grow 100 kW.h per year.

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 1 408 remaining customers in 2001/02. The ten year trend is an annual decrease of 7.5% in the number of customers. The number of customers is expected to decrease 6% per year throughout the forecast period. Average use was 10 334 kW.h per customer in 2001/02 and is forecasted to be 10 300 kW.h per customer.

Diesel

This group includes the remaining diesel sites in Manitoba - Brochet, Lac Brochet, Tadoule Lake and Shamattawa. These sites consumed 6 GW.h in 2001/02. Consumption is expected to increase to 17 GW.h by 2022/23. Consumption at these sites is expected to grow because the service limitations have been upgraded from 15 amps to 60 amps.

Table 5

TOTAL RESIDENTIAL SALES

Fiscal Year	Basic GW.h	Diesel GW.h	Seasonal GW.h	FRWH GW.h	Total Residential GW.h	%
1990/91	4787	11	51	34	4882	0.2%
1991/92	4714	11	51	31	4807	-1.5%
1992/93	4777	12	52	27	4868	1.3%
1993/94	4938	13	51	25	5027	3.3%
1994/95	4717	13	47	23	4800	-4.5%
1995/96	5205	15	48	21	5288	10.2%
1996/97	5256	16	48	20	5340	1.0%
1997/98	4859	13	46	19	4937	-7.5%
1998/99	4874	11	44	18	4947	0.2%
1999/00	4861	5	46	16	4928	-0.4%
2000/01	5212	5	49	15	5282	7.2%
2001/02	5136	6	49	15	5206	-1.4%
2002/03	5292	6	49	14	5361	3.0%
2003/04	5337	7	51	13	5408	0.9%
2004/05	5379	7	52	12	5450	0.8%
2005/06	5410	8	53	11	5483	0.6%
2006/07	5441	9	55	11	5515	0.6%
2007/08	5472	9	56	10	5547	0.6%
2008/09	5502	10	57	9	5579	0.6%
2009/10	5535	10	59	9	5613	0.6%
2010/11	5569	11	60	8	5648	0.6%
2011/12	5604	11	61	8	5685	0.7%
2012/13	5641	12	63	7	5723	0.7%
2013/14	5679	12	64	7	5762	0.7%
2014/15	5718	13	65	6	5803	0.7%
2015/16	5753	13	67	6	5839	0.6%
2016/17	5788	14	68	6	5876	0.6%
2017/18	5825	14	69	5	5914	0.6%
2018/19	5862	15	71	5	5953	0.7%
2019/20	5900	15	72	5	5992	0.7%
2020/21	5938	16	73	4	6032	0.7%
2021/22	5977	16	75	4	6072	0.7%
2022/23	6016	17	76	4	6113	0.7%

Table 6

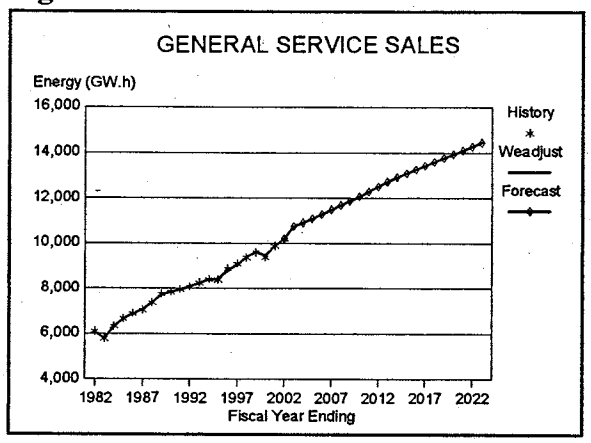
RESIDENTIAL BASIC SALES

Fiscal Year	Basic Standard			Basic All-Electric			Total Basic			
	Mtrs.	GW.h	Avg.	Mtrs.	GW.h	Avg.	Mtrs.	GW.h	Avg.	MSE
1990/91	201097	2030	10095	103898	2757	26536	304995	4787	15695	34.07%
1991/92	201121	2015	10019	105935	2699	25478	307056	4714	15352	34.50%
1992/93	201757	1956	9695	107697	2821	26194	309454	4777	15437	34.80%
1993/94	202875	2001	9863	109528	2937	26815	312403	4938	15807	35.06%
1994/95	204002	1971	9662	111130	2746	24710	315132	4717	14968	35.26%
1995/96	204911	2118	10336	112479	3087	27445	317390	5205	16399	35.44%
1996/97	206511	2115	10242	113604	3141	27649	320115	5256	16419	35.49%
1997/98	209289	2032	9709	114456	2827	24699	323745	4859	15009	35.35%
1998/99	210521	2073	9847	115854	2801	24177	326375	4874	14934	35.50%
1999/00	213230	2073	9722	116903	2788	23849	330133	4861	14724	35.41%
2000/01	214571	2178	10150	117937	3035	25734	332508	5213	15678	35.47%
2001/02	215434	2207	10244	119316	2929	24548	334750	5136	15343	35.64%
2002/03	216105	2232	10328	120781	3060	25335	336886	5292	15709	35.85%
2003/04	216357	2234	10326	122616	3104	25315	338973	5338	15748	36.17%
2004/05	216676	2236	10320	124303	3143	25285	340979	5379	15775	36.45%
2005/06	217666	2245	10314	125337	3165	25252	343003	5410	15772	36.54%
2006/07	218703	2255	10311	126332	3186	25219	345035	5441	15769	36.61%
2007/08	219742	2265	10308	127304	3206	25184	347046	5471	15764	36.68%
2008/09	220787	2276	10309	128252	3226	25154	349039	5502	15763	36.74%
2009/10	221781	2287	10312	129244	3248	25131	351025	5535	15768	36.82%
2010/11	222739	2298	10317	130286	3271	25106	353025	5569	15775	36.91%
2011/12	223679	2309	10323	131369	3295	25082	355048	5604	15784	37.00%
2012/13	224637	2321	10332	132454	3320	25065	357091	5641	15797	37.09%
2013/14	225585	2333	10342	133562	3346	25052	359147	5679	15812	37.19%
2014/15	226520	2346	10357	134682	3372	25037	361202	5718	15830	37.29%
2015/16	227437	2359	10372	135802	3394	24992	363239	5753	15838	37.39%
2016/17	228322	2372	10389	136933	3416	24947	365255	5788	15846	37.49%
2017/18	229182	2386	10411	138067	3438	24901	367249	5824	15858	37.59%
2018/19	230010	2400	10434	139214	3462	24868	369224	5862	15877	37.70%
2019/20	230808	2414	10459	140367	3486	24835	371175	5900	15895	37.82%
2020/21	231561	2428	10485	141533	3510	24800	373094	5938	15916	37.93%
2021/22	232254	2442	10514	142716	3535	24769	374970	5977	15940	38.06%
2022/23	232883	2455	10542	143915	3561	24744	376798	6016	15966	38.19%

GENERAL SERVICE

The General Service sector represents 65.9% of all sales within the Manitoba Hydro service area. It includes sales to all Commercial and Industrial businesses within Manitoba, except businesses in the Winnipeg Hydro jurisdiction. This sector consists of six forecast groups - Top Consumers, Mass Market, Seasonal, Water Heating, Diesel and Surplus Energy Program (SEP). The last four groups represent only 0.4% of all General Service sales. The adjacent graph shows that the load grew, except during the 1982/83 recession and a minor downturn in 1999/00.

Figure 5



The General Service sector is forecast to increase from a weather-adjusted base of 10 205 GW.h in 2001/02 to 14 447 GW.h by 2022/23. This represents an average growth of 202 GW.h per year, which is very similar to the growth rates experienced over the last ten (212 GW.h) and twenty (206 GW.h) year periods. The increase in General Service consumption can be primarily attributed to steady economic performance and low electricity prices. The chemical, oil/petroleum and food/beverage sectors are expected to lead the way.

GENERAL SERVICE HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Sales	Adjustment	Adjusted Sales	Fiscal Year	Forecast Sales
1981/82	6097	-3	6094	2002/03	10749
1982/83	5768	11	5779	2003/04	10901
1983/84	6322	-1	6321	2004/05	11075
1984/85	6660	-4	6656	2005/06	11274
1985/86	6889	-23	6866	2006/07	11481
1986/87	7038	26	7064	2007/08	11679
1987/88	7364	18	7382	2008/09	11872
1988/89	7763	-28	7735	2009/10	12061
1989/90	7842	-10	7832	2010/11	12277
1990/91	7958	-2	7956	2011/12	12505
1991/92	8057	23	8080	2012/13	12718
1992/93	8245	-8	8237	2013/14	12921
1993/94	8406	-17	8389	2014/15	13090
1994/95	8385	36	8421	2015/16	13256
1995/96	8866	-78	8788	2016/17	13422
1996/97	9095	-60	9035	2017/18	13589
1997/98	9365	33	9398	2018/19	13758
1998/99	9591	46	9637	2019/20	13927
1999/00	9381	76	9457	2020/21	14099
2000/01	9872	-7	9865	2021/22	14271
2001/02	10190	15	10205	2022/23	14447

GENERAL SERVICE - TOP CONSUMERS METHODOLOGY

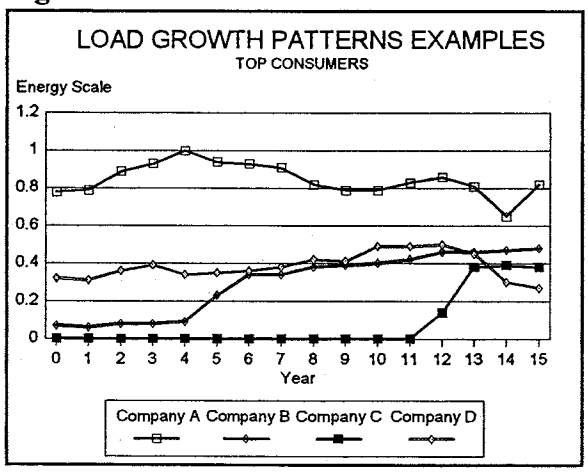
This category includes the top energy consuming businesses in the Manitoba Hydro service area and represents 47.3% of all electricity consumed in the General Service sector. The Top Consumers group includes: INCO, HBM&S (Flin Flon/Stall), Gerdau (MRM), HBM&S (Ruttan), Griffin Canada, TVX Gold, Nexen Chemicals, Simplot, TransCanada Power (TCP), Enbridge, Tembec (Pine Falls Paper), Tolko, Louisiana Pacific, University of Manitoba, Maple Leaf (Brandon), Midwest Foods, McCain Foods and Albchem, a new chemical plant in Hargrave that will be energized in this year. The Top Consumers category includes all future energy requirements for the above mentioned customers. Some customers are planning major expansions, some customers are expected to remain at current operating levels and some customers are planning to reduce their levels of consumption in the future.

This category must also contain some speculative load growth because new, large Industrial customers will be energized to the Manitoba Hydro system in the future. Therefore, starting in 2006/07, we have created a classification called Potential Large Industrial Loads. This classification is used to represent the load requirements of potential Industrial loads that will be energized throughout the forecast period, but at this time, these loads are unspecified. For example, in the last two decades, six new Industrial loads have been energized in Manitoba - HBM&S at Flin Flon, TransCanada Power at Iles Des Chenes, Maple Leaf at Brandon, Louisiana Pacific, New Britannia (TVX Gold) mine and Albchem. The forecast must contain an allotment for new Industrial customers to set up operations in Manitoba.

Each customer in the Top Consumers group is forecasted individually. Information on individual company operating plans is collected by Manitoba Hydro Key and Major Account representatives. This information is used to prepare company specific forecasts. Information of this nature can be very sensitive and, as such, is treated as confidential and not available for public review.

The Top Consumers must be forecast individually because their loads do not grow in a slow, steady, predictable pattern. Their loads can change abruptly and in distinct stages. If a customer decides to expand operations, the load will increase quickly. Conversely, if a customer decides to down size or cease operations, the load will decrease dramatically. These type of load changes are not conducive to econometric forecasting models and must be examined on an individual basis. The adjacent graph illustrates the example of annual load variation that can occur with large Industrial customers. Company

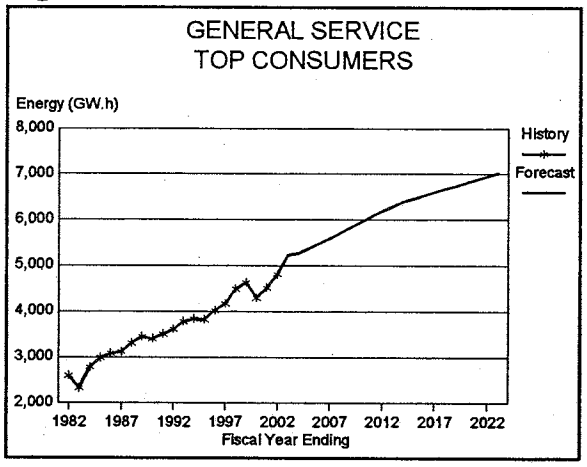
Figure 6



A had a strike in year fourteen. Company B grew steadily throughout, but had a major expansion in years five and six. Company C started operations in year twelve. Company D increased production in year fourteen, but lowered electricity consumption due to plant efficiency improvements.

The adjacent graph shows that the Top Consumers category has grown consistently over the last two decades. Most of the customers in this category have increased electricity consumption over this period. Six new loads (HBM&S at Flin Flon, TransCanada Power, Maple Leaf, Louisiana Pacific, New Britannia and Albchem) have been added to the system since 1981. These new customers have added 1 420 GW.h of load over the period, averaging 71 GW.h per year. Expansion at Nexen Chemicals has also contributed to the growth of this sector.

Figure 7



The Top Consumer category is forecast to increase from a base of 4 818 GW.h in 2001/02 to 7 020 GW.h by 2022/23. This represents an average growth of 105 GW.h per year, which is slightly lower than the ten year (121 GW.h) and twenty year (111 GW.h) growth rates.

In 2002/03, this group is expected to grow rapidly due to the Nexen chemical plant expansion and the addition of the new Albchem chemical plant. This growth will be offset slightly as Ruttan ceases operations and Tolko is expected to add self-generation. In 2003/04, Maple Leaf at Brandon should add a second shift and the HBM&S expansion at Flin Flon should be completed.

The forecast includes some potential for conversion of natural gas pipelines to electric drive motors, further expansion in the chemicals sector and 60 GW.h per year by 2006/07, increasing to 90 GW.h per year by 2012/13 for other Potential Large Industrial loads.

GENERAL SERVICE - MASS MARKET METHODOLOGY

This category includes all other Commercial and Industrial businesses located in the Manitoba Hydro service area, excluding the Top Consumers group. This classification consists of 48 354 customer meters that are classified as General Service and represents 52.3% of all the electricity consumed in the General Service sector. This group is forecasted using econometric techniques. The General Service Mass Market econometric model was derived using sales data over the 1989-2002 period and produced the following results (with t-statistics shown):

$$\underset{}{LGSNG=} \underset{(2.0)}{(.380 \times LGSNG1)} + \underset{(-0.6)}{(-.237 \times LRPE1)} + \underset{(2.5)}{(.432 \times LGDP)} + \underset{(0.4)}{1.16689}$$

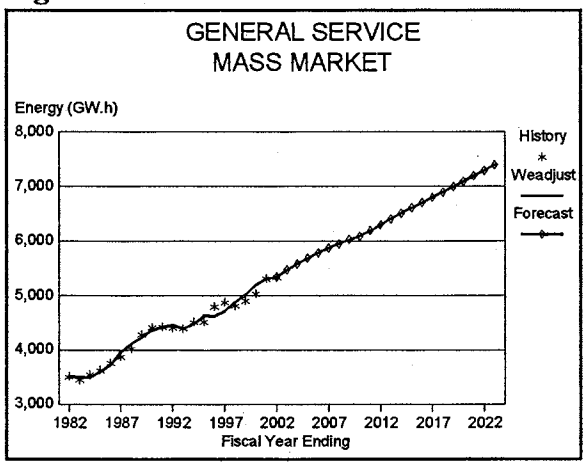
$R^2 = 98.2\%$ DF = 10

LGSNG - Log of the weather-adjusted General Service Mass Market sales
LGSNG1 - Log of the weather-adjusted General Service Mass Market sales for the previous year
LRPE1 - Log of the real price of electricity for the previous year
LGDP - Log of the real gross domestic product

The Mass Market forecast is finalized by reducing the econometric results by the amount of expected savings from Commercial and Industrial DSM programs. The forecast is then allocated to the Small Non-Demand, Small Demand, Medium and Large rate classes based on historical growth proportions.

The Mass Market load has grown steadily throughout the last two decades, except for brief periods of inactivity during the economic downturns of the early 1980's and 1990's. This load is resilient and does not decrease dramatically due to economic fluctuations, plant closures and strikes. Many of the larger businesses in this group are schools, hospitals, grocery stores, hotels, large offices and government buildings that provide necessary services. These businesses are fairly stable, electricity consumption is not as dependent on volatile market conditions.

Figure 8



The Mass Market category is forecast to increase from a weather-adjusted base of 5 345 GW.h in 2001/02 to 7 403 GW.h by 2022/23. This represents an average growth of 98 GW.h per year, which is similar to the ten (92 GW.h) and twenty year (99 GW.h) annual growth rates. The Mass Market growth is based on expectations of falling real electricity prices and steady economic growth.

GENERAL SERVICE - OTHER

This category includes the four General Service groups that represent only 0.4% of all General Service sales. These groups have unique rate codes and are forecasted separately for rate and billing purposes. These groups have a very minor effect on the overall load forecast and therefore will not be discussed in detail in this report. These groups are forecasted using trend analysis and extrapolation techniques.

Seasonal

There were 783 General Service Seasonal customers by the end of the 2001/02 fiscal year. The five year trend is an annual decrease of 2% in the number of customers per year. The number of customers is expected to be 770 in 2002/03 and decline 10 per year. Average use was 5 466 kW.h per customer in 2001/02 and is forecast to be 5 550 kW.h per customer in 2002/03 and grow 25 kW.h per year.

Water Heating

General Service Water Heating is a flat rate unmetered service that has not been available since November 12, 1969. There were 267 remaining customers by the end of the 2001/02 fiscal year. The five year trend is an annual decrease of 5% in the number of customers. The number of customers is expected to decrease 5% per year throughout the forecast period. Average use was 28 727 kW.h per customer in 2001/02 and is forecast to be 28 700 kW.h per customer.

Diesel

The Diesel Full Cost classification consumed 5 GW.h in 2001/02. Consumption is expected to increase to 18 GW.h by 2022/23.

Surplus Energy Program

Participants in the Surplus Energy Program (SEP) are expected to consume 26 GW.h per year during the 2002/03 to 2003/04 period and then the program will be discontinued or altered in some fashion.

Table 7

TOTAL GENERAL SERVICE SALES

Fiscal Year	Mass Market (GW.h)	Top Consumers (GW.h)	Diesel (GW.h)	Seasonal (GW.h)	FRWH (GW.h)	SEP/DFH (GW.h)	Total General Service (GW.h)	%
1990/91	4421	3503	11	7	18	0	7958	1.5%
1991/92	4405	3611	11	7	17	6	8057	1.2%
1992/93	4391	3783	12	7	15	37	8245	2.3%
1993/94	4513	3836	13	6	12	27	8406	2.0%
1994/95	4519	3825	14	6	11	10	8385	-0.3%
1995/96	4800	4021	16	5	10	14	8866	5.7%
1996/97	4875	4173	17	5	10	15	9095	2.6%
1997/98	4813	4493	14	5	9	31	9365	3.0%
1998/99	4906	4632	9	5	8	30	9591	2.4%
1999/00	5032	4299	4	5	8	33	9381	-2.2%
2000/01	5315	4515	4	4	8	26	9872	5.2%
2001/02	5330	4818	5	4	8	24	10190	3.2%
2002/03	5476	5230	6	4	7	26	10749	5.5%
2003/04	5587	5270	6	4	7	26	10901	1.4%
2004/05	5687	5370	7	4	7	0	11075	1.6%
2005/06	5786	5470	8	4	6	9	11274	1.8%
2006/07	5873	5590	8	4	6	0	11481	1.8%
2007/08	5951	5710	9	4	6	0	11679	1.7%
2008/09	6023	5830	9	4	5	0	11872	1.7%
2009/10	6092	5950	10	4	5	0	12061	1.6%
2010/11	6187	6070	11	4	5	0	12277	1.8%
2011/12	6295	6190	11	4	5	0	12505	1.9%
2012/13	6408	6290	12	4	4	0	12718	1.7%
2013/14	6511	6390	12	4	4	0	12921	1.6%
2014/15	6609	6460	13	4	4	0	13090	1.3%
2015/16	6705	6530	14	4	4	0	13256	1.3%
2016/17	6801	6600	14	4	4	0	13422	1.3%
2017/18	6898	6670	15	4	3	0	13589	1.2%
2018/19	6996	6740	15	4	3	0	13758	1.2%
2019/20	7095	6810	16	4	3	0	13927	1.2%
2020/21	7196	6880	17	4	3	0	14099	1.2%
2021/22	7298	6950	17	3	3	0	14271	1.2%
2022/23	7403	7020	18	3	3	0	14447	1.2%

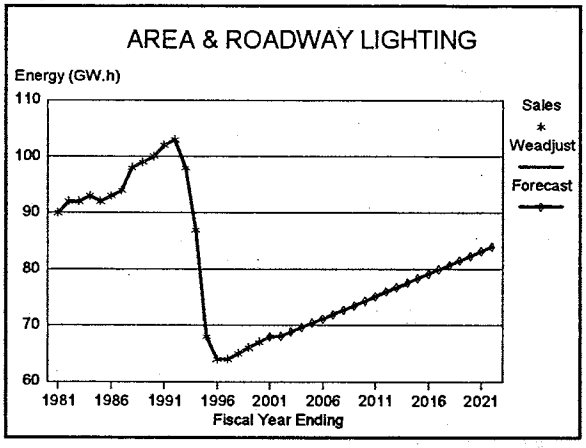
Table 8

GENERAL SERVICE BASIC SALES									
Fiscal Year	Mass Market			Top Consumers			Total Basic		
	Mtrs.	GW.h	Avg.	Mtrs.	GW.h	Avg. (MW.h)	Mtrs.	GW.h	Avg.
1990/91	44284	4421	99833	18	3503	194611	44302	7924	178863
1991/92	44327	4405	99375	18	3611	200611	44345	8016	180764
1992/93	44707	4381	97994	20	3783	189150	44727	8164	182530
1993/94	44998	4513	100293	21	3836	182667	45019	8349	185455
1994/95	45350	4519	99647	21	3825	182143	45371	8344	183906
1995/96	45727	4800	104971	23	4021	174826	45750	8821	192809
1996/97	45840	4875	106348	28	4173	149036	45868	9048	197262
1997/98	46493	4813	103521	33	4493	136152	46526	9306	200017
1998/99	47141	4906	104071	34	4632	136235	47175	9538	202183
1999/00	47653	5032	105597	35	4299	122829	47688	9331	195668
2000/01	48036	5315	110646	31	4515	145645	48067	9830	204506
2001/02	48354	5330	110229	25	4818	192720	48379	10148	209760
2002/03	48754	5476	112319	26	5230	201154	48780	10706	219475
2003/04	49154	5587	113663	25	5270	210800	49179	10857	220765
2004/05	49554	5687	114764	25	5370	214800	49579	11057	223018
2005/06	49954	5786	115827	25	5470	218800	49979	11256	225215
2006/07	50354	5873	116634	25	5590	223600	50379	11463	227535
2007/08	50754	5951	117252	26	5710	219615	50780	11661	229638
2008/09	51154	6023	117743	26	5830	224231	51180	11853	231594
2009/10	51554	6092	118167	26	5950	228846	51580	12042	233463
2010/11	51954	6187	119086	26	6070	233462	51980	12257	235802
2011/12	52354	6295	120239	26	6190	238077	52380	12485	238354
2012/13	52754	6408	121469	26	6290	241923	52780	12698	240584
2013/14	53154	6511	122493	26	6390	245769	53180	12901	242591
2014/15	53554	6609	123408	26	6460	248462	53580	13069	243916
2015/16	53954	6705	124273	26	6530	251154	53980	13235	245183
2016/17	54354	6801	125124	26	6600	253846	54380	13401	246433
2017/18	54754	6898	125982	26	6670	256538	54780	13568	247682
2018/19	55154	6996	126845	26	6740	259231	55180	13736	248931
2019/20	55554	7095	127714	26	6810	261923	55580	13905	250180
2020/21	55954	7195	128588	26	6880	264615	55980	14075	251429
2021/22	56354	7298	129503	26	6950	267308	56380	14248	252714
2022/23	56754	7403	130440	26	7020	270000	56780	14423	254015

AREA & ROADWAY LIGHTING

The Area and Roadway Lighting sector represents only 0.4% of all sales within the Manitoba Hydro service area. It includes electricity sales for the Sentinel Lighting and Street Lighting rate classes. Sentinel Lighting is an outdoor lighting service where units are available as rentals to an existing metered service or on an unmetered flat rate basis. Street Lighting includes all municipal roadway lighting in the Manitoba Hydro service area. In the early 1990's, usage dropped due to conversion to energy-efficient, high-pressure, sodium vapour street lighting.

Figure 9



The Area and Roadway Lighting sector is forecast to increase from 68 GW.h in 2001/02 to 81 GW.h by 2022/23. Sentinel Lighting is forecast to increase by 400 rentals per year with an estimated usage of 500 kW.h each. Street Lighting is forecast to increase an average of 0.5 GW.h per year because most of the existing street lights have been converted through the DSM initiative. New street lighting additions should increase overall consumption.

AREA & ROADWAY LIGHTING
HISTORICAL/WEATHER ADJUSTMENT/FORECAST

Fiscal Year	Sales	Adjustment	Adjusted Sales	Fiscal Year	Forecast Sales
1981/82	92	0	92	2002/03	68
1982/83	92	0	92	2003/04	68
1983/84	93	0	93	2004/05	69
1984/85	92	0	92	2005/06	70
1985/86	93	0	93	2006/07	70
1986/87	94	0	94	2007/08	71
1987/88	98	0	98	2008/09	72
1988/89	99	0	99	2009/10	72
1989/90	100	0	100	2010/11	73
1990/91	102	0	102	2011/12	74
1991/92	103	0	103	2012/13	74
1992/93	98	0	98	2013/14	75
1993/94	87	0	87	2014/15	76
1994/95	68	0	68	2015/16	76
1995/96	64	0	64	2016/17	77
1996/97	64	0	64	2017/18	77
1997/98	65	0	65	2018/19	78
1998/99	66	0	66	2019/20	79
1999/00	67	0	67	2020/21	79
2000/01	68	0	68	2021/22	80
2001/02	68	0	68	2022/23	81

Table 9

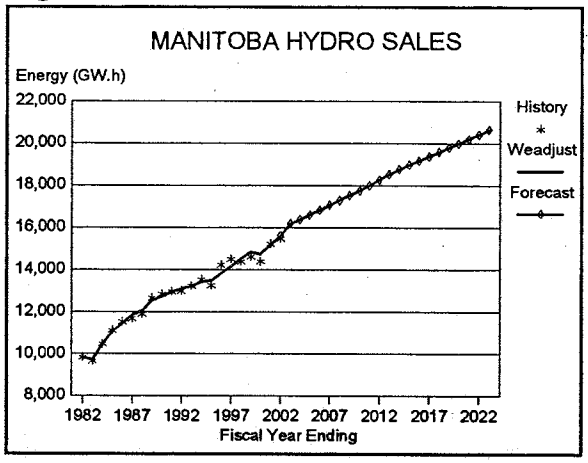
AREA AND ROADWAY LIGHTING

Fiscal Year	Sentinel Flat Rates		Sentinel Rentals		Street Lighting		Total Lighting	
	Mtrs	GW.h	Mtrs	GW.h	Mtrs	GW.h	Mtrs	GW.h
1990/91	13821	14	5558	0	743	88	20123	102
1991/92	14346	15	5511	0	748	88	20604	103
1992/93	14817	13	5409	0	757	84	20983	98
1993/94	15432	14	5427	0	783	72	21642	87
1994/95	15722	8	5413	0	759	60	21893	68
1995/96	16205	8	5424	0	731	56	22360	64
1996/97	16777	9	5400	0	726	56	22903	64
1997/98	17378	9	5454	0	727	56	23559	65
1998/99	17864	9	5487	0	734	57	24086	66
1999/00	18546	10	5473	0	729	57	24748	67
2000/01	18968	10	5475	0	727	58	25170	68
2001/02	19166	10	5468	0	732	58	25365	68
2002/03	19491	10	5475	0	719	58	25685	68
2003/04	19816	10	5475	0	720	58	26011	68
2004/05	20216	10	5475	0	721	59	26412	69
2005/06	20616	10	5475	0	722	59	26813	70
2006/07	21016	11	5475	0	723	60	27214	70
2007/08	21416	11	5475	0	724	60	27615	71
2008/09	21816	11	5475	0	725	61	28016	72
2009/10	22216	11	5475	0	726	61	28417	72
2010/11	22616	11	5475	0	727	62	28818	73
2011/12	23016	12	5475	0	728	62	29219	74
2012/13	23416	12	5475	0	729	62	29620	74
2013/14	23816	12	5475	0	730	63	30021	75
2014/15	24216	12	5475	0	731	63	30422	76
2015/16	24616	12	5475	0	732	64	30823	76
2016/17	25016	13	5475	0	733	64	31224	77
2017/18	25416	13	5475	0	734	65	31625	77
2018/19	25816	13	5475	0	735	65	32026	78
2019/20	26216	13	5475	0	736	66	32427	79
2020/21	26616	13	5475	0	737	66	32828	79
2021/22	27016	14	5475	0	738	67	33229	80
2022/23	27416	14	5475	0	739	67	33630	81

MANITOBA HYDRO SALES (GENERAL CONSUMERS)

The Manitoba Hydro Sales category consists of all sales delivered to customers in the Manitoba Hydro service area. This category includes the total of all sales from the Residential, General Service and Lighting groups. The General Service sector makes up about two-thirds, the Residential sector makes up about one-third and the Lighting group is only 0.4% of all sales. The adjacent graph shows that Manitoba Hydro Sales have grown steadily, except for the 1982/83 recession. The high growth rates in the 80's were due to electric space heating conversions.

Figure 10



The Manitoba Hydro Sales (General Consumers) category is forecast to increase from a weather-adjusted base of 15 615 GW.h in 2001/02 to 20 641 GW.h by 2022/23. This represents an average growth of 239 GW.h per year, which is slightly lower than the ten year annual growth rate of 249 GW.h. The reasons for growth are specified in the Residential and General Service sections of this report.

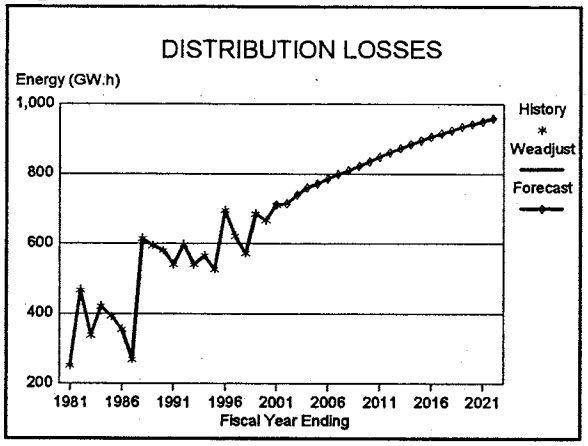
MANITOBA HYDRO SALES (GENERAL CONSUMERS)
HISTORICAL/WEATHER ADJUSTMENT/FORECAST

Fiscal Year	Sales	Adjustment	Adjusted Sales	Fiscal Year	Forecast Sales
1981/82	9833	-3	9830	2002/03	16178
1982/83	9648	77	9725	2003/04	16377
1983/84	10469	-18	10451	2004/05	16595
1984/85	11110	-47	11063	2005/06	16826
1985/86	11517	-74	11443	2006/07	17067
1986/87	11660	184	11844	2007/08	17297
1987/88	11878	154	12032	2008/09	17522
1988/89	12732	-105	12627	2009/10	17746
1989/90	12907	-97	12810	2010/11	17997
1990/91	13027	-3	13024	2011/12	18263
1991/92	13006	117	13123	2012/13	18515
1992/93	13211	-10	13201	2013/14	18759
1993/94	13520	-90	13430	2014/15	18968
1994/95	13253	235	13488	2015/16	19171
1995/96	14219	-400	13819	2016/17	19375
1996/97	14499	-344	14155	2017/18	19581
1997/98	14366	159	14525	2018/19	19788
1998/99	14605	242	14847	2019/20	19998
1999/00	14376	357	14733	2020/21	20210
2000/01	15221	-40	15181	2021/22	20424
2001/02	15463	152	15615	2022/23	20641

DISTRIBUTION LOSSES

The Distribution Losses category represents the resistence losses incurred in delivering power from the distribution station to the customers' meter. These losses are the difference between Manitoba Hydro at Common Bus less Construction and Manitoba Hydro Sales less Diesel. Diesel sales are excluded because they are not part of the Integrated System. The losses vary because Manitoba Hydro Sales are measured on a cycle billing basis and Common Bus is measured on a calendar month basis. Use at the customers' meter lags the delivery of power to the Common Bus.

Figure 11



This category also includes unbilled sales and the error associated with flat rate estimates. Unbilled sales include energy used by Manitoba Hydro offices, Customer Accounting adjustments and energy lost through theft. Flat rate estimates include a number of unmetered services where energy is estimated and subject to inaccuracy. Distribution losses are forecast to be 4.7% higher than Manitoba Hydro Sales less Diesel.

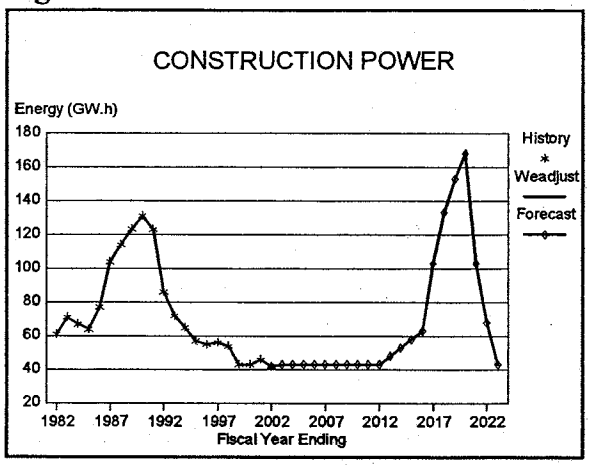
DISTRIBUTION LOSSES
HISTORICAL/WEATHER ADJUSTMENT/FORECAST

Fiscal Year	Losses	Adjustment	Adjusted Losses	Fiscal Year	Forecast Losses
1981/82	466	0	466	2002/03	760
1982/83	338	0	338	2003/04	769
1983/84	419	0	419	2004/05	779
1984/85	389	0	389	2005/06	790
1985/86	354	0	354	2006/07	801
1986/87	269	0	269	2007/08	812
1987/88	614	0	614	2008/09	823
1988/89	508	0	508	2009/10	833
1989/90	487	0	487	2010/11	845
1990/91	455	0	455	2011/12	857
1991/92	559	0	559	2012/13	869
1992/93	530	0	530	2013/14	880
1993/94	565	0	565	2014/15	890
1994/95	526	0	526	2015/16	900
1995/96	696	0	696	2016/17	909
1996/97	621	0	621	2017/18	919
1997/98	572	0	572	2018/19	929
1998/99	685	0	685	2019/20	938
1999/00	666	0	666	2020/21	948
2000/01	723	0	723	2021/22	958
2001/02	716	0	716	2022/23	968

CONSTRUCTION POWER

The Construction Power category represents the energy used by Manitoba Hydro and its contractors in the construction of major capital works such as generating stations, converter stations and major transmission lines. This category also includes station service until a plant is commissioned. The adjacent graph shows that consumption increased significantly during the peak of Limestone development. Recently, the Construction figures include 35 GW.h at Gillam, 7 GW.h at Limestone and another 1.5 GW.h at Kettle.

Figure 12



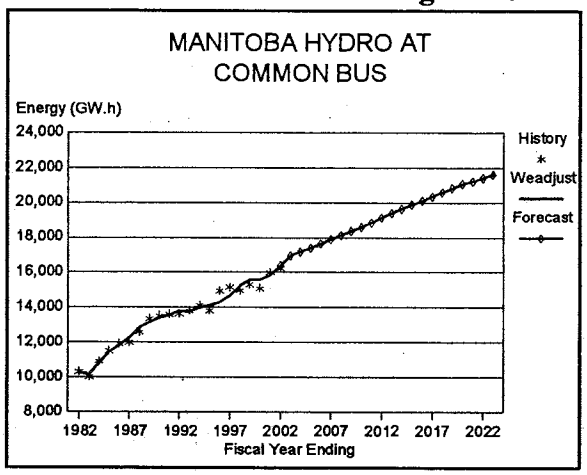
The Construction Power category is forecast to be 42.5 GW.h per year until the construction of Wuskwatim and Gull generating stations commence. The most recent, approved development plans project for a first power date of 2019 and 2020 for the Wuskwatim and Gull generating stations, repectively. The sequencing of generation development plans are subject to change given an appropriate business case.

CONSTRUCTION POWER HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Use	Adjustment	Adjusted Use	Fiscal Year	Forecast Use
1981/82	61	0	61	2002/03	43
1982/83	71	0	71	2003/04	43
1983/84	67	0	67	2004/05	43
1984/85	64	0	64	2005/06	43
1985/86	77	0	77	2006/07	43
1986/87	104	0	104	2007/08	43
1987/88	114	0	114	2008/09	43
1988/89	123	0	123	2009/10	43
1989/90	131	0	131	2010/11	43
1990/91	123	0	123	2011/12	43
1991/92	86	0	86	2012/13	48
1992/93	72	0	72	2013/14	53
1993/94	65	0	65	2014/15	58
1994/95	57	0	57	2015/16	63
1995/96	55	0	55	2016/17	103
1996/97	56	0	56	2017/18	133
1997/98	54	0	54	2018/19	153
1998/99	43	0	43	2019/20	168
1999/00	43	0	43	2020/21	103
2000/01	46	0	46	2021/22	68
2001/02	42	0	42	2022/23	43

MANITOBA HYDRO AT COMMON BUS

Manitoba Hydro at Common Bus represents 86.9% of the Manitoba Load at Common Bus. It is measured as the sum of all load from Manitoba Hydro distribution points within the province. It includes all sales to customers in the Manitoba Hydro service area plus associated distribution losses. It also includes energy used by Manitoba Hydro and its contractors in the construction of major capital works such as generating stations, converter stations and transmission lines.

Figure 13



The Manitoba Hydro at Common Bus category is forecast to increase from a weather-adjusted base of 16 395 GW.h in 2001/02 to 21 617 GW.h by 2022/23. This represents an average growth of 249 GW.h per year, which is slightly lower the ten year annual growth rate of 260 GW.h. Manitoba Hydro at Common Bus will increase proportionally to Manitoba Hydro (General Consumers) sales.

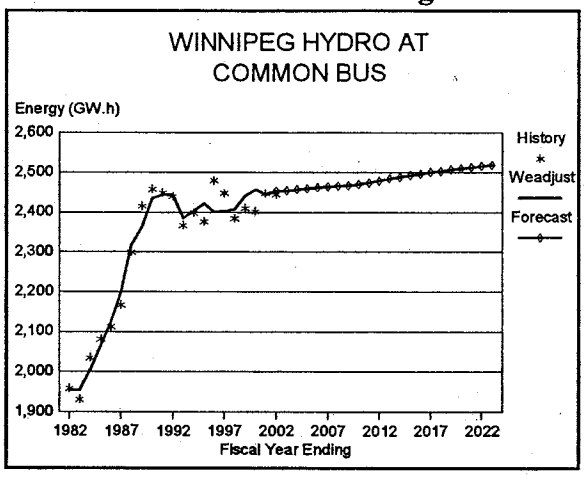
MANITOBA HYDRO AT COMMON BUS
HISTORICAL/WEATHER ADJUSTMENT/FORECAST

Fiscal Year	MHCB	Adjustment	Adjusted MHCB	Fiscal Year	Forecast MHCB
1981/82	10323	-47	10276	2002/03	16968
1982/83	10018	174	10192	2003/04	17176
1983/84	10916	-110	10806	2004/05	17402
1984/85	11524	-61	11463	2005/06	17643
1985/86	11909	-80	11829	2006/07	17894
1986/87	11993	277	12270	2007/08	18134
1987/88	12587	253	12840	2008/09	18368
1988/89	13344	-204	13140	2009/10	18601
1989/90	13505	-86	13419	2010/11	18863
1990/91	13583	-15	13568	2011/12	19140
1991/92	13629	170	13799	2012/13	19408
1992/93	13799	-48	13751	2013/14	19667
1993/94	14124	-127	13997	2014/15	19890
1994/95	13809	296	14105	2015/16	20107
1995/96	14939	-624	14315	2016/17	20359
1996/97	15143	-471	14672	2017/18	20603
1997/98	14965	270	15235	2018/19	20839
1998/99	15312	379	15691	2019/20	21073
1999/00	15077	508	15585	2020/21	21228
2000/01	15981	-140	15841	2021/22	21416
2001/02	16210	185	16395	2022/23	21617

WINNIPEG HYDRO AT COMMON BUS

Winnipeg Hydro at Common Bus represents 13.1% of the Manitoba Load at Common Bus. It is measured as the sum of all load from Winnipeg Hydro distribution points within the province. It includes all sales to customers in the Winnipeg Hydro service area plus associated distribution losses. The adjacent graph shows that the Winnipeg Hydro load grew significantly during the 1980's due to development of the downtown area of Winnipeg, but then dropped. In the 1990's, the load remained stable, but has started to slowly increase during the last four years.

Figure 14



The Winnipeg Hydro category is forecast to increase from a weather-adjusted base of 2 453 GW.h in 2001/02 to 2 519 GW.h by 2022/23. This represents an average growth of three GW.h per year, which is slightly higher than the ten year annual growth rate of one GW.h, but lower than the twenty year annual growth rate 25 GW.h. The increase in consumption is primarily due to continued falling real electricity prices and the expectation of steady population growth.

WINNIPEG HYDRO AT COMMON BUS HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	WHCB	Adjustment	Adjusted WHCB	Fiscal Year	Forecast WHCB
1981/82	1958	-3	1955	2002/03	2454
1982/83	1931	23	1954	2003/04	2457
1983/84	2035	-30	2005	2004/05	2459
1984/85	2081	-13	2068	2005/06	2462
1985/86	2112	14	2126	2006/07	2464
1986/87	2167	32	2199	2007/08	2466
1987/88	2299	18	2317	2008/09	2467
1988/89	2415	-52	2363	2009/10	2470
1989/90	2458	-23	2435	2010/11	2474
1990/91	2448	-4	2444	2011/12	2479
1991/92	2439	4	2443	2012/13	2484
1992/93	2367	18	2385	2013/14	2488
1993/94	2399	4	2403	2014/15	2492
1994/95	2376	46	2422	2015/16	2496
1995/96	2479	-78	2401	2016/17	2500
1996/97	2447	-44	2403	2017/18	2503
1997/98	2384	23	2407	2018/19	2507
1998/99	2410	31	2441	2019/20	2510
1999/00	2402	55	2457	2020/21	2513
2000/01	2447	-2	2445	2021/22	2516
2001/02	2444	9	2453	2022/23	2519

WINNIPEG HYDRO METHODOLOGY

The Winnipeg Hydro sector is forecasted using an econometric equation. The econometric model was derived using sales data over the 1992-2001 period and produced the following results (with t-statistics shown):

	(1.1)		*(-0.1)*		*(0.5)*		*(0.4)*
LWHNG =	*(.394 x LWHNG1)*	+	*(-.027 x LRPE1)*	+	*(.338 x LPOP)*	+	*2.38426*

R^2 = 45.0% DF = 7

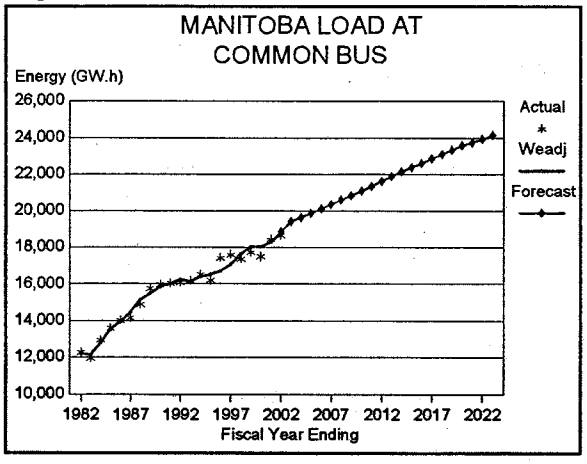
LWHNG - Log of the weather-adjusted Winnipeg Hydro at Common Bus
LWHNG1 - Log of the weather-adjusted Winnipeg Hydro at Common Bus for the previous year
LRPE1 - Log of the real price of electricity for the previous year
LPOP - Log of the population of Manitoba

The Winnipeg Hydro forecast is finalized by reducing the econometric results by the amount of expected savings from the Commercial lighting program in the Winnipeg Hydro service area.

MANITOBA LOAD AT COMMON BUS

Manitoba Load at Common Bus is the sum of all Manitoba Hydro and Winnipeg Hydro loads at Common Bus. It represents the total load measured from all the distribution points within Manitoba. It includes all sales to Manitoba customers plus associated distribution losses. This category excludes transmission losses and station service. In the 1980's, load growth was due to rural electric space heat conversions and downtown development in Winnipeg. In the 1990's, load growth was due to Industrial development in the Manitoba Hydro service area.

Figure 15



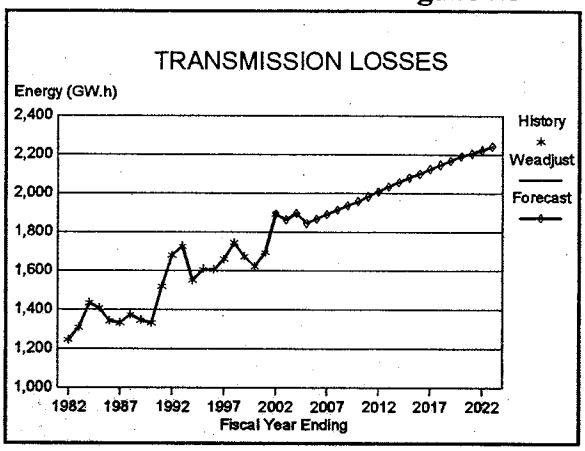
The Manitoba Load at Common Bus category is forecast to increase from a weather-adjusted base of 18 849 GW.h in 2001/02 to 24 136 GW.h by 2022/23. This represents an average growth of 252 GW.h per year, which is slightly lower than the ten year annual growth rate of 261 GW.h. Most of this load growth will occur in the Manitoba Hydro service area.

MANITOBA LOAD AT COMMON BUS HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	MLCB	Adjustment	Adjusted MLCB	Fiscal Year	Forecast MLCB
1981/82	12281	-50	12231	2002/03	19422
1982/83	11949	197	12146	2003/04	19633
1983/84	12951	-140	12811	2004/05	19861
1984/85	13605	-74	13531	2005/06	20105
1985/86	14021	-66	13955	2006/07	20358
1986/87	14160	309	14469	2007/08	20599
1987/88	14886	271	15157	2008/09	20836
1988/89	15760	-256	15504	2009/10	21071
1989/90	15964	-109	15855	2010/11	21337
1990/91	16031	-20	16011	2011/12	21619
1991/92	16067	174	16241	2012/13	21892
1992/93	16166	-30	16136	2013/14	22155
1993/94	16523	-123	16400	2014/15	22382
1994/95	16185	341	16526	2015/16	22603
1995/96	17418	-702	16716	2016/17	22859
1996/97	17590	-514	17076	2017/18	23106
1997/98	17350	293	17643	2018/19	23346
1998/99	17722	410	18132	2019/20	23583
1999/00	17479	563	18042	2020/21	23741
2000/01	18428	-142	18286	2021/22	23932
2001/02	18655	194	18849	2022/23	24136

TRANSMISSION LOSSES

Transmission Losses category represents the amount of energy that is lost in delivering power from the generation stations to all of the distribution points on the Common Bus. This category only contains losses associated with supplying Manitoba customers. Losses attributable to exports and the gains attributable to imports are excluded. It is calculated as the difference between Net Total Energy minus the Manitoba Load at Common Bus. Transmission losses are substantial because most of the northern generation is transmitted to southern distribution points - 900 kilometres away. Transmission losses vary significantly depending on system configuration, outages and the magnitude of the load being transmitted over the lines. Note that the Transmission losses increased dramatically in 2001/02 due to the failure of two transformers on the HVDC system.

Figure 16



Transmission Losses are forecast to be higher than normal in the first two forecast years. After that the losses are expected to return to normal and are forecasted to be 9.3% of the Manitoba Load at Common Bus. Transmission Losses will increase as the Manitoba Load at Common Bus increases.

TRANSMISSION LOSSES HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Losses	Adjustment	Adjusted Losses	Fiscal Year	Forecast Losses
1981/82	1247	0	1247	2002/03	1864
1982/83	1311	0	1311	2003/04	1898
1983/84	1436	0	1436	2004/05	1847
1984/85	1409	0	1409	2005/06	1870
1985/86	1344	0	1344	2006/07	1893
1986/87	1335	0	1335	2007/08	1915
1987/88	1374	0	1374	2008/09	1938
1988/89	1348	0	1348	2009/10	1960
1989/90	1334	0	1334	2010/11	1985
1990/91	1522	0	1522	2011/12	2011
1991/92	1680	0	1680	2012/13	2037
1992/93	1728	0	1728	2013/14	2060
1993/94	1552	0	1552	2014/15	2082
1994/95	1609	0	1609	2015/16	2103
1995/96	1606	0	1606	2016/17	2127
1996/97	1660	0	1660	2017/18	2149
1997/98	1745	0	1745	2018/19	2171
1998/99	1675	0	1675	2019/20	2194
1999/00	1623	0	1623	2020/21	2208
2000/01	1696	0	1696	2021/22	2226
2001/02	1894	0	1894	2022/23	2245

Table 10

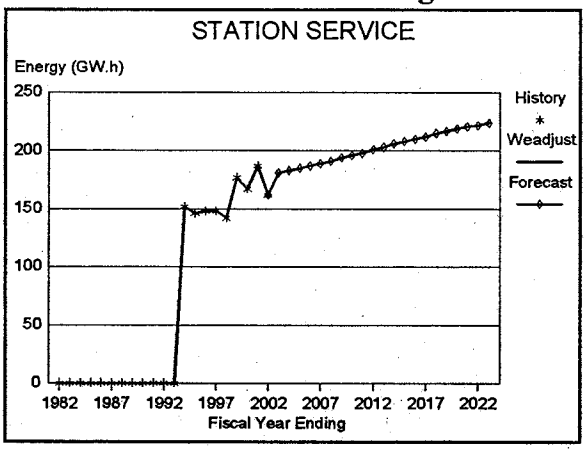
MONTHLY TRANSMISSION LOSSES
Energy (GW.h)

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2001/02 Actual	144	138	141	147	137	134	154	158	183	192	181	184	1894
2002/03	141	141	137	142	142	136	148	163	186	195	164	169	1864
2003/04	142	143	139	145	144	138	150	164	190	197	173	171	1898
2004/05	138	140	137	141	141	134	146	161	186	193	162	167	1847
2005/06	140	141	138	144	143	136	148	163	188	195	164	169	1870
2006/07	141	143	140	146	145	137	150	165	191	198	166	172	1893
2007/08	143	145	142	148	147	139	151	167	193	200	168	174	1915
2008/09	144	146	144	150	150	140	153	168	196	202	170	176	1938
2009/10	146	148	145	152	152	142	154	170	198	204	171	178	1960
2010/11	147	150	147	155	154	143	156	172	201	207	173	180	1985
2011/12	149	152	149	157	156	145	158	174	204	209	176	182	2011
2012/13	150	153	151	159	158	147	159	177	207	212	178	185	2036
2013/14	152	155	153	161	160	148	161	179	210	215	180	187	2060
2014/15	154	156	154	162	162	150	163	181	212	218	182	189	2082
2015/16	155	158	155	164	163	151	164	182	215	220	185	191	2103
2016/17	157	159	157	165	165	152	166	185	217	223	187	193	2127
2017/18	158	161	158	167	166	154	168	187	220	226	189	196	2149
2018/19	160	162	160	168	168	155	169	189	223	229	191	198	2171
2019/20	161	164	161	170	169	156	171	191	225	231	194	200	2194
2020/21	162	165	162	171	170	157	172	192	227	233	195	201	2208
2021/22	163	166	163	172	172	158	173	194	229	235	197	203	2226
2022/23	165	167	165	174	173	160	174	195	231	238	199	205	2245

STATION SERVICE

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

Figure 17



Station Service energy is forecast to be 0.9% of the Manitoba Load at Common Bus. Station Service energy is forecast to increase from 162 GW.h in 2001/02 to 224 GW.h by 2022/23. Station Service at the time of peak is forecast to increase from 37 MW in 2001/02 to 41 MW by 2022/23.

STATION SERVICE HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Use	Adjustment	Adjusted Use	Fiscal Year	Forecast Use
1981/82	0	0	0	2002/03	181
1982/83	0	0	0	2003/04	183
1983/84	0	0	0	2004/05	185
1984/85	0	0	0	2005/06	187
1985/86	0	0	0	2006/07	189
1986/87	0	0	0	2007/08	191
1987/88	0	0	0	2008/09	194
1988/89	0	0	0	2009/10	196
1989/90	0	0	0	2010/11	198
1990/91	0	0	0	2011/12	201
1991/92	0	0	0	2012/13	203
1992/93	0	0	0	2013/14	206
1993/94	152	0	152	2014/15	208
1994/95	146	0	146	2015/16	210
1995/96	148	0	148	2016/17	212
1996/97	148	0	148	2017/18	215
1997/98	142	0	142	2018/19	217
1998/99	177	0	177	2019/20	219
1999/00	167	0	167	2020/21	221
2000/01	187	0	187	2021/22	222
2001/02	162	0	162	2022/23	224

Table 11

MONTHLY STATION SERVICE
Energy (GW.h)

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2001/02 Actual	15	10	7	9	10	8	12	13	19	21	19	18	162
2002/03	16	12	10	11	13	10	12	15	22	21	20	18	181
2003/04	16	12	11	11	13	10	13	15	23	21	20	19	183
2004/05	16	12	11	11	13	10	13	15	23	21	20	19	185
2005/06	16	12	11	11	13	10	13	16	23	22	21	19	187
2006/07	16	12	11	11	14	10	13	16	23	22	21	19	189
2007/08	16	12	11	12	14	10	13	16	24	22	21	20	191
2008/09	17	13	11	12	14	11	13	16	24	22	21	20	194
2009/10	17	13	11	12	14	11	13	16	24	23	22	20	196
2010/11	17	13	11	12	14	11	14	16	24	23	22	20	198
2011/12	17	13	12	12	15	11	14	17	25	23	22	20	201
2012/13	18	13	12	12	15	11	14	17	25	24	23	21	203
2013/14	18	13	12	12	15	11	14	17	25	24	23	21	206
2014/15	18	14	12	13	15	11	14	17	26	24	23	21	208
2015/16	18	14	12	13	15	11	14	17	26	24	23	21	210
2016/17	18	14	12	13	15	12	15	17	26	25	24	22	212
2017/18	18	14	12	13	16	12	15	18	26	25	24	22	215
2018/19	19	14	13	13	16	12	15	18	27	25	24	22	217
2019/20	19	14	13	13	16	12	15	18	27	25	24	22	219
2020/21	19	14	13	13	16	12	15	18	27	26	24	22	221
2021/22	19	15	13	13	16	12	15	19	27	26	25	23	222
2022/23	19	15	13	14	16	12	15	19	28	26	25	23	224

Table 12

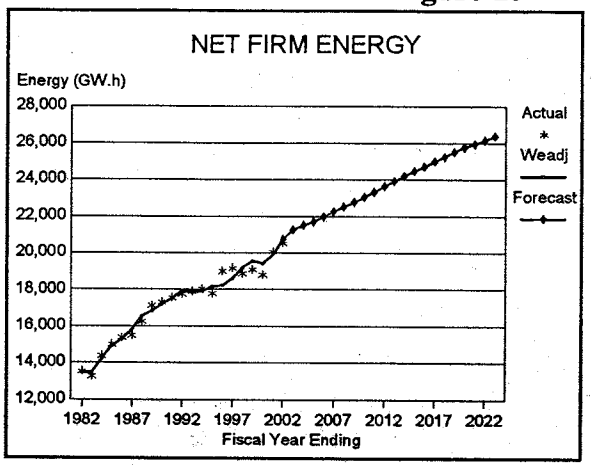
MONTHLY STATION SERVICE
Peak (MW)

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
2001/02 Actual	25	22	11	12	17	16	22	33	31	37	39	28	37
2002/03	28	26	13	16	22	15	23	32	35	34	35	30	35
2003/04	28	26	13	17	22	15	23	32	35	34	36	31	35
2004/05	29	26	13	17	22	15	23	33	36	35	36	31	35
2005/06	29	26	13	17	23	15	23	33	36	35	36	31	35
2006/07	29	27	13	17	23	15	24	33	36	35	36	32	36
2007/08	29	27	13	18	23	15	24	33	37	35	37	32	36
2008/09	30	27	14	18	24	16	24	34	37	36	37	32	36
2009/10	30	28	14	18	24	16	24	34	37	36	37	32	36
2010/11	30	28	14	19	24	16	24	34	38	36	38	33	37
2011/12	30	28	14	19	25	16	25	35	38	36	38	33	37
2012/13	31	29	14	19	25	16	25	35	38	37	38	33	38
2013/14	31	29	15	19	25	17	25	35	39	37	39	34	38
2014/15	31	29	15	19	26	17	26	36	39	38	39	34	38
2015/16	32	30	15	20	26	17	26	36	40	38	39	34	39
2016/17	32	30	15	20	26	17	26	36	40	38	40	35	39
2017/18	32	30	15	20	26	17	26	37	40	39	40	35	39
2018/19	33	31	15	20	27	17	27	37	41	39	41	35	40
2019/20	33	31	15	21	27	18	27	37	41	39	41	36	40
2020/21	33	31	16	21	27	18	27	38	41	40	41	36	40
2021/22	34	31	16	21	27	18	27	38	42	40	42	36	41
2022/23	34	32	16	21	28	18	28	38	42	40	42	37	41

NET FIRM ENERGY

The Net Firm Energy category includes all electricity that is generated to meet the firm energy requirements of all customers within Manitoba. It excludes non-firm (interruptible loads) and station service loads. It is calculated by subtracting non-firm sales and station service loads from the Gross Total Energy requirements. Net Firm Energy is a critical factor in determining Manitoba Hydro's future development plans. Net Firm Energy has grown steadily during the past two decades, except for the 1982/83 recession and the economic downturn in the early 1990's.

Figure 18



The Net Firm Energy category is forecast to increase from a weather-adjusted base of 20 738 GW.h in 2001/02 to 26 381 GW.h by 2022/23. This represents an average growth of 269 GW.h per year, which is slightly lower than the ten year annual growth rate of 280 GW.h.

NET FIRM ENERGY
HISTORICAL/WEATHER ADJUSTMENT/FORECAST

Fiscal Year	Energy	Adjustment	Adjusted Energy	Fiscal Year	Forecast Energy
1981/82	13527	-55	13472	2002/03	21260
1982/83	13260	217	13477	2003/04	21504
1983/84	14387	-154	14233	2004/05	21708
1984/85	15014	-81	14933	2005/06	21975
1985/86	15366	-72	15294	2006/07	22251
1986/87	15495	339	15834	2007/08	22515
1987/88	16260	298	16558	2008/09	22774
1988/89	17108	-282	16826	2009/10	23031
1989/90	17298	-120	17178	2010/11	23322
1990/91	17553	-22	17531	2011/12	23630
1991/92	17748	191	17939	2012/13	23928
1992/93	17894	-33	17861	2013/14	24215
1993/94	18048	-135	17913	2014/15	24464
1994/95	17784	376	18160	2015/16	24705
1995/96	19000	-772	18228	2016/17	24985
1996/97	19173	-566	18607	2017/18	25255
1997/98	18872	323	19195	2018/19	25517
1998/99	19095	451	19546	2019/20	25776
1999/00	18804	619	19423	2020/21	25949
2000/01	20075	-156	19919	2021/22	26158
2001/02	20525	213	20738	2022/23	26381

Table 13

MONTHLY SCHEDULE OF NET FIRM ENERGY (GW.h)
Base Forecast

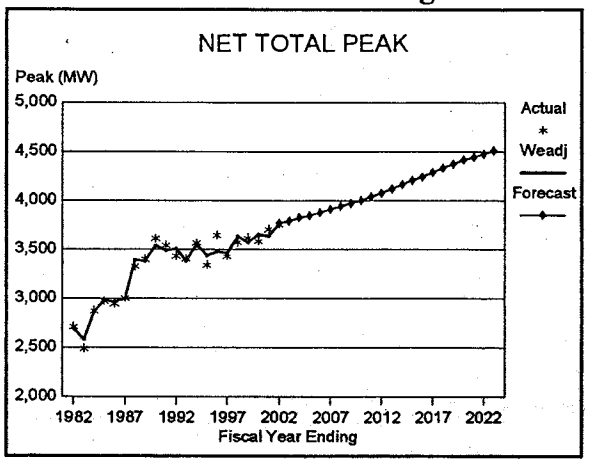
Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2001/02 Actual	1573	1486	1432	1499	1567	1419	1627	1728	2060	2164	1876	2094	20525
2002/03	1620	1560	1500	1560	1585	1471	1664	1881	2204	2282	1951	1980	21260
2003/04	1627	1571	1517	1582	1601	1490	1677	1885	2235	2289	2028	2001	21504
2004/05	1644	1592	1546	1604	1632	1507	1692	1915	2259	2315	1982	2022	21708
2005/06	1662	1614	1569	1632	1659	1527	1711	1935	2284	2336	2001	2044	21975
2006/07	1681	1637	1593	1661	1688	1548	1732	1956	2309	2359	2020	2068	22251
2007/08	1700	1659	1616	1689	1715	1568	1751	1975	2333	2380	2039	2090	22515
2008/09	1718	1681	1639	1717	1742	1588	1770	1994	2356	2400	2057	2111	22774
2009/10	1736	1703	1661	1745	1769	1607	1789	2013	2380	2420	2075	2133	23031
2010/11	1756	1727	1687	1775	1798	1629	1811	2035	2406	2444	2095	2157	23322
2011/12	1778	1752	1713	1807	1829	1653	1834	2059	2435	2470	2118	2184	23630
2012/13	1801	1775	1735	1830	1853	1675	1858	2084	2464	2499	2143	2210	23928
2013/14	1823	1798	1757	1853	1876	1696	1881	2109	2492	2528	2168	2236	24215
2014/15	1842	1817	1776	1872	1895	1714	1900	2130	2517	2553	2190	2259	24464
2015/16	1861	1835	1794	1891	1915	1731	1920	2151	2540	2577	2210	2281	24705
2016/17	1882	1857	1814	1913	1937	1752	1942	2175	2568	2605	2235	2306	24985
2017/18	1903	1877	1835	1934	1958	1771	1963	2198	2595	2632	2258	2331	25255
2018/19	1923	1897	1854	1955	1979	1790	1984	2221	2621	2658	2281	2354	25517
2019/20	1943	1917	1874	1975	1999	1809	2004	2243	2647	2684	2303	2378	25776
2020/21	1956	1931	1887	1989	2013	1822	2018	2258	2663	2701	2318	2393	25949
2021/22	1972	1947	1902	2005	2030	1837	2035	2276	2684	2721	2336	2412	26158
2022/23	1990	1964	1919	2023	2047	1854	2053	2295	2706	2744	2355	2432	26381

- See the Glossary of Terms for a definition of Net Firm Energy.

NET TOTAL PEAK

The Net Total Peak is defined to be the maximum integrated hourly load at generation adjusted for losses associated with exports or imports, less station service, but with curtailed loads added back in. The term "integrated" indicates that the average load within that peak hour is used. The Net Total Peak has not grown very much during the 1990's because many of our large Industrial customers have improved their efficiency. Manitoba Hydro is very diligent in helping our Industrial customers to improve the efficiency of their business operations.

Figure 19



The Net Total Peak is forecast to increase from a weather-adjusted base of 3 769 MW in 2001/02 to 4 513 MW by 2022/23. This represents an average growth of 35 MW per year, which is higher than the ten year annual growth rate of 26 MW, but lower than the twenty year annual growth rate 54 MW.

NET TOTAL PEAK HISTORICAL/WEATHER ADJUSTMENT/FORECAST					
Fiscal Year	Peak	Adjustment	Adjusted Peak	Fiscal Year	Forecast Peak
1981/82	2713	-16	2697	2002/03	3794
1982/83	2494	91	2585	2003/04	3828
1983/84	2875	-12	2863	2004/05	3850
1984/85	2974	8	2982	2005/06	3882
1985/86	2945	23	2968	2006/07	3914
1986/87	3003	-5	2998	2007/08	3945
1987/88	3326	67	3393	2008/09	3975
1988/89	3403	-19	3384	2009/10	4005
1989/90	3611	-71	3540	2010/11	4041
1990/91	3542	-53	3489	2011/12	4080
1991/92	3435	74	3509	2012/13	4126
1992/93	3404	-18	3386	2013/14	4170
1993/94	3567	-11	3556	2014/15	4210
1994/95	3342	94	3436	2015/16	4248
1995/96	3649	-170	3479	2016/17	4293
1996/97	3476	32	3508	2017/18	4336
1997/98	3573	63	3636	2018/19	4378
1998/99	3639	-43	3596	2019/20	4419
1999/00	3588	66	3654	2020/21	4446
2000/01	3706	-67	3639	2021/22	4478
2001/02	3760	9	3769	2022/23	4513

Table 14

MONTHLY SCHEDULE OF NET TOTAL PEAK (MW)
Base Forecast

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
2001/02 Actual	2735	2478	2631	2711	2775	2602	2780	3211	3398	3760	3568	3437	3760
2002/03	2867	2632	2645	2671	2740	2589	2807	3286	3738	3761	3605	3327	3794
2003/04	2883	2659	2666	2714	2768	2613	2809	3313	3772	3796	3635	3360	3828
2004/05	2906	2681	2693	2745	2806	2638	2838	3338	3800	3806	3657	3387	3850
2005/06	2932	2714	2731	2791	2850	2671	2865	3366	3836	3836	3685	3418	3882
2006/07	2959	2748	2769	2837	2895	2705	2894	3394	3871	3866	3713	3449	3914
2007/08	2985	2781	2806	2881	2939	2737	2920	3420	3905	3894	3740	3479	3945
2008/09	3010	2813	2843	2925	2982	2769	2947	3446	3938	3922	3766	3507	3975
2009/10	3035	2846	2879	2969	3025	2802	2973	3471	3970	3948	3791	3536	4005
2010/11	3065	2882	2919	3017	3072	2838	3003	3502	4009	3981	3822	3570	4041
2011/12	3097	2921	2962	3067	3122	2877	3036	3535	4051	4017	3856	3606	4080
2012/13	3134	2957	2999	3105	3160	2912	3073	3576	4097	4063	3900	3648	4126
2013/14	3170	2992	3034	3141	3196	2947	3109	3616	4141	4107	3943	3688	4170
2014/15	3202	3022	3064	3172	3228	2977	3140	3651	4180	4146	3981	3724	4210
2015/16	3232	3051	3094	3202	3258	3005	3170	3685	4218	4184	4017	3759	4248
2016/17	3268	3085	3128	3238	3294	3039	3205	3725	4263	4228	4060	3799	4293
2017/18	3303	3118	3162	3272	3329	3072	3239	3764	4306	4271	4101	3838	4336
2018/19	3336	3150	3194	3305	3363	3103	3272	3801	4347	4312	4141	3876	4378
2019/20	3369	3181	3226	3338	3396	3134	3304	3837	4388	4353	4180	3913	4419
2020/21	3390	3202	3247	3359	3417	3155	3325	3861	4414	4379	4206	3937	4446
2021/22	3417	3228	3272	3385	3444	3180	3351	3890	4447	4411	4237	3967	4478
2022/23	3445	3255	3299	3413	3472	3206	3379	3921	4481	4445	4270	3998	4513

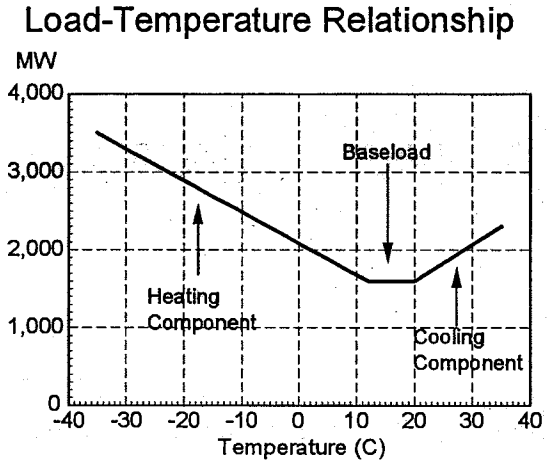
- See the Glossary of Terms for a definition of Net Total Peak.

HOURLY LOAD MODEL

The Hourly Load Model is designed to accurately estimate total electricity usage in Manitoba. Hourly system energy readings are related to the hour of day, day of week, month of year, and the current and past temperatures.

The adjacent graph illustrates the model's concepts. The base load is the temperature-insensitive part that varies by hour of day. The heating component is the additional load required as the temperature decreases. The cooling component is the additional load required as the temperature increases. The model requires two sets of inputs. (1) Base load coefficients are expressed in MW and vary by month, weekday, and hour of day. (2) Temperature-sensitive coefficients, i.e. heating and cooling, are expressed in MW/degree Celsius and vary by temperature and hour.

Figure 20



The Hourly Load Model predicts the hourly energy for every hour of each year. This is done for 25 different years of historical temperatures (from April 1977 to March 2002). In the first two years of the forecast, these 25 replications are summarized to get expected values and their standard deviations and represent the exact day-of-week pattern that will occur in these two years.

In the remaining years of the forecast, each of the 25 years of temperatures are combined with four day-of-week variations. These 100 replications are summarized to produce an average year. This smooths out the variation that would otherwise occur due to extra weekends in a month or leap years.

Output from the Hourly Load Model produces monthly energy distributions, monthly peaks, annual peaks, on-peak and off-peak energy splits, probabilities of peak occurrence, load duration curves, hourly load estimates and other types of information.

Table 15

HISTORICAL NET FIRM ENERGY, NET TOTAL PEAK AND LOAD FACTOR

Fiscal Year	Net Firm Energy (GW.h)	%	Net Total Peak (MW)	%	Load Factor %
1966/67	5677	11.2%	1046	6.1%	62.0%
1967/68	6062	6.8%	1162	11.1%	59.6%
1968/69	6709	10.7%	1263	8.7%	60.6%
1969/70	7517	12.0%	1409	11.6%	60.9%
1970/71	8313	10.6%	1551	10.1%	61.2%
1971/72	9080	9.2%	1720	10.9%	60.3%
1972/73	9528	4.9%	1785	3.8%	60.9%
1973/74	10581	11.1%	1959	9.7%	61.7%
1974/75	10872	2.8%	1991	1.6%	62.3%
1975/76	11432	5.2%	2202	10.6%	59.3%
1976/77	11768	2.9%	2350	6.7%	57.2%
1977/78	11962	1.6%	2446	4.1%	55.8%
1978/79	12483	4.4%	2405	-1.7%	59.3%
1979/80	12797	2.5%	2465	2.5%	59.3%
1980/81	12529	-2.1%	2536	2.9%	56.4%
1981/82	13527	8.0%	2713	7.0%	56.9%
1982/83	13260	-2.0%	2494	-8.1%	60.7%
1983/84	14387	8.5%	2875	15.3%	57.1%
1984/85	15014	4.4%	2974	3.4%	57.6%
1985/86	15366	2.3%	2945	-1.0%	59.6%
1986/87	15495	0.8%	3003	2.0%	58.9%
1987/88	16260	4.9%	3326	10.8%	55.8%
1988/89	17108	5.2%	3403	2.3%	57.4%
1989/90	17298	1.1%	3611	6.1%	54.7%
1990/91	17553	1.5%	3542	-1.9%	56.6%
1991/92	17748	1.1%	3435	-3.0%	59.0%
1992/93	17894	0.8%	3404	-0.9%	60.0%
1993/94	18048	0.9%	3567	4.8%	57.8%
1994/95	17784	-1.5%	3342	-6.3%	60.7%
1995/96	19000	6.8%	3649	9.2%	59.4%
1996/97	19173	0.9%	3476	-4.7%	63.0%
1997/98	18872	-1.6%	3573	2.8%	60.3%
1998/99	19095	1.2%	3639	1.8%	59.9%
1999/00	18804	-1.5%	3588	-1.4%	59.8%
2000/01	20075	6.8%	3706	3.3%	61.8%
2001/02	20525	2.2%	3760	1.5%	62.3%

- See the Glossary of Terms for a definition of Net Firm Energy and Net Total Peak.

ALTERNATE SCENARIOS

A Medium-Low and Medium-High scenario have been prepared to represent the sensitivity of the forecast based on various economic and demographic assumptions. Each scenario represents a different version of future economic growth in Manitoba. Although any number of assumptions could be made, these two scenarios were chosen as being representative of Medium-Low and Medium-High economic growth.

When compared to the Base Forecast, the Medium-Low scenario includes lower population growth, lower housing formation rates, lower economic growth, lower oil and natural gas price increases, lower electric space heat saturation rates, lower business formation rates, lower business electricity usage, more shutdowns/closures of existing large customers and lower probabilities of large electrical-intensive industries locating in the province.

When compared to the Base Forecast, the Medium-High scenario includes higher population growth, higher housing formation rates, higher economic growth, higher oil and natural gas price increases, higher electric space heat saturation rates, higher business formation rates, higher business electricity usage, less shutdowns/closures of existing large customers and higher probabilities of large electrical-intensive industries locating in the province.

Table 16

MEDIUM LOW SCENARIO
2001/02 - 2022/23

Fiscal Year	Net Firm Energy (GW.h)	%	Net Total Peak (MW)	%	Load Factor %
2001/02 Actual	20525	2.2%	3760	1.5%	62.3%
Weather	213		9		
2001/02 Adjusted	20738	4.0%	3769	4.6%	62.8%
2002/03	21080	1.6%	3769	0.0%	63.8%
2003/04	21218	0.7%	3787	0.5%	64.0%
2004/05	21262	0.2%	3786	0.0%	64.1%
2005/06	21361	0.5%	3793	0.2%	64.3%
2006/07	21446	0.4%	3798	0.1%	64.5%
2007/08	21567	0.6%	3808	0.3%	64.7%
2008/09	21684	0.5%	3817	0.2%	64.9%
2009/10	21802	0.5%	3827	0.3%	65.0%
2010/11	21953	0.7%	3842	0.4%	65.2%
2011/12	22108	0.7%	3859	0.4%	65.4%
10 Year Avg.		0.6%		0.2%	
2012/13	22277	0.8%	3886	0.7%	65.4%
2013/14	22435	0.7%	3911	0.6%	65.5%
2014/15	22588	0.7%	3935	0.6%	65.5%
2015/16	22736	0.7%	3957	0.6%	65.6%
2016/17	22885	0.7%	3981	0.6%	65.6%
2017/18	23034	0.7%	4004	0.6%	65.7%
2018/19	23186	0.7%	4027	0.6%	65.7%
2019/20	23338	0.7%	4051	0.6%	65.8%
2020/21	23493	0.7%	4075	0.6%	65.8%
2021/22	23649	0.7%	4100	0.6%	65.8%
2022/23	23808	0.7%	4125	0.6%	65.9%
21 Year Avg.		0.7%		0.4%	

- See the Glossary of Terms for a definition of Net Firm Energy and Net Total Peak.

Table 17

MONTHLY SCHEDULE OF NET FIRM ENERGY (GW.h)
Medium-Low Scenario

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2001/02 Actual	1573	1486	1432	1499	1567	1419	1627	1728	2060	2164	1876	2094	20525
2002/03	1605	1546	1487	1546	1571	1458	1650	1866	2187	2265	1936	1963	21080
2003/04	1604	1549	1496	1560	1579	1469	1654	1861	2208	2261	2003	1974	21218
2004/05	1608	1557	1511	1568	1596	1473	1655	1877	2217	2272	1945	1982	21262
2005/06	1614	1565	1522	1583	1610	1480	1661	1883	2226	2278	1950	1990	21361
2006/07	1618	1573	1531	1597	1623	1487	1666	1887	2233	2282	1953	1996	21446
2007/08	1625	1584	1543	1614	1639	1496	1674	1895	2244	2289	1960	2005	21567
2008/09	1632	1595	1555	1630	1654	1505	1682	1902	2254	2296	1966	2014	21684
2009/10	1639	1605	1567	1646	1670	1514	1690	1909	2264	2303	1972	2024	21802
2010/11	1649	1618	1581	1665	1688	1526	1700	1919	2277	2314	1981	2036	21953
2011/12	1658	1632	1596	1684	1706	1537	1710	1930	2291	2325	1991	2048	22108
2012/13	1671	1645	1608	1697	1719	1550	1724	1944	2308	2342	2005	2064	22277
2013/14	1683	1657	1620	1710	1732	1561	1736	1958	2323	2358	2019	2078	22435
2014/15	1695	1669	1632	1722	1744	1572	1749	1971	2338	2373	2032	2092	22588
2015/16	1707	1680	1643	1734	1756	1583	1761	1983	2353	2387	2045	2105	22736
2016/17	1718	1692	1654	1745	1768	1594	1772	1996	2367	2402	2058	2118	22885
2017/18	1730	1703	1665	1757	1780	1605	1784	2009	2382	2417	2070	2132	23034
2018/19	1741	1715	1677	1769	1792	1616	1796	2022	2397	2432	2083	2146	23186
2019/20	1753	1727	1688	1781	1804	1628	1809	2035	2412	2447	2097	2159	23338
2020/21	1765	1739	1700	1793	1816	1639	1821	2048	2427	2462	2110	2173	23493
2021/22	1777	1751	1711	1806	1828	1650	1833	2062	2442	2478	2123	2187	23649
2022/23	1789	1763	1723	1818	1841	1662	1846	2075	2458	2493	2137	2202	23808

- See the Glossary of Terms for a definition of Net Firm Energy.

Table 18

MONTHLY SCHEDULE OF NET TOTAL PEAK (MW)
Medium-Low Scenario

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
2001/02 Actual	2735	2478	2631	2711	2775	2602	2780	3211	3398	3760	3568	3437	3760
2002/03	2845	2611	2624	2650	2718	2568	2785	3263	3713	3736	3581	3304	3769
2003/04	2848	2625	2632	2680	2733	2579	2774	3276	3732	3755	3596	3322	3787
2004/05	2851	2628	2640	2692	2752	2585	2783	3279	3737	3743	3595	3328	3786
2005/06	2857	2642	2658	2717	2776	2598	2791	3284	3748	3748	3599	3336	3793
2006/07	2860	2653	2673	2740	2797	2610	2796	3287	3757	3751	3601	3342	3798
2007/08	2868	2669	2693	2766	2823	2626	2805	3294	3769	3759	3607	3352	3808
2008/09	2876	2684	2712	2793	2848	2641	2814	3301	3781	3765	3613	3361	3817
2009/10	2884	2699	2732	2819	2873	2657	2823	3308	3793	3772	3619	3371	3827
2010/11	2896	2719	2755	2850	2903	2676	2836	3320	3812	3785	3630	3386	3842
2011/12	2909	2740	2780	2881	2934	2697	2851	3333	3831	3799	3643	3401	3859
2012/13	2931	2760	2800	2902	2955	2717	2872	3357	3858	3825	3669	3426	3886
2013/14	2951	2779	2820	2922	2975	2736	2891	3379	3882	3850	3692	3448	3911
2014/15	2970	2798	2838	2941	2995	2754	2911	3400	3906	3873	3715	3470	3935
2015/16	2989	2816	2857	2960	3013	2772	2929	3421	3929	3896	3737	3491	3957
2016/17	3007	2834	2875	2979	3032	2790	2947	3442	3952	3919	3759	3512	3981
2017/18	3026	2852	2893	2997	3051	2808	2966	3462	3975	3942	3781	3533	4004
2018/19	3045	2870	2911	3016	3071	2826	2985	3483	3998	3965	3804	3554	4027
2019/20	3065	2889	2930	3035	3090	2844	3004	3505	4022	3989	3827	3576	4051
2020/21	3084	2907	2949	3055	3110	2863	3023	3526	4046	4012	3850	3598	4075
2021/22	3104	2926	2968	3074	3129	2881	3042	3548	4070	4037	3873	3620	4100
2022/23	3124	2946	2987	3094	3150	2900	3062	3570	4095	4061	3897	3642	4125

- See the Glossary of Terms for a definition of Net Total Peak.

Table 19

MEDIUM HIGH SCENARIO
2001/02 - 2022/23

Fiscal Year	Net Firm Energy (GW.h)	%	Net Total Peak (MW)	%	Load Factor %
2001/02 Actual	20525	2.2%	3760	1.5%	62.3%
Weather	213		9		
2001/02 Adjusted	20738	4.0%	3769	4.6%	62.8%
2002/03	21474	3.5%	3825	1.5%	64.1%
2003/04	21866	1.8%	3882	1.5%	64.3%
2004/05	22166	1.4%	3920	1.0%	64.6%
2005/06	22583	1.9%	3973	1.4%	64.9%
2006/07	22979	1.8%	4023	1.3%	65.2%
2007/08	23364	1.7%	4071	1.2%	65.5%
2008/09	23745	1.6%	4119	1.2%	65.8%
2009/10	24127	1.6%	4167	1.2%	66.1%
2010/11	24502	1.6%	4217	1.2%	66.3%
2011/12	24901	1.6%	4270	1.3%	66.6%
10 Year Avg.		1.8%		1.3%	
2012/13	25299	1.6%	4332	1.5%	66.7%
2013/14	25688	1.5%	4393	1.4%	66.8%
2014/15	26063	1.5%	4451	1.3%	66.8%
2015/16	26470	1.6%	4516	1.5%	66.9%
2016/17	26869	1.5%	4579	1.4%	67.0%
2017/18	27261	1.5%	4640	1.3%	67.1%
2018/19	27652	1.4%	4702	1.3%	67.1%
2019/20	27959	1.1%	4748	1.0%	67.2%
2020/21	28302	1.2%	4801	1.1%	67.3%
2021/22	28662	1.3%	4857	1.2%	67.4%
2022/23	29054	1.4%	4919	1.3%	67.4%
21 Year Avg.		1.6%		1.3%	

- See the Glossary of Terms for a definition of Net Firm Energy and Net Total Peak.

Table 20

MONTHLY SCHEDULE OF NET FIRM ENERGY (GW.h)
Medium-High Scenario

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2001/02 Actual	1573	1486	1432	1499	1567	1419	1627	1728	2060	2164	1876	2094	20525
2002/03	1637	1577	1517	1577	1603	1488	1682	1900	2224	2303	1969	1998	21474
2003/04	1655	1600	1545	1611	1630	1518	1707	1916	2269	2324	2060	2032	21866
2004/05	1679	1628	1580	1640	1668	1541	1729	1954	2303	2360	2021	2063	22166
2005/06	1710	1662	1615	1680	1708	1572	1760	1987	2342	2396	2053	2099	22583
2006/07	1738	1694	1648	1719	1746	1602	1791	2018	2379	2429	2082	2133	22979
2007/08	1766	1726	1681	1757	1783	1632	1820	2048	2414	2462	2111	2166	23364
2008/09	1794	1757	1713	1794	1820	1661	1849	2077	2449	2494	2139	2198	23745
2009/10	1821	1789	1745	1832	1857	1690	1878	2107	2484	2526	2167	2231	24127
2010/11	1848	1820	1777	1869	1893	1718	1906	2136	2519	2558	2195	2263	24502
2011/12	1877	1852	1810	1908	1931	1748	1936	2167	2557	2593	2225	2297	24901
2012/13	1907	1883	1840	1939	1963	1777	1968	2201	2596	2633	2260	2333	25299
2013/14	1938	1913	1869	1970	1994	1805	1999	2234	2634	2671	2293	2368	25688
2014/15	1966	1942	1897	2000	2024	1833	2029	2267	2671	2708	2325	2402	26063
2015/16	1998	1973	1928	2032	2056	1863	2061	2302	2711	2749	2360	2439	26470
2016/17	2028	2004	1958	2063	2088	1892	2093	2336	2750	2788	2395	2475	26869
2017/18	2059	2034	1987	2094	2119	1920	2124	2369	2789	2827	2429	2511	27261
2018/19	2089	2064	2016	2125	2150	1949	2155	2403	2827	2866	2462	2546	27652
2019/20	2113	2088	2040	2149	2174	1972	2180	2429	2857	2896	2488	2573	27959
2020/21	2139	2114	2066	2176	2202	1997	2207	2459	2890	2930	2518	2604	28302
2021/22	2167	2142	2093	2205	2230	2024	2236	2489	2925	2965	2549	2637	28662
2022/23	2197	2172	2122	2235	2262	2052	2267	2523	2964	3004	2583	2672	29054

- See the Glossary of Terms for a definition of Net Firm Energy.

Table 21

MONTHLY SCHEDULE OF NET TOTAL PEAK (MW)
Medium-High Scenario

Fiscal Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Annual
2001/02 Actual	2735	2478	2631	2711	2775	2602	2780	3211	3398	3760	3568	3437	3760
2002/03	2894	2657	2670	2697	2766	2614	2833	3315	3770	3792	3636	3356	3825
2003/04	2929	2702	2709	2758	2812	2655	2853	3363	3826	3850	3688	3410	3882
2004/05	2964	2736	2749	2801	2863	2692	2895	3402	3870	3876	3725	3451	3920
2005/06	3009	2787	2804	2865	2925	2743	2941	3449	3927	3927	3774	3502	3973
2006/07	3050	2835	2857	2925	2985	2791	2983	3493	3980	3974	3819	3549	4023
2007/08	3091	2883	2908	2985	3044	2838	3025	3536	4031	4020	3862	3595	4071
2008/09	3131	2929	2959	3044	3102	2884	3066	3577	4081	4065	3905	3640	4119
2009/10	3171	2977	3011	3103	3160	2931	3107	3619	4132	4110	3948	3686	4167
2010/11	3212	3024	3062	3162	3219	2978	3148	3662	4184	4156	3991	3731	4217
2011/12	3255	3074	3116	3225	3281	3028	3192	3708	4240	4206	4039	3781	4270
2012/13	3305	3122	3165	3274	3331	3075	3242	3763	4302	4267	4099	3837	4332
2013/14	3354	3169	3212	3323	3381	3122	3290	3817	4362	4327	4156	3892	4393
2014/15	3401	3214	3258	3370	3428	3167	3337	3870	4420	4385	4213	3945	4451
2015/16	3453	3263	3308	3421	3480	3216	3387	3927	4484	4448	4274	4004	4516
2016/17	3504	3312	3357	3472	3531	3263	3437	3983	4547	4510	4334	4061	4579
2017/18	3553	3359	3405	3521	3581	3310	3486	4038	4608	4571	4393	4116	4640
2018/19	3603	3407	3453	3570	3631	3357	3535	4093	4669	4632	4452	4172	4702
2019/20	3641	3444	3490	3608	3669	3394	3573	4135	4715	4678	4496	4215	4748
2020/21	3684	3485	3532	3651	3713	3435	3615	4182	4768	4730	4547	4263	4801
2021/22	3730	3528	3576	3696	3759	3478	3660	4233	4824	4786	4601	4314	4857
2022/23	3779	3576	3624	3745	3808	3525	3709	4288	4885	4847	4660	4370	4919

- See the Glossary of Terms for a definition of Net Total Peak.

LOAD FORECAST UNCERTAINTY

The Medium-Low and Medium-High scenarios represent the expected forecast of loads given a set of specified economic conditions that correspond to assumptions of lower and higher economic growth. However, these scenarios do not imply a likelihood of occurrence. To establish these likelihoods (and for other probabilistic or risk analysis purposes), the following estimates of the variation in the forecast are provided. The variation in the forecast is divided into two parts:

1) **Weather and Random Variation** - is the variation caused by above or below normal temperatures, or by increased or decreased short-term consumption by groups of customers or industries. This variation is determined from the Hourly Load Model.

2) **Economic and Modeling Variation** - is the variation due to changes in economic conditions and modeling assumptions. This variation is obtained by taking the historical weather-adjusted annual energy and determining the year-to-year variation in its growth. A statistically-based method of estimating the year-to-year variation has been used this year, resulting in a lower estimate of future economic and modeling variation. This change has lowered the probability of exceeding either the Medium-Low or Medium-High scenarios.

The two variations are combined to determine the total uncertainty of the forecast. These are converted to a statistical measure known as a standard deviation. The future load is expected to be within one standard deviation of the Base Forecast 68% of the time and within three standard deviations of the Base Forecast 99% of the time.

Figure 21

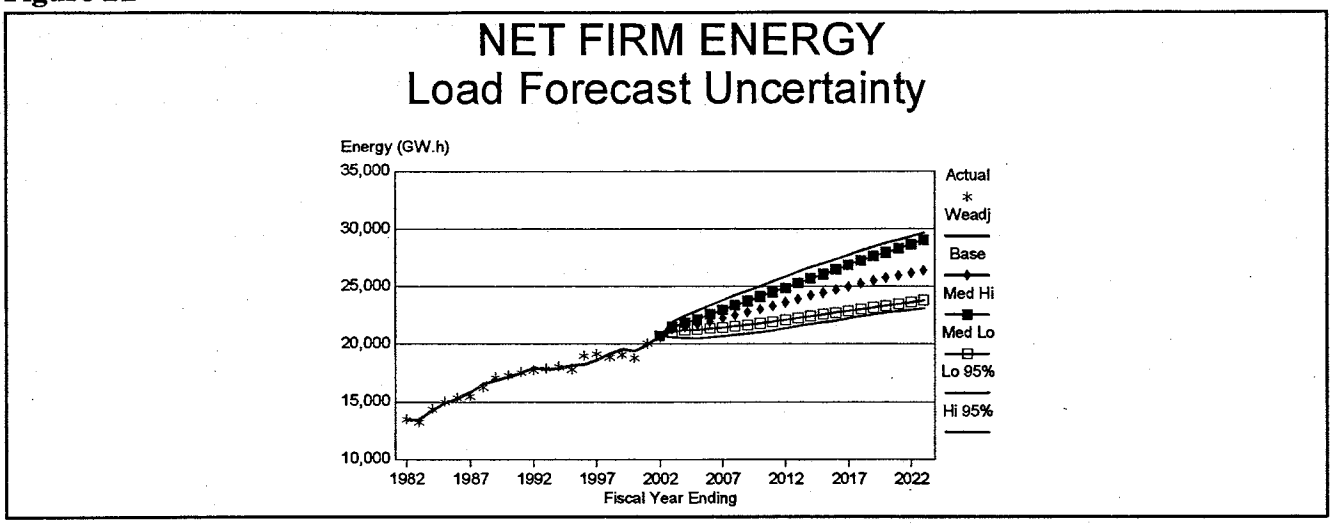


Table 22

Fiscal Year	Net Firm Energy Base Fcst	Wthr and Misc Std Dev	Econ and Model Std Dev	Total Std Dev	95% Lower Conf. Intrvl. (LCL)	Net Firm Energy MedLo Scenario	Net Firm Energy MedHi Scenario	95% Upper Conf. Intrvl. (UCL)	Prob. Actual > MedLo	Prob. Actual > MedHi
2002/03	21260	226	257	342	20590	21080	21474	21931	70%	27%
2003/04	21504	227	446	501	20523	21218	21866	22486	72%	24%
2004/05	21708	223	576	618	20497	21262	22166	22920	77%	23%
2005/06	21975	223	682	718	20569	21361	22583	23382	80%	20%
2006/07	22251	223	774	805	20673	21446	22979	23829	84%	18%
2007/08	22515	223	855	884	20782	21567	23364	24247	86%	17%
2008/09	22774	223	930	956	20900	21684	23745	24648	87%	16%
2009/10	23031	223	999	1024	21025	21802	24127	25037	89%	14%
2010/11	23322	223	1064	1087	21192	21953	24502	25452	90%	14%
2011/12	23630	224	1124	1146	21383	22108	24901	25877	91%	13%
2012/13	23928	226	1182	1203	21570	22277	25299	26287	92%	13%
2013/14	24215	228	1237	1258	21750	22435	25688	26681	92%	12%
2014/15	24464	229	1290	1310	21897	22588	26063	27032	92%	11%
2015/16	24705	231	1340	1360	22039	22736	26470	27371	93%	10%
2016/17	24985	233	1389	1409	22225	22885	26869	27746	93%	9%
2017/18	25255	235	1436	1455	22403	23034	27261	28108	94%	8%
2018/19	25517	237	1482	1501	22576	23186	27652	28459	94%	8%
2019/20	25776	239	1526	1545	22749	23338	27959	28804	94%	8%
2020/21	25949	240	1569	1587	22838	23493	28302	29061	94%	7%
2021/22	26158	241	1611	1629	22966	23649	28662	29351	94%	6%
2022/23	26381	243	1652	1670	23109	23808	29054	29654	94%	6%

Figure 22

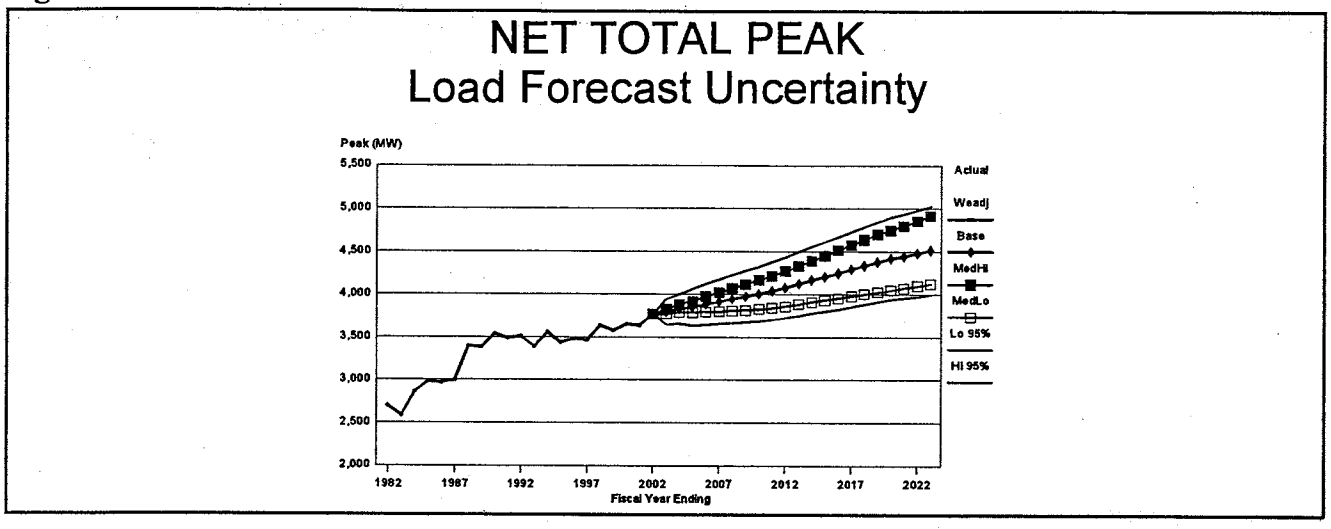


Table 23

Fiscal Year	Net Total Peak Base Fcst	Wthr and Misc Std Dev	Econ and Model Std Dev	Total Std Dev	95% Lower Conf. Intrvl. (LCL)	Net Total Peak MedLo Scenario	Net Total Peak MedHi Scenario	95% Upper Conf. Intrvl. (UCL)	Prob. Actual > MedLo	Prob. Actual > MedHi
2002/03	3794	67	36	76	3644	3769	3825	3944	63%	34%
2003/04	3828	58	65	87	3657	3787	3882	3999	68%	27%
2004/05	3850	68	85	109	3636	3786	3920	4064	72%	26%
2005/06	3882	69	100	122	3643	3793	3973	4121	77%	23%
2006/07	3914	69	114	133	3654	3798	4023	4174	81%	21%
2007/08	3945	70	125	143	3664	3808	4071	4226	83%	19%
2008/09	3975	71	136	154	3674	3817	4119	4276	85%	17%
2009/10	4005	72	146	163	3686	3827	4167	4324	86%	16%
2010/11	4041	73	156	173	3703	3842	4217	4379	88%	15%
2011/12	4080	74	165	181	3725	3859	4270	4435	89%	15%
2012/13	4126	75	174	190	3754	3886	4332	4498	90%	14%
2013/14	4170	75	183	198	3782	3911	4393	4558	91%	13%
2014/15	4210	76	192	206	3806	3935	4451	4614	91%	12%
2015/16	4248	76	201	215	3827	3957	4516	4669	91%	11%
2016/17	4293	77	209	222	3857	3981	4579	4729	92%	10%
2017/18	4336	78	216	230	3886	4004	4640	4786	93%	9%
2018/19	4378	78	224	237	3913	4027	4702	4843	93%	9%
2019/20	4419	79	230	243	3942	4051	4748	4896	93%	9%
2020/21	4446	79	237	250	3957	4075	4801	4935	93%	8%
2021/22	4478	80	243	256	3976	4100	4857	4980	93%	7%
2022/23	4513	80	250	262	3999	4125	4919	5027	93%	6%

FORECAST ACCURACY

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

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

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

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

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

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

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

Figure 23

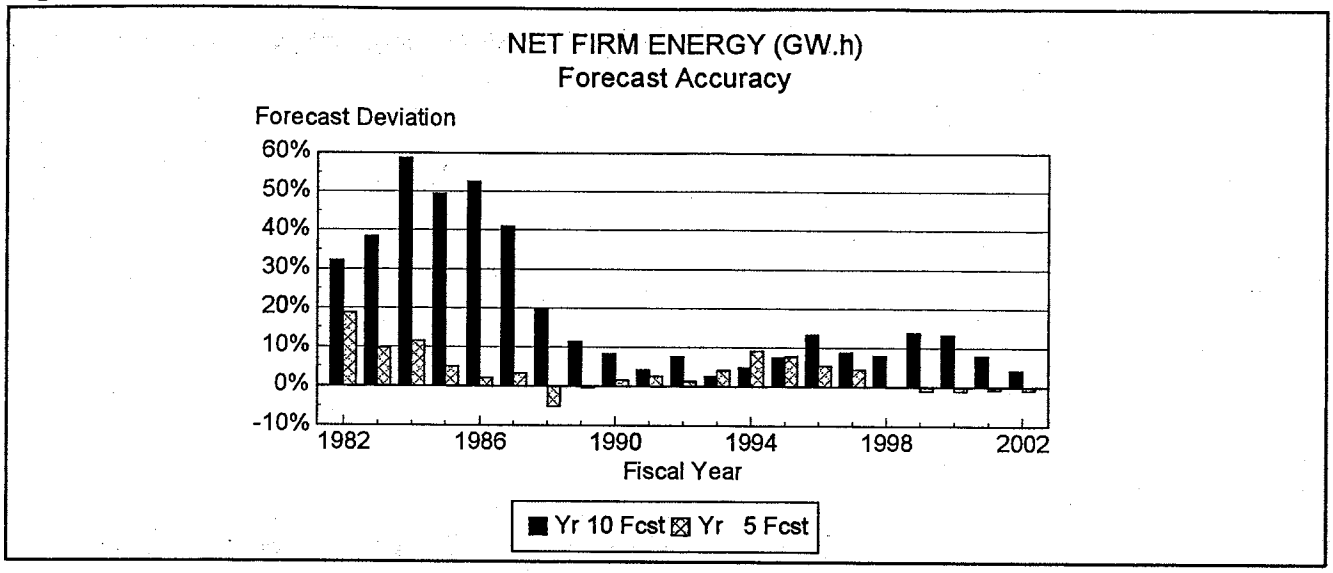


Table 24

Fiscal Year	Forecast Prepared 10 Years Previous	Forecast Prepared 5 Years Previous	Actual Net Firm Energy	Weather Adjustment	Weadj. Net Firm Energy	10 Year Percent Deviation	5 Year Percent Deviation
1981/82	17812	16010	13527	-55	13472	32.2%	18.8%
1982/83	18633	14778	13260	217	13477	38.3%	9.7%
1983/84	22587	15868	14357	-154	14233	58.7%	11.5%
1984/85	22332	15679	15014	-81	14933	49.5%	5.0%
1985/86	23339	15600	15366	-72	15294	52.6%	2.0%
1986/87	22325	16333	15495	339	15834	41.0%	3.2%
1987/88	19823	15692	16260	298	16558	19.7%	-5.2%
1988/89	18751	16753	17108	-282	16826	11.4%	-0.4%
1989/90	18585	17451	17298	-120	17178	8.2%	1.6%
1990/91	18254	17994	17553	-22	17531	4.1%	2.6%
1991/92	19311	18166	17748	191	17939	7.6%	1.3%
1992/93	18312	18592	17894	-33	17861	2.5%	4.1%
1993/94	18773	19539	18048	-135	17913	4.8%	9.1%
1994/95	19508	19551	17784	376	18160	7.4%	7.7%
1995/96	20659	19194	19000	-772	18228	13.3%	5.3%
1996/97	20229	19427	19173	-566	18607	8.7%	4.4%
1997/98	20737	19183	18872	323	19195	8.0%	-0.1%
1998/99	22059	19356	19095	451	19546	12.9%	-1.0%
1999/00	22018	19222	18804	619	19423	13.4%	-1.0%
2000/01	21502	19752	20075	-156	19919	7.9%	-0.8%
2001/02	21582	20559	20525	213	20738	4.1%	-0.9%

Figure 24

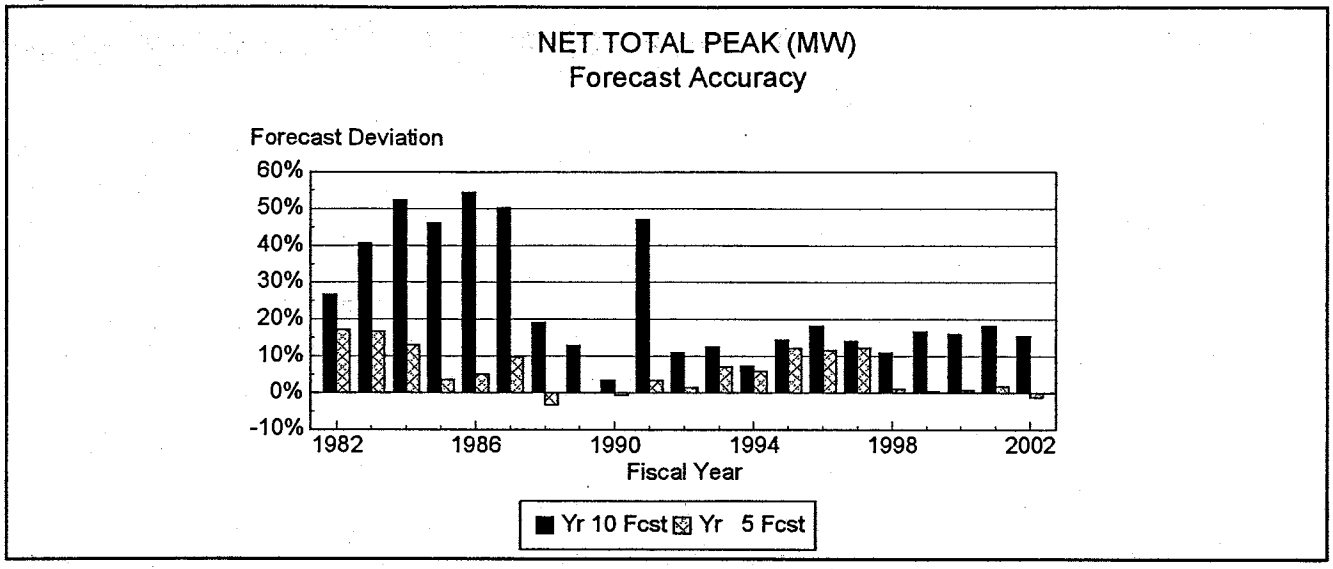


Table 25

Fiscal Year	Forecast Prepared 10 Years Previous	Forecast Prepared 5 Years Previous	Actual Net Total Peak	Curtailed and Weather Adjustment	Weadj. Net Total Peak	10 Year Percent Deviation	5 Year Percent Deviation
1981/82	3420	3161	2713	-16	2697	26.8%	17.2%
1982/83	3632	3013	2494	91	2585	40.5%	16.6%
1983/84	4361	3234	2575	-12	2863	52.3%	13.0%
1984/85	4356	3087	2974	8	2982	46.1%	3.5%
1985/86	4584	3119	2945	23	2968	54.4%	5.1%
1986/87	4506	3293	3003	-5	2998	50.3%	9.8%
1987/88	4041	3286	3326	67	3393	19.1%	-3.2%
1988/89	3822	3384	3403	-19	3384	12.9%	0.0%
1989/90	3659	3515	3611	-71	3540	3.4%	-0.7%
1990/91	3652	3603	3542	-53	3489	4.7%	3.3%
1991/92	3896	3557	3435	74	3509	11.0%	1.4%
1992/93	3809	3631	3404	-18	3386	12.5%	7.2%
1993/94	3816	3771	3567	-11	3556	7.3%	6.0%
1994/95	3930	3855	3342	94	3436	14.4%	12.2%
1995/96	4115	3884	3649	-170	3479	18.3%	11.6%
1996/97	4003	3943	3476	32	3508	14.1%	12.4%
1997/98	4036	3671	3573	63	3636	11.0%	1.0%
1998/99	4194	3610	3639	-43	3596	16.6%	0.4%
1999/01	4234	3682	3588	66	3654	15.9%	0.8%
2000/01	4303	3696	3706	-67	3639	18.2%	1.6%
2001/02	4352	3725	3760	9	3769	15.5%	-1.2%

CALENDAR YEAR RESULTS

Table 26

ENERGY SALES TO MANITOBA HYDRO CUSTOMERS
2001-2022 (GW.h)
Base Forecast

Calendar Year	Residential	General Service	Area & Roadway Lighting	Manitoba Hydro Sales Incl Diesel		Total Diesel	Manitoba Hydro Sales Excl Diesel
2001 Actual	5249	10153	68	15470	3.3%	11	15459
2002	5308	10561	67	15937	3.0%	12	15925
2003	5390	10858	68	16316	2.4%	13	16303
2004	5434	11028	69	16530	1.3%	14	16516
2005	5471	11219	70	16759	1.4%	15	16744
2006	5504	11425	70	16998	1.4%	16	16982
2007	5536	11625	71	17232	1.4%	18	17214
2008	5568	11819	71	17459	1.3%	19	17440
2009	5601	12009	72	17682	1.3%	20	17662
2010	5635	12217	73	17925	1.4%	21	17904
2011	5672	12442	73	18187	1.5%	22	18165
2012	5709	12659	74	18443	1.4%	23	18420
2013	5748	12866	75	18689	1.3%	24	18665
2014	5788	13043	75	18907	1.2%	26	18881
2015	5826	13210	76	19113	1.1%	27	19086
2016	5863	13376	77	19316	1.1%	28	19288
2017	5901	13543	77	19521	1.1%	29	19492
2018	5939	13711	78	19728	1.1%	30	19698
2019	5978	13880	79	19937	1.1%	31	19906
2020	6018	14051	79	20148	1.1%	32	20116
2021	6058	14223	80	20361	1.1%	33	20328
2022	6098	14398	81	20577	1.1%	34	20543

Table 27

NET FIRM ENERGY
2001 - 2022 (GW.h)
Base Forecast

Calendar Year	Dist. Losses	Man. Hydro Const.	Wpg Hydro	Manitoba Load at Common Bus	Trans. Losses & Stn Service	Gross Total Energy	Non Firm Energy	Station Service	Net Firm Energy
2001 Actual	583	42	2444	18527	1982	20509	21	162	20327
2002	894	44	2452	19315	2072	21387	28	179	21180
2003	740	43	2456	19542	2065	21608	26	182	21400
2004	832	43	2459	19850	2051	21900	8	184	21708
2005	801	43	2461	20048	2050	22098	0	186	21912
2006	811	43	2463	20299	2075	22374	0	188	22186
2007	822	43	2465	20544	2100	22644	0	191	22453
2008	833	43	2467	20782	2125	22907	0	193	22714
2009	843	43	2469	21017	2149	23167	0	195	22972
2010	855	43	2473	21275	2175	23450	0	197	23253
2011	868	43	2478	21552	2204	23756	0	200	23556
2012	870	46	2483	21818	2231	24049	0	203	23846
2013	882	51	2487	22084	2258	24342	0	205	24137
2014	892	56	2491	22320	2282	24603	0	207	24695
2015	901	61	2495	22543	2305	24848	0	209	24639
2016	914	87	2499	22788	2331	25119	0	212	24907
2017	923	121	2502	23039	2356	25394	0	214	25180
2018	931	145	2506	23281	2380	25661	0	216	25445
2019	941	162	2509	23518	2405	25923	0	218	25705
2020	943	127	2512	23699	2424	26122	0	220	25902
2021	956	81	2515	23881	2442	26323	0	222	26101
2022	968	52	2518	24081	2463	26544	0	224	26320

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

GLOSSARY OF TERMS

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

1) **GROSS vs NET** - for both energy and peak, gross figures include station service loads; whereas net figures exclude station service loads.

2) **TOTAL vs FIRM** - total energy includes non-firm energy; whereas firm energy excludes non-firm energy. Total peak adds back curtailed loads; whereas firm peak excludes curtailed loads.

Station Service - is electricity consumed by generating stations in the production of electric power.

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

Curtailable - is load that can be curtailed on short notice. Customers are given a discount for subscribing to this less firm source of power. Curtailable loads affects peak demand because most periods of curtailment tend to be at or near the system peak. It is assumed that this rate will have no effect on energy consumption because customers can purchase make-up energy after the curtailment.

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

Net Total Energy - same as Gross Total Energy except station service loads are excluded.

Net Firm Energy - same as Gross Total Energy except station service and non-firm loads are excluded.

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

Net Total Peak - same as Gross Total Peak except station service loads are excluded.

Net Firm Peak - same as Gross Total Peak except station service and curtailable loads are excluded.