# POWER PLANNING AND DEVELOPMENT DIVISION

## Report on

# THE 2004/05 POWER RESOURCE PLAN

Report No. PP&D-04/05
Date: July 22, 2004

# THE 2004/05 POWER RESOURCE PLAN

**SUBJECT:**

Power Resource Plan for the 2004/05 IFF

**RECOMMENDATION:**

The 2004/05 Power Resource Plan includes demand-side management projections, upgrades to existing facilities and new additions required to meet the base domestic load forecast and committed firm exports to the planning horizon of the next 35 years.

It is recommended that the following resource plan be adopted for purposes of the 2004/05 IFF and the 20 year capital plan. Although not all projects included in the plan have received final corporate commitment, these projects are judged to be reasonable and practical based on current status and analysis. Such uncommitted projects in the plan are still subject to corporate approval based on individual project evaluations.

Supply-Side Enhancement Projects (SSE)

Total: 683 MW/3339 GWh by Mar 2013 including:

| | |
|---|---|
| Achieved to Date: | 140 MW/732 GWh by Mar 2003 |
| Planned Additional: | Total: 216 MW/ 457 GWh by Mar 2013 |
| Kelsey Rerunnering | (75 MW/0 GWh) by 2011/12 |
| HVDC Bipole III Line | (86 MW/437 GWh) by 2012/13 |
| Winnipeg River Plants | (10 MW/20 GWh) |
| Northern AC Enhancements | (45 MW/undetermined GWh) |

License Review and Continuation of Operation: Total: 327 MW/2150 GWh

| | | |
|---|---|---|
| Pointe du Bois | (90 MW/320 GWh) | License Review Dec 2011 |
| Selkirk #1-2 | (132 MW/1030 GWh) | License Review 2005/06-2019/20 |
| Brandon #5 | (105 MW/800 GWh) | License Review 2006/07-2018/19 |

Demand Side Management Program (DSM)

| | |
|---|---|
| Achieved to Date (verified): | 179 MW/ 488 GWh by Mar 2002 |
| Planned Additional (1.75 x 2001 Option 4): | 185 MW/ 716 GWh by Mar 2013 |

New Generation

Wind:

| | | |
|---|---|---|
| Phase I | (100 MW) | 2005/06 |
| Phase II | (50 MW) | 2006/07 |
| Phase III | (50 MW) | 2007/08 |
| Phase IV | (50 MW) | 2008/09 |

| | | |
|---|---|---|
| Hydro: | | |
| Wuskwatim | (200 MW) | 2010/11 |
| Conawapa | (1250 MW) | 2024/25 |

**BACKGROUND:**

This report assesses the system supply relative to demand and firm commitments to determine the timing of future generation additions. Updated information includes DSM, SSE, existing plant service capability, renewal of firm export contracts/ diversity agreements and the 2004 Load Forecast.

The economic evaluations presented in this document and used to determine the next plant after Wuskwatim are based on the 2002/03 export price assumptions, updated with the current G911 information (G911-1, effective 2004/05/18).

Timing of New Resource Requirements for Domestic Load

In anticipation of a favourable outcome at the CEC hearings, regulatory and licensing process and NCN ratification, Wuskwatim is assumed to have an in-service-date of 2010. On that basis, Figure 1 indicates that new energy resources are required to meet the forecasted domestic load requirements by 2024/25 deferring new resource requirements (post Wuskwatim) by two years compared to last year's IFF. There are no committed exports by 2024 except for the Lake St. Joseph exchange of 145 GWh.

Next Plant Selection after Wuskwatim

The 2004/05 Power Resource Plan builds on previous resource planning studies which identified Wuskwatim, Conawapa, Gull and simple cycle combustion turbines as the most attractive options. In addition, this year a new smaller capacity Conawapa is being considered. This concept includes constructing the full scale civil structures at Conawapa but installing only 5 of the 10 units.

Firm Export Assumptions

Figure 1 provides current energy projections for total firm load and dependable supply (resources). The total load includes the 2004 base domestic forecast and current committed firm exports (e.g. NSP 500 MW Extension, MMPA 60/30 MW, GRE 50 MW, WPS 100 MW) which remained unchanged from last year. The resources include the ongoing operation of existing generation that has already been committed such as Brandon #5 (2006/07) and Selkirk #1 & 2 (2005/06), although these still must pass through the regulatory process. Successful license reviews for Brandon #5 and Selkirk #1 & 2 will allow continued operation of these facilities to the years 2018/19 and 2019/20 respectively, which will likely be the end of their service life. The dependable energy supply also includes imports from long-term dependable energy contracts or from unfirm energy contracts that can be expected to be renewed in the very long term.

Wind Generation Assumptions

In 2003/04, the Corporation committed to 250 MW of wind generation provided that it is technically, economically and financially viable. As in the 2003/04 Power Resource Plan, the initial 100 MW of wind generation is assumed for an in-service-date of 2005/06. This in-service date is still considered achievable and it is based on a recent Power Purchase Agreement with a private developer.

The remaining annual additions of 50 MW have assumed in-service dates of 2006/07, 2007/08 and 2009/10 respectively, similar to last year. It is assumed that the first 50 MW of wind will be developed by a private developer (NUG) with the remaining 100 MW being developed by Manitoba Hydro.

It is expected that these wind power installations will be located at one or more of the seven wind sites currently being monitored.

Supply-Side Enhancement Assumptions

The 2004/05 Power Resource Plan includes Kelsey rerunnering which provides 75 MW of incremental capacity. This project does not affect the timing of new generation because it has no increase in associated dependable energy. There are a range of options for the rehabilitation/redevelopment of Pointe du Bois and Slave Falls Generating Stations. This Power Resource Plan assumes that Pointe du Bois will continue to operate and that a decision will be made to move forward with rehabilitation at that site. It is assumed that rehabilitation will be complete by 2012 and will realize a gain of 13 MW, (90 MW), from 2012 to the end of the planning horizon. Engineering studies are underway and a recommendation will be forthcoming once an evaluation has been completed.

Demand Side Management Assumptions

Future DSM options are currently in the process of being updated, based upon the recently completed DSM Market Achievable Potential Study. The 2004/05 Power Resource Plan includes a DSM projection which is 1.75 times the DSM of the 2003/04 Power Resource Plan, net of adjustments[1]. This current DSM projection is based on an adjustment of the Option 4 level DSM derived in the 2001/02 Power Smart Plan. Until the new plan is finalized, an interim estimate of the anticipated savings has been made based on the DSM Market Potential Study. It is judged that this higher level of DSM will be economic.

Work done for the CEC process indicates that the Upper Bound Scenario of the DSM Market Potential Study is approximately double the 2001/02 plan. Recognizing the uncertainty of achieving the upper bound savings, it is judged that the 1.75 factor represents a reasonable increase to the 2001/02 plan.

It is expected that a fully revised DSM plan will be included in the 2005/06 Power Resource Plan.

Load Forecast

[1] DSM values have been adjusted to be incremental to the savings achieved under the Power Smart Programs by assuming that savings forecasted under the 2001 plan have been achieved up to March 2004

The 2004/05 Load Forecast results in a lower base load firm energy forecast in the period past 2012/13 and a higher energy forecast for the shorter term (period from 2006/07 to 2012/13). The lower forecast projected from 2013/14 to the remainder of the study period translates to an average decrease in load of around 540 GWh for the period between 2013/14 to the end of the study period. Since additional firm surplus energy also becomes available from increased DSM throughout the entire study period, the overall surplus firm energy increases by about 885 GWh in the year 2022/23.

Relative to the 2003/2004 IFF, which required new resources (post Wuskwatim) in the year 2022/23, the recommended sequence for the 2004/2005 Power Resource Plan requires new generation (post Wuskwatim) to support an energy deficit of approximately 40 GWh in 2024/25. Figure 2 and Table A depict the energy balances and Table B depicts capacity balances for the recommended IFF sequence.

Figure1

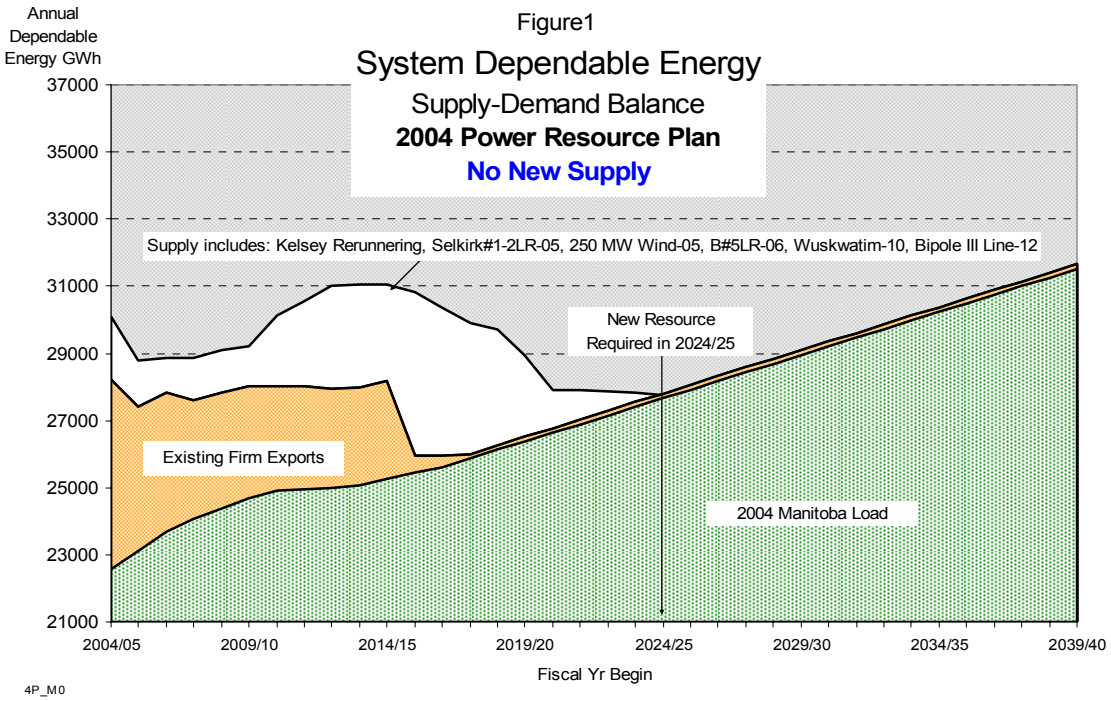
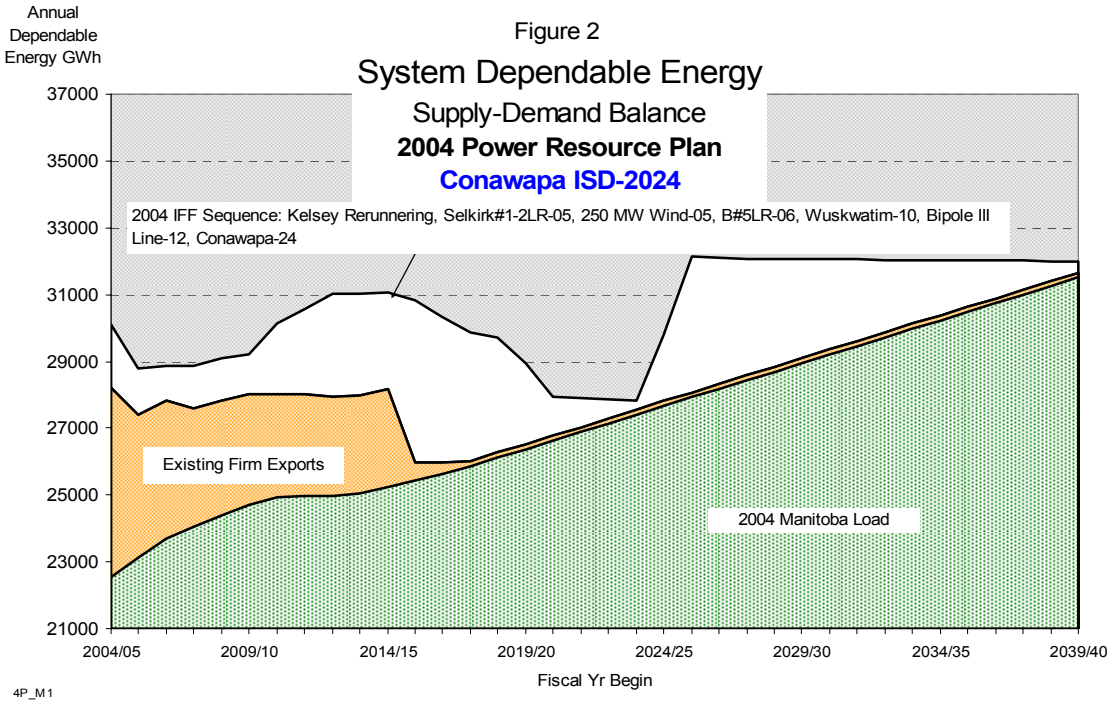



Figure 2



**JUSTIFICATION:**

Using the generation options of Gull, Conawapa, simple cycle combustion turbines and a 5 unit Conawapa, four sequences were developed that would satisfy the capacity/dependable energy requirements for the period of 2004/05 to 2039/40, inclusive. These plants are restricted to in-service dates required to meet domestic load requirements.

This evaluation utilizes the 2002/03 export price assumptions, updated to 2004, which includes consideration of environmental impacts of emissions and other pollutants. The generation sequence recommended for the 2004/05 IFF is Wuskwatim 2010/11 followed by Conawapa 2024/25.

Table 1 below shows the incremental present value benefit in millions of 2004 present value dollars of the sequences relative to the all SCCT sequence, calculated at both 6% and 10% real discount rates. The incremental Internal Rate of Return is also shown, representing the return on the incremental investment of each sequence relative to the all SCCT sequence. Comparisons are made to the all SCCT sequence because it is the sequence which requires the lowest capital investment. The incremental benefits calculated at the 10% real discount rate provides a similar comparison to economic evaluations of Wuskwatim presented in the 2003 Clean Environment Commission submission.

A t either discount rate, the Conawapa ISD 2024 sequence provides the most benefit of all sequences considered.

**Table 1**
**Expected Benefits Relative to all SCCT Sequence**
**(Bipole III Line ISD 2012 Pre-Justified)**
Millions of 2004 PV Dollars, 2004 **EXPECTED** Export Prices

| | **Conawapa -24** (10 units) | **Conawapa -24** (first 5 units of 10) | **Gull-24** SCCT1X-35, 39 |
|---|---|---|---|
| Incremental NPV @ **6% Discount Rate** | **563** | **391** | **285** |
| Incremental NPV @ **10% Discount Rate** | **10** | **-25** | **-31** |
| **Incremental IRR** | **10.2%** | **9.5%** | **9.2%** |

Notes:
Sequence ISDs developed from 2004 Base Load Forecast, and 2004 DSM, First Firm Energy Deficit in 2024
Sequences include: Selkirk LR-2005, B#5 LR-2006, Bipole III Line-2012, Wuskwatim-2010
Economic evaluations based on 2004 Base Load Forecast & DSM, adjusted 2002/03 Export Prices.
Comparisons are of 4P-M1 (C-24), 4P-M2 (C5units-24), 4P-M4 (G-24) compared to 4P-M3 (SCCT-24)

**RISKS:**

Risks to the 2004/05 Power Resource Plan Recommendation generally relate to selection of next plant, variations in load growth, inability to develop planned supply additions and inability to extend existing operations.

The most significant risks of next plant selection in this resource plan, relate specifically to the selection of Conawapa versus Gull. Although the analyses leading up to the 2004/05 Power Resource Plan, including the extensive and thorough material submitted to the Wuskwatim CEC Process, have indicated that development of Conawapa after Wuskwatim could be the most economic generation sequence to meet Manitoba load, a number of uncertainties have kept it from being included in past recommendations. These uncertainties, discussed below, are now no longer judged sufficient to override the selection of Conawapa as the most economic option for next plant.

**Risks specific to Conawapa as next plant**

1. Conawapa is a large plant:

The size of Conawapa has been identified as a risk to its development. This issue has been addressed in two ways, as a comparison to Gull:

- A later in-service date of 2024 for Conawapa would result in equivalent or less risk in terms unexportable surplus energy compared to an early in-service-date for Gull. (It is acknowledged that the Corporation is protecting an early in-service-date for Gull and for the purposes of this document, 2013 has been assumed as the early in-service date.) Figures 3 and 4, on the following page, illustrate the incremental surplus median energy that the Gull-2013 scenario and the Conawapa-2024 scenario would add to the system. The annual energy surpluses are visually depicted to characterize the quantity and the timing of the surplus. Conawapa with an in-service date of 2024, under median flow conditions, would result in less surplus energy being potentially restricted by existing tie-lines, compared to development of Gull in 2013.

- The 5-unit Conawapa would be similar in capacity to Gull and would require less transmission capability than a 10-unit Conawapa, thus making it closer to Gull in capacity and cost, but with significantly higher energy. The decision to install the remaining 5 units (and additional transmission capability) could result from evaluations at a later date. Table 2, on the following page, compares the cost and characteristics of Conawapa (10 units), Conawapa (5 units), and Gull.

2. Cost Estimates of Conawapa:

For planning purposes, the generation and transmission cost estimates for Gull and Conawapa have been prepared using similar methodologies and are considered to be comparable. Cost Curves using the range estimating process have been prepared for both options and the 50 percentile cost estimate has been used in the resource evaluation studies. The levels of contingency included in the generating station estimates for Conawapa and Gull are 10.7% and 9.0%, respectively.

The current cost estimate for Conawapa GS was prepared on the basis of bids for the Limestone General Contract and prices for major equipment based on the recent experience with manufacturers' quotations for Wuskwatim and Gull GS. Further updates of the Gull and Conawapa cost estimates are scheduled for Fall 2004.

The Power Resource Plan recommendation of Conawapa for an in-service–date of 2024 allows significant time to re-evaluate cost estimates relative to any future changes before final commitment.

**Table 2**
**Comparison of Costs & Characteristics of Gull and Conawapa**
Millions of 2004 Base Dollars, 2004 $/MWh

| | Conawapa-24 | 5-unit Conawapa-24 | Gull-24 |
|---|---|---|---|
| Generation Station Costs | 2058 | 1780 | 1657 |
| Transmission Costs | 848 | 541 | 586 |
| Total Costs | **2906** | **2321** | **2243** |
| Levelized Costs $/MWh @ 6 % Discount Rate | **42** | **42** | **48** |
| Levelized Costs $/MWh @ 10 % Discount Rate | **70** | **71** | **80** |
| Dependable GWh | 4550 | 4430 | 2900 |
| Average GWh | 7000 | 5600 | 4430 |

**Figure 3**
Energy Available For Export

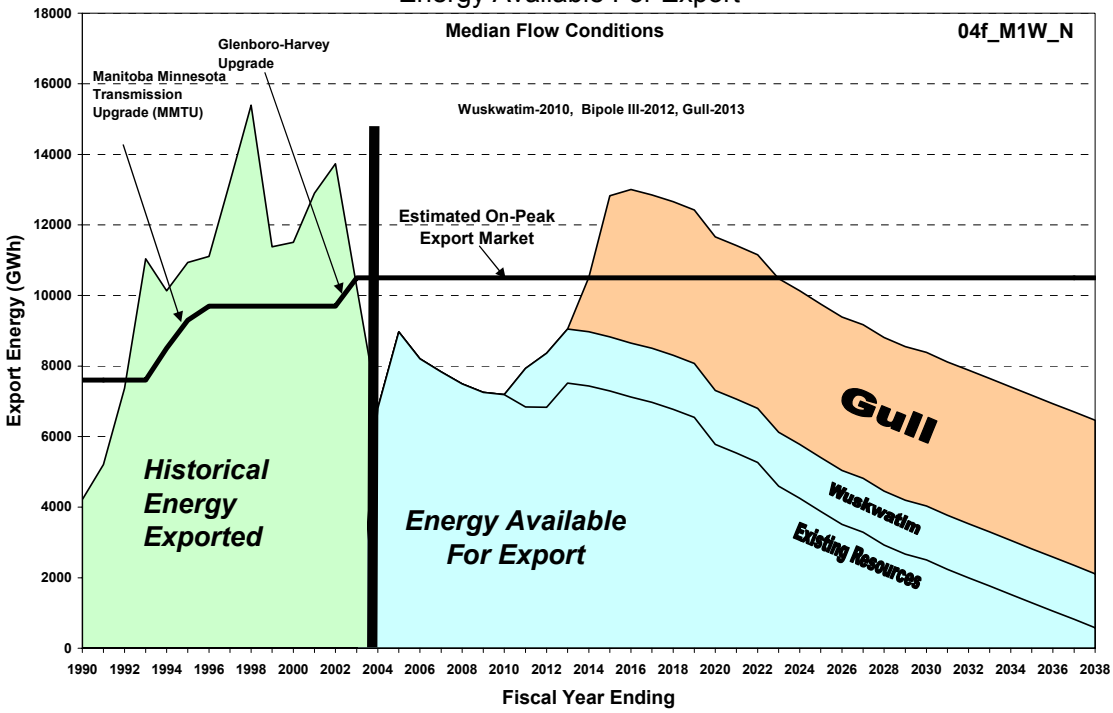
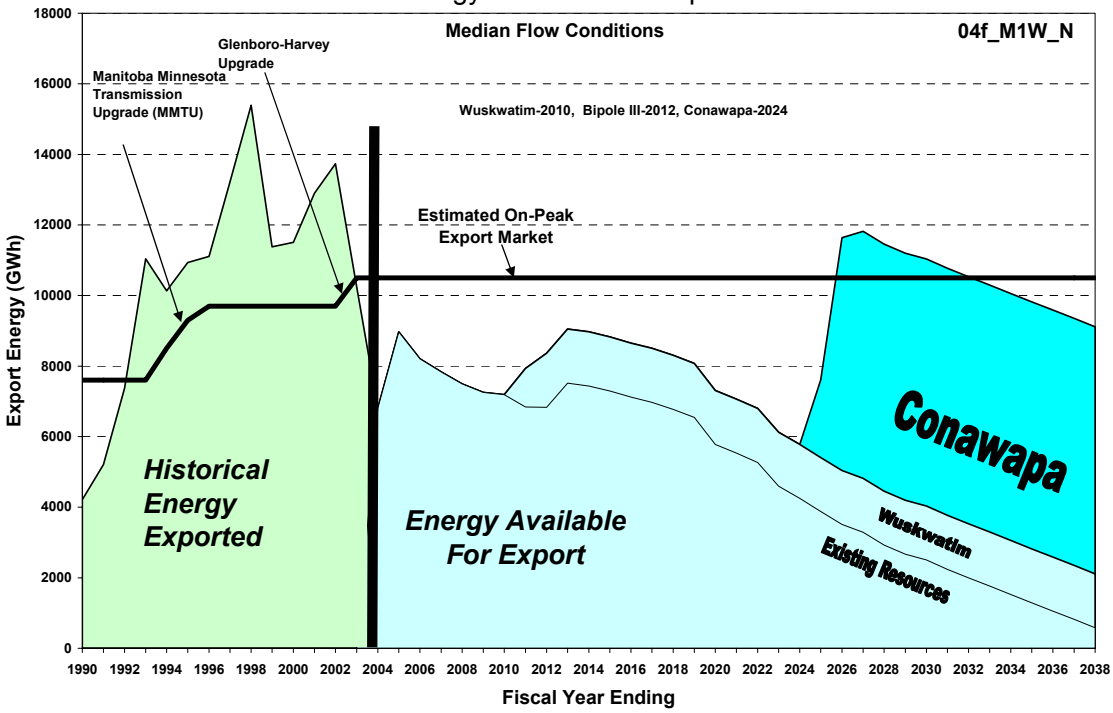



**Figure 4**
Energy Available For Export



3.Conawapa B axis versus DX axis:

The decision on which axis is to be developed for Conawapa would ultimately affect the capacity of the plant. Selection of the DX axis would likely provide 10% more capacity at Conawapa (1250 MW vs 1375 MW) allowing for greater hydro capability in the event the Gillam Island site is not developable. However, this would add additional investment risk to the Conawapa project. The recommendation of Conawapa for an in-service-date of 2024 allows sufficient time to re-evaluate the selection of the preferred axis prior to final commitment.

**Other Risks:**

Bipole III HVDC Line

Work is ongoing and the routing of the line is yet to be determined. Since the in-service-date of 2010 is not considered to be attainable and 2012 is more likely, the energy and capacity available from reduction in transmission losses resulting from construction and system operation of Bipole III line has been included for an in-service of 2012.

Recognizing that there is a risk of the Bipole III Line not being constructed in advance of new generation, a sensitivity was conducted in which the Bipole III Line is included with new northern generation developed to meet domestic load requirements. The costs and line benefits are now considered as part of the sequence economic analysis. For comparative purposes, all three northern hydro options (Conawapa, 5 unit Conawapa and Gull) have been included as these options would all depend on the Bipole III Line for transmission

Tables 3 below, tabulates the results of this scenario comparison. Under this sensitivity, SCCTs are most economic at the 10% discount rate but the Conawapa -2024 sequence is most economic at 6%.

**Table 3**
**Expected Benefits Relative to all SCCT Sequence**
**(Bipole III Line costs and benefits included with northern hydro development ISD-2024)**

Millions of 2004 PV Dollars, 2004 **EXPECTED** Export Prices

| | Conawapa-24 | Conawapa -24 (first 5 units of 10) | Gull-24 SCCT1X-35, 39 |
|---|---|---|---|
| Incremental NPV @ **6% Discount Rate** | **589** | **416** | **310** |
| Incremental NPV @ **10% Discount Rate** | **1** | **-34** | **-40** |
| **Incremental IRR** | **10.0%** | **9.4%** | **9.1%** |

This sensitivity assumes the Bipole III line being developed in 2024 would still be utilizing the East of Lake Winnipeg route. The loss reduction benefits are included but no monetary value is included for the reliability benefits.

Should the Bipole III line utilize the Interlake or West routes, the capital costs would be higher and the benefits resulting from loss reductions lower. A further sensitivity was conducted to estimate the impact on expected benefits of Conawapa, Conawapa 5 units and Gull should Bipole III Line be constructed on a West route. For this West route sensitivity, costs were estimated to be 46% higher and benefits from reduced losses were estimated to be 41% lower than if the line were construct east of Lake Winnipeg. Table 4 below, tabulates the results of this scenario comparison.

**Table 4**
**Expected Benefits Relative to all SCCT Sequence**
**(Bipole III Line costs increase by 46% and benefits decrease by 41%, west routing, included with northern hydro development ISD-2024)**
Millions of 2004 PV Dollars, 2004 **EXPECTED** Export Prices

| | Conawapa-24 | Conawapa -24 (first 5 units of 10) | Gull-24 SCCT1X-35, 39 |
|---|---|---|---|
| Incremental NPV @ **6% Discount Rate** | **508** | **335** | **229** |
| Incremental NPV @ **10% Discount Rate** | **-38** | **-73** | **-79** |
| **Incremental IRR** | **9.4%** | **8.7%** | **8.2%** |

Inclusion of at least some reliability benefits with the Interlake or West line would reduce or eliminate the cost impacts relative to the SCCT sequence. Thus, the additional costs for the Conawapa and Gull sequences would be larger but probably not sufficient to reverse the recommendation for Conawapa in 2024.

Higher Load Growth

The 2004 Medium High Load Growth scenario would result in deficits in the years 2008/09 and 2009/10, of 280 GWh and 410 GWh respectively. The addition of Wuskwatim in the year 2010/11 provides sufficient additional supply to maintain a net surplus of dependable energy until the year 2019/20. In the 2003/2004 IFF, under the High Load Growth scenario new resources were required (post Wuskwatim) one year earlier in the year 2018/19.

Lower Load Growth

If actual long-term domestic load growth turned out to be lower than the base load forecast, the requirement for new generation would be deferred from the current 2024 date under base load growth. For example, by applying the 2004 Medium Low Load Forecast, the need date for new generation would be 2048/49.

Climate Change

Impacts of potential future climate change could result in either increases or decreases to hydraulic generation capability due to changes in water supply. Wuskwatim provides some degree of protection against lower system energy generation capability through its advancement to 2010. Additional supply requirements would be addressed by advancing the next plant after Wuskwatim.

Wuskwatim

As presented during the Clean Environment Commission review process, 2010 is currently considered to be the earliest achievable ISD. A decision is expected later this year to proceed with Wuskwatim, however, it is possible a construction decision may not be able to be made until after December, in which case the in-service date would be later than 2010.

Development of Wind Generation

Of the 250 MW of wind generation included, it is assumed 150 MW will be acquired through power purchase agreements with private developers acting as Non Utility Generators and are subject to the commitments of these external parties. No final decisions have been made on any specific facilities and studies are ongoing to determine the technical, economic and financial viability of wind power development.

Thermal License Reviews

Selkirk Unit#1 & 2 License Review (LR) for continuing operation on natural gas is underway and is assumed to be complete within the year. The License Review may determine that a cooling tower be installed to attain full energy output at Selkirk. If the cooling tower is required, installation would not be expected to be complete until the fall of 2008.

Brandon Unit#5 License Review (LR) for continuing operation on coal is assumed to occur before 2006/07, however, there continues to be some risk that continued coal operation may not be realized. Over the past few years, Brandon #5 has been operated more frequently for economic reasons. In the future, it is expected that this trend will continue.

Uncertainty with respect to Brandon Unit #5 LR Selkirk Unit#1 & 2 L LR does not affect the timing of next plant for domestic load requirements. The current plan assumes that the retirement of both plants has already occurred before 2024/2025.

Pointe du Bois

The business case analysis and final recommendation for Pointe du Bois has not been completed, however initial indications are that it will be economic to at least rehabilitate the plant. With respect to gains from rehabilitation, the capacity gain (13MW) has been included and the energy gain has not yet been evaluated.

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## System Firm Energy Demand and Dependable Resources (GW.h)

**Table A**

2004 Power Resource Plan, DSM - Option 4 : Updated for 2004, 2004 Base Load Forecast

Kelsey RR, Selkirk#1-2LR-05, 250MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

1998 Base Dependable Ratings



Supply includes: Kelsey Rerunnering, Selkirk#1-2LR-05, 250 MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

A-04C1

| Fiscal Year | | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | 2022/23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Power Resources | | | | | | | | | | | | | | | | | | | | |
| Manitoba Hydro Plants | | | | | | | | | | | | | | | | | | | | |
| Existing Meeting MB Load | | 20840 | 20830 | 20810 | 20800 | 20780 | 20770 | 20750 | 20740 | 20720 | 20700 | 20690 | 20680 | 20660 | 20640 | 20630 | 20610 | 20600 | 20590 | 20580 |
| Hydro Adjustment | | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 10 | | | | | | | |
| Existing NET | x | 21180 | 21170 | 21150 | 21140 | 21120 | 21110 | 21090 | 21080 | 21060 | 21040 | 21030 | 20690 | 20660 | 20640 | 20630 | 20610 | 20600 | 20590 | 20580 |
| WUSKWATIM | x | | | | | | | 878 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 |
| | x | | | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | | | |
| BiPole III HVDC LINE | x | | | | | | | | | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 |
| Manitoba Thermal Plants | | | | | | | | | | | | | | | | | | | | |
| Brandon Unit 5 License Review | x | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | | | | |
| Selkirk License Review | x | 990 | 990 | 990 | 1010 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | | | |
| Brandon Units 6-7 SCCT | x | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 |
| | x | | | | | | | | | | | | | | | | | | | |
| New Thermal | | | | | | | | | | | | | | | | | | | | |
| CCCT's | x | | | | | | | | | | | | | | | | | | | |
| SCCT2X's | x | | | | | | | | | | | | | | | | | | | |
| SCCT1X's | x | | | | | | | | | | | | | | | | | | | |
| Wind Committed 250 MW | x | | 215 | 359 | 502 | 645 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 |
| New Wind Generation | x | | | | | | | | | | | | | | | | | | | |
| Demand Side Management | x | 113 | 228 | 319 | 404 | 486 | 556 | 619 | 675 | 716 | 758 | 803 | 846 | 891 | 940 | 977 | 1011 | 1045 | 1032 | 1003 |
| Major Rerunnering Kelsey Rerunnering | x | | | | | | | | | | | | | | | | | | | |
| Pointe du Bois Rehab | x | | | | | | | | | | | | | | | | | | | |
| Imports (incremental dependable energy to be determined) | | | | | | | | | | | | | | | | | | | | |
| Non-Contracted Unfirm Energy IMPORT: | x | | | | | | | | | | | | | | | 601 | 1485 | 1575 | 1575 | 1575 |
| Diversity IMPORT | x | 2705 | 2705 | 2705 | 2705 | 2705 | 2705 | 2705 | 2705 | 2705 | 2705 | 2705 | 2760 | 2259 | 1769 | 974 | 90 | | | |
| 500 MW NSP Energy Guarantee | x | 1575 | 131 | | | | | | | | | | | | | | | | | |
| ONTARIO 200MW Sale | x | | | | | | | | | | | | | | | | | | | |
| OTTER TAIL POWER 50MW | x | 200 | 17 | | | | | | | | | | | | | | | | | |
| GREAT RIVER ENERGY 50MW | x | 230 | 230 | 230 | 19 | | | | | | | | | | | | | | | |
| TOTAL POWER RESOURCES | x | 30093 | 28786 | 28853 | 28880 | 29086 | 29218 | 30139 | 30557 | 31015 | 31037 | 31072 | 30830 | 30344 | 29883 | 29716 | 28930 | 27924 | 27901 | 27862 |
| Demand | | | | | | | | | | | | | | | | | | | | |
| 2004 Base Load Forecast | | 22554 | 23129 | 23685 | 24052 | 24383 | 24689 | 24920 | 24952 | 24988 | 25059 | 25246 | 25432 | 25616 | 25860 | 26129 | 26368 | 26627 | 26880 | 27138 |
| Exports | | | | | | | | | | | | | | | | | | | | |
| Diversity Export (all) | | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 486 | 194 | 194 | | | | | | |
| NORTHERN STATES POWER 500MW Sale | | 3616 | 2406 | 2296 | 2296 | 2296 | 2296 | 2296 | 2296 | 2296 | 2296 | 2296 | 191 | | | | | | | |
| ONTARIO (Lake St. Joseph Exchange) | | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 |
| ONTARIO 200MW Sale | | | | | | | | | | | | | | | | | | | | |
| OTTER TAIL POWER 50MW | | 237 | 237 | 237 | 237 | 237 | 237 | 20 | | | | | | | | | | | | |
| OTTER TAIL POWER 50MW | | 200 | 17 | | | | | | | | | | | | | | | | | |
| GREAT RIVER ENERGY 50MW | | 230 | 230 | 230 | 19 | | | | | | | | | | | | | | | |
| WISCONSIN PUBLIC SERVICE 100MW | | 459 | 459 | 459 | 77 | | | | | | | | | | | | | | | |
| MINNESOTA MUNICIPAL POWER AGENCY 60/30MW | | 285 | 285 | 285 | 285 | 285 | 155 | 142 | 142 | 12 | | | | | | | | | | |
| TOTAL LOAD | | 28212 | 27394 | 27823 | 27597 | 27832 | 28008 | 28009 | 28021 | 27927 | 27986 | 28173 | 25962 | 25955 | 26005 | 26274 | 26513 | 26772 | 27025 | 27283 |
| SURPLUS | | **1881** | **1392** | **1030** | **1283** | **1254** | **1210** | **2130** | **2536** | **3088** | **3051** | **2899** | **4868** | **4389** | **3878** | **3442** | **2417** | **1152** | **876** | **579** |

## System Firm Energy Demand and Dependable Resources (GW.h)

**Table A**

2004 Power Resource Plan, DSM - Option 4 : Updated for 2004, 2004 Base Load Forecast

Kelsey RR, Selkirk#1-2LR-05, 250MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

1998 Base Dependable Ratings



Supply includes: Kelsey Rerunnering, Selkirk#1-2LR-05, 250 MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

A-04C1

| Fiscal Year | | 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 | 2031/32 | 2032/33 | 2033/34 | 2034/35 | 2035/36 | 2036/37 | 2037/38 | 2038/39 | 2039/40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Power Resources | | | | | | | | | | | | | | | | | | |
| Manitoba Hydro Plants | | | | | | | | | | | | | | | | | | |
| Existing Meeting MB Load | | 20580 | 20570 | 20560 | 20560 | 20550 | 20540 | 20540 | 20530 | 20530 | 20520 | 20510 | 20510 | 20500 | 20490 | 20490 | 20480 | 20480 |
| Hydro Adjustment | | | | | | | | | | | | | | | | | | |
| Existing NET | x | 20580 | 20570 | 20560 | 20560 | 20550 | 20540 | 20540 | 20530 | 20530 | 20520 | 20510 | 20510 | 20500 | 20490 | 20490 | 20480 | 20480 |
| WUSKWATIM | x | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 |
| | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | | | | | | | | | | | | |
| BiPole III HVDC LINE | x | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 | 437 |
| Manitoba Thermal Plants | | | | | | | | | | | | | | | | | | |
| Brandon Unit 5 License Review | x | | | | | | | | | | | | | | | | | |
| Selkirk License Review | x | | | | | | | | | | | | | | | | | |
| Brandon Units 6-7 SCCT | x | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 | 2300 |
| | x | | | | | | | | | | | | | | | | | |
| New Thermal | | | | | | | | | | | | | | | | | | |
| CCCT's | x | | | | | | | | | | | | | | | | | |
| SCCT2X's | x | | | | | | | | | | | | | | | | | |
| SCCT1X's | x | | | | | | | | | | | | | | | | | |
| Wind Committed 250 MW | x | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 | 717 |
| New Wind Generation | x | | | | | | | | | | | | | | | | | |
| Demand Side Management | x | 963 | 919 | 876 | 849 | 829 | 815 | 818 | 824 | 824 | 824 | 824 | 824 | 824 | 824 | 824 | 824 | 824 |
| Major Rerunnering Kelsey Rerunnering | x | | | | | | | | | | | | | | | | | |
| Pointe du Bois Rehab | x | | | | | | | | | | | | | | | | | |
| Imports (incremental dependable energy to be determined) | | | | | | | | | | | | | | | | | | |
| Non-Contracted Unfirm Energy IMPORT: | x | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 | 1575 |
| Diversity IMPORT | x | | | | | | | | | | | | | | | | | |
| 500 MW NSP Energy Guarantee | x | | | | | | | | | | | | | | | | | |
| ONTARIO 200MW Sale | x | | | | | | | | | | | | | | | | | |
| OTTER TAIL POWER 50MW | x | | | | | | | | | | | | | | | | | |
| GREAT RIVER ENERGY 50MW | x | | | | | | | | | | | | | | | | | |
| TOTAL POWER RESOURCES | x | 27822 | 27768 | 27715 | 27688 | 27658 | 27634 | 27637 | 27633 | 27633 | 27623 | 27613 | 27613 | 27603 | 27593 | 27593 | 27583 | 27583 |
| Demand | | | | | | | | | | | | | | | | | | |
| 2004 Base Load Forecast | | 27399 | 27665 | 27921 | 28177 | 28434 | 28690 | 28945 | 29203 | 29462 | 29719 | 29974 | 30229 | 30484 | 30740 | 30997 | 31253 | 31510 |
| Exports | | | | | | | | | | | | | | | | | | |
| Diversity Export (all) | | | | | | | | | | | | | | | | | | |
| NORTHERN STATES POWER 500MW Sale | | | | | | | | | | | | | | | | | | |
| ONTARIO (Lake St. Joseph Exchange) | | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 |
| ONTARIO 200MW Sale | | | | | | | | | | | | | | | | | | |
| OTTER TAIL POWER 50MW | | | | | | | | | | | | | | | | | | |
| OTTER TAIL POWER 50MW | | | | | | | | | | | | | | | | | | |
| GREAT RIVER ENERGY 50MW | | | | | | | | | | | | | | | | | | |
| WISCONSIN PUBLIC SERVICE 100MW | | | | | | | | | | | | | | | | | | |
| MINNESOTA MUNICIPAL POWER AGENCY 60/30MW | | | | | | | | | | | | | | | | | | |
| TOTAL LOAD | | 27544 | 27810 | 28066 | 28322 | 28579 | 28835 | 29090 | 29348 | 29607 | 29864 | 30119 | 30374 | 30629 | 30885 | 31142 | 31398 | 31655 |
| SURPLUS | | 278 | -42 | -351 | -634 | -921 | -1201 | -1453 | -1715 | -1974 | -2241 | -2506 | -2761 | -3026 | -3292 | -3549 | -3815 | -4072 |

## System Firm Capacity (Winter Peak) Demand and Resources (MW)

**Table B**

2004 Power Resource Plan, DSM - Option 4 : Updated for 2004, 2004 Base Load Forecast

Kelsey RR, Selkirk#1-2LR-05, 250MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12
1998 Base Dependable Ratings
Supply includes: Kelsey Rerunnering, Selkirk#1-2LR-05, 250 MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

A-04C1

| Fiscal Year | | | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | 2022/23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Power Resources | | | | | | | | | | | | | | | | | | | | | |
| Manitoba Hydro Plants | | | | | | | | | | | | | | | | | | | | | |
| Existing Hydro | | x | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 |
| New Hydro | | | | | | | | | | | | | | | | | | | | | |
| WUSKWATIM | | x | | | | | | | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| BiPole III HVDC LINE | | x | | | | | | | | | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| Manitoba Thermal Plants | | | | | | | | | | | | | | | | | | | | | |
| Brandon Unit 5 License Review | | x | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | | | | |
| Selkirk License Review | | x | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | | | |
| Brandon Units 6-7 SCCT | | x | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 |
| | | x | | | | | | | | | | | | | | | | | | | |
| New Thermal | | | | | | | | | | | | | | | | | | | | | |
| CCCT's | | x | | | | | | | | | | | | | | | | | | | |
| SCCT2X's | | x | | | | | | | | | | | | | | | | | | | |
| SCCT1X's | | x | | | | | | | | | | | | | | | | | | | |
| Wind | | | | | | | | | | | | | | | | | | | | | |
| Committed | 250 MW | x | | 11 | 17 | 22 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| New Wind Generation | | x | | | | | | | | | | | | | | | | | | | |
| Demand Side Management | | NR x | 36 | 56 | 68 | 79 | 90 | 99 | 108 | 117 | 123 | 130 | 138 | 143 | 149 | 156 | 161 | 167 | 172 | 171 | 168 |
| Major Rerunnering | Kelsey Rerunnering | x | | 11 | 21 | 32 | 43 | 54 | 64 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| | Pointe du Bois Rehab | x | | | | | | | | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| Imports | | | | | | | | | | | | | | | | | | | | | |
| Diversity | | NR x | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 660 | 440 | 440 | 220 | | | | |
| TOTAL POWER RESOURCES | | x | 5949 | 5991 | 6019 | 6046 | 6073 | 6093 | 6313 | 6345 | 6438 | 6445 | 6452 | 6568 | 6353 | 6360 | 6146 | 5826 | 5700 | 5698 | 5695 |
| Peak Demand | | | | | | | | | | | | | | | | | | | | | |
| 2004 Base Load Forecast | | R x | 4024 | 4099 | 4165 | 4203 | 4242 | 4278 | 4304 | 4306 | 4310 | 4328 | 4360 | 4392 | 4423 | 4462 | 4506 | 4544 | 4586 | 4627 | 4665 |
| | | R x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| Exports | | | | | | | | | | | | | | | | | | | | | |
| 500 MW NSP Sale | | x | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | | | | | | | | |
| 200 MW Ont Sale | | R x | | | | | | | | | | | | | | | | | | | |
| OTP 50 MW | | | 57 | | | | | | | | | | | | | | | | | | |
| OTP 50 MW | | x | 57 | 57 | 57 | 57 | 57 | 57 | | | | | | | | | | | | | |
| GREAT RIVER ENERGY 50MW | | x | 55 | 55 | 55 | | | | | | | | | | | | | | | | |
| WISCONSIN PUBLIC SERVICE 100MW | | x | 110 | 110 | 110 | | | | | | | | | | | | | | | | |
| MINNESOTA MUNICIPAL POWER AGENCY | 60/30 | x | 68 | 68 | 68 | 68 | 68 | 34 | 34 | 34 | | | | | | | | | | | |
| Total Load | | x | 4864 | 4939 | 5005 | 4878 | 4917 | 4919 | 4888 | 4890 | 4860 | 4878 | 4910 | 4392 | 4423 | 4462 | 4506 | 4544 | 4586 | 4627 | 4665 |
| Reserve | | NR R | 413 | 419 | 426 | 429 | 432 | 435 | 437 | 437 | 436 | 438 | 441 | 431 | 460 | 464 | 495 | 525 | 530 | 535 | 540 |
| TOTAL DEMAND | | | 5277 | 5359 | 5431 | 5307 | 5350 | 5355 | 5326 | 5327 | 5296 | 5316 | 5351 | 4823 | 4883 | 4926 | 5001 | 5069 | 5116 | 5162 | 5205 |
| SURPLUS | | | **672** | **632** | **587** | **739** | **723** | **739** | **987** | **1018** | **1142** | **1129** | **1102** | **1745** | **1470** | **1434** | **1145** | **757** | **584** | **537** | **491** |

## System Firm Capacity (Winter Peak) Demand and Resources (MW)

**Table B**

2004 Power Resource Plan, DSM - Option 4 : Updated for 2004, 2004 Base Load Forecast

Kelsey RR, Selkirk#1-2LR-05, 250MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

1998 Base Dependable Ratings



Supply includes: Kelsey Rerunnering, Selkirk#1-2LR-05, 250 MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

A-04C1

| Fiscal Year | | | | 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 | 2031/32 | 2032/33 | 2033/34 | 2034/35 | 2035/36 | 2036/37 | 2037/38 | 2038/39 | 2039/40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Power Resources | | | | | | | | | | | | | | | | | | | | |
| Manitoba Hydro Plants | | | | | | | | | | | | | | | | | | | | |
| Existing Hydro | | | x | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 |
| New Hydro | | | | | | | | | | | | | | | | | | | | |
| WUSKWATIM | | | x | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | | | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| BiPole III HVDC LINE | | | x | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| Manitoba Thermal Plants | | | | | | | | | | | | | | | | | | | | |
| Brandon Unit 5 License Review | | | x | | | | | | | | | | | | | | | | | |
| Selkirk License Review | | | x | | | | | | | | | | | | | | | | | |
| Brandon Units 6-7 SCCT | | | x | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 |
| | | | x | | | | | | | | | | | | | | | | | |
| New Thermal | | | | | | | | | | | | | | | | | | | | |
| CCCT's | | | x | | | | | | | | | | | | | | | | | |
| SCCT2X's | | | x | | | | | | | | | | | | | | | | | |
| SCCT1X's | | | x | | | | | | | | | | | | | | | | | |
| Wind | | | | | | | | | | | | | | | | | | | | |
| Committed | | 250 MW | x | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| New Wind Generation | | | x | | | | | | | | | | | | | | | | | |
| Demand Side Management | | NR | x | 164 | 159 | 154 | 152 | 150 | 149 | 149 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| Major Rerunnering | Kelsey Rerunnering | | x | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| | Pointe du Bois Rehab | | x | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| Imports | | | | | | | | | | | | | | | | | | | | |
| Diversity | | NR | x | | | | | | | | | | | | | | | | | |
| TOTAL POWER RESOURCES | | | x | 5691 | 5686 | 5682 | 5679 | 5677 | 5676 | 5677 | 5677 | 5677 | 5677 | 5677 | 5677 | 5677 | 5677 | 5677 | 5677 | 5677 |
| Peak Demand | | | | | | | | | | | | | | | | | | | | |
| 2004 Base Load Forecast | | R | x | 4704 | 4744 | 4784 | 4824 | 4864 | 4904 | 4944 | 4984 | 5024 | 5064 | 5104 | 5144 | 5184 | 5224 | 5264 | 5304 | 5344 |
| | | R | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| | | | x | | | | | | | | | | | | | | | | | |
| Exports | | | | | | | | | | | | | | | | | | | | |
| 500 MW NSP Sale | | | x | | | | | | | | | | | | | | | | | |
| 200 MW Ont Sale | | R | x | | | | | | | | | | | | | | | | | |
| OTP 50 MW | | | | | | | | | | | | | | | | | | | | |
| OTP 50 MW | | | x | | | | | | | | | | | | | | | | | |
| GREAT RIVER ENERGY 50MW | | | x | | | | | | | | | | | | | | | | | |
| WISCONSIN PUBLIC SERVICE 100MW | | | x | | | | | | | | | | | | | | | | | |
| MINNESOTA MUNICIPAL POWER AGENCY | 60/30 | | x | | | | | | | | | | | | | | | | | |
| Total Load | | | x | 4704 | 4744 | 4784 | 4824 | 4864 | 4904 | 4944 | 4984 | 5024 | 5064 | 5104 | 5144 | 5184 | 5224 | 5264 | 5304 | 5344 |
| Reserve | | NR | R | 545 | 550 | 556 | 561 | 566 | 571 | 575 | 580 | 585 | 590 | 595 | 599 | 604 | 609 | 614 | 619 | 623 |
| TOTAL DEMAND | | | | 5249 | 5294 | 5340 | 5385 | 5430 | 5475 | 5519 | 5564 | 5609 | 5654 | 5699 | 5743 | 5788 | 5833 | 5878 | 5923 | 5967 |
| SURPLUS | | | | **442** | **392** | **342** | **295** | **248** | **202** | **157** | **113** | **68** | **23** | **-21** | **-66** | **-111** | **-156** | **-201** | **-245** | **-290** |

E1910E

**MANITOBA HYDRO**

INTEROFFICE MEMORANDUM

**FROM** Deborah Warnick
Administrative Representative
Resource Planning & Market Analysis

**TO**

**DATE** 2004 10 13

**FILE**

**SUBJECT** **REVISION TO 2004/05 POWER RESOURCE PLAN**

Attached is Revision 1 of **Table B: System Firm Capacity (Winter Peak) Demand and Resources (MW)** of the 2004/05 Power Resource Plan.

Specifically, the values for Demand Side Management have been changed.

Please store Revision 1 with the copy of the 2004/05 Power Resource Plan.

/wlk

# System Firm Capacity (Winter Peak) Demand and Resources (MW)

**Table B**

2004 Power Resource Plan, DSM - Option 4 : Updated for 2004, 2004 Base Load Forecast

Kelsey RR, Selkirk#1-2LR-05, 250MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12
1998 Base Dependable Ratings
Supply includes: Kelsey Rerunning, Selkirk#1-2LR-05, 250 MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

A-04D1



| Fiscal Year | | | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | 2022/23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Power Resources | | | | | | | | | | | | | | | | | | | | | |
| Manitoba Hydro Plants | | | | | | | | | | | | | | | | | | | | | |
| Existing Hydro | | x | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 |
| New Hydro | | | | | | | | | | | | | | | | | | | | | |
| WUSKWATIM | | x | | | | | | | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| BiPole III HVDC LINE | | x | | | | | | | | | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| Manitoba Thermal Plants | | | | | | | | | | | | | | | | | | | | | |
| Brandon Unit 5 License Review | | x | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | | | | | |
| Selkirk License Review | | x | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | 132 | | | | |
| Brandon Units 6-7 SCCT | | x | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 |
| | | x | | | | | | | | | | | | | | | | | | | |
| New Thermal | | | | | | | | | | | | | | | | | | | | | |
| CCCT's | | x | | | | | | | | | | | | | | | | | | | |
| SCCT2X's | | x | | | | | | | | | | | | | | | | | | | |
| SCCT1X's | | x | | | | | | | | | | | | | | | | | | | |
| Wind | | | | | | | | | | | | | | | | | | | | | |
| Committed | 250 MW | x | | 11 | 17 | 22 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| New Wind Generation | | x | | | | | | | | | | | | | | | | | | | |
| Demand Side Management | | NR x | 33 | 67 | 87 | 107 | 126 | 143 | 159 | 173 | 185 | 197 | 210 | 220 | 230 | 241 | 251 | 261 | 271 | 268 | 263 |
| Major Rerunning | Kelsey Rerunning | x | | 11 | 21 | 32 | 43 | 54 | 64 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| | Pointe du Bois Rehab | x | | | | | | | | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| Imports | | | | | | | | | | | | | | | | | | | | | |
| Diversity | | NR x | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 660 | 440 | 440 | 220 | | | | |
| TOTAL POWER RESOURCES | | x | 5946 | 6002 | 6038 | 6074 | 6109 | 6137 | 6364 | 6402 | 6500 | 6512 | 6525 | 6644 | 6434 | 6446 | 6236 | 5920 | 5798 | 5796 | 5791 |
| Peak Demand | | | | | | | | | | | | | | | | | | | | | |
| 2004 Base Load Forecast | | R x | 4024 | 4099 | 4165 | 4203 | 4242 | 4278 | 4304 | 4306 | 4310 | 4328 | 4360 | 4392 | 4423 | 4462 | 4506 | 4544 | 4586 | 4627 | 4665 |
| | | R x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | | | |
| Exports | | | | | | | | | | | | | | | | | | | | | |
| 500 MW NSP Sale | | x | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | | | | | | | | |
| 200 MW Ont Sale | | R x | | | | | | | | | | | | | | | | | | | |
| OTP 50 MW | | | 57 | | | | | | | | | | | | | | | | | | |
| OTP 50 MW | | x | 57 | 57 | 57 | 57 | 57 | 57 | | | | | | | | | | | | | |
| GREAT RIVER ENERGY 50MW | | x | 55 | 55 | 55 | | | | | | | | | | | | | | | | |
| WISCONSIN PUBLIC SERVICE 100MW | | x | 110 | 110 | 110 | | | | | | | | | | | | | | | | |
| MINNESOTA MUNICIPAL POWER AGENCY | 60/3( | x | 68 | 68 | 68 | 68 | 68 | 34 | 34 | 34 | | | | | | | | | | | |
| Total Load | | x | 4864 | 4939 | 5005 | 4878 | 4917 | 4919 | 4888 | 4890 | 4860 | 4878 | 4910 | 4392 | 4423 | 4462 | 4506 | 4544 | 4586 | 4627 | 4665 |
| Reserve | | NR R | 413 | 418 | 423 | 426 | 428 | 430 | 431 | 430 | 429 | 430 | 432 | 421 | 450 | 454 | 484 | 514 | 518 | 523 | 528 |
| TOTAL DEMAND | | | 5277 | 5357 | 5429 | 5304 | 5345 | 5349 | 5320 | 5320 | 5289 | 5308 | 5342 | 4813 | 4873 | 4916 | 4990 | 5058 | 5104 | 5150 | 5193 |
| SURPLUS | | | **668** | **644** | **610** | **770** | **764** | **788** | **1044** | **1081** | **1211** | **1204** | **1183** | **1831** | **1561** | **1530** | **1246** | **862** | **694** | **646** | **597** |

8103

# System Firm Capacity (Winter Peak) Demand and Resources (MW)

**Table B**

2004 Power Resource Plan, DSM - Option 4 : Updated for 2004, 2004 Base Load Forecast

Kelsey RR, Selkirk#1-2LR-05, 250MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

1998 Base Dependable Ratings



Supply includes: Kelsey Rerunnering, Selkirk#1-2LR-05, 250 MW Wind-05, B#5LR-06, Wuskwatim-10, Bipole III Line-12

A-04D1



| Fiscal Year | | | 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 | 2031/32 | 2032/33 | 2033/34 | 2034/35 | 2035/36 | 2036/37 | 2037/38 | 2038/39 | 2039/40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Power Resources | | | | | | | | | | | | | | | | | | | |
| Manitoba Hydro Plants | | | | | | | | | | | | | | | | | | | |
| Existing Hydro | | x | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 | 4828 |
| New Hydro | | | | | | | | | | | | | | | | | | | |
| WUSKWATIM | | x | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | | x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| BiPole III HVDC LINE | | x | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| Manitoba Thermal Plants | | | | | | | | | | | | | | | | | | | |
| Brandon Unit 5 License Review | | x | | | | | | | | | | | | | | | | | |
| Selkirk License Review | | x | | | | | | | | | | | | | | | | | |
| Brandon Units 6-7 SCCT | | x | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | 298 |
| | | x | | | | | | | | | | | | | | | | | |
| New Thermal | | | | | | | | | | | | | | | | | | | |
| CCCT's | | x | | | | | | | | | | | | | | | | | |
| SCCT2X's | | x | | | | | | | | | | | | | | | | | |
| SCCT1X's | | x | | | | | | | | | | | | | | | | | |
| Wind | | | | | | | | | | | | | | | | | | | |
| Committed | 250 MW | x | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| New Wind Generation | | x | | | | | | | | | | | | | | | | | |
| Demand Side Management | NR | x | 255 | 247 | 239 | 235 | 232 | 229 | 230 | 231 | 231 | 231 | 231 | 231 | 231 | 231 | 231 | 231 | 231 |
| Major Rerunnering | Kelsey Rerunnering | x | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| | Pointe du Bois Rehab | x | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| Imports | | | | | | | | | | | | | | | | | | | |
| Diversity | NR | x | | | | | | | | | | | | | | | | | |
| TOTAL POWER RESOURCES | | x | 5783 | 5775 | 5767 | 5762 | 5759 | 5757 | 5757 | 5759 | 5759 | 5759 | 5759 | 5759 | 5759 | 5759 | 5759 | 5759 | 5759 |
| Peak Demand | | | | | | | | | | | | | | | | | | | |
| 2004 Base Load Forecast | | R x | 4704 | 4744 | 4784 | 4824 | 4864 | 4904 | 4944 | 4984 | 5024 | 5064 | 5104 | 5144 | 5184 | 5224 | 5264 | 5304 | 5344 |
| | | R x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| | | x | | | | | | | | | | | | | | | | | |
| Exports | | | | | | | | | | | | | | | | | | | |
| 500 MW NSP Sale | | x | | | | | | | | | | | | | | | | | |
| 200 MW Ont Sale | | R x | | | | | | | | | | | | | | | | | |
| OTP 50 MW | | | | | | | | | | | | | | | | | | | |
| OTP 50 MW | | x | | | | | | | | | | | | | | | | | |
| GREAT RIVER ENERGY 50MW | | x | | | | | | | | | | | | | | | | | |
| WISCONSIN PUBLIC SERVICE 100MW | | x | | | | | | | | | | | | | | | | | |
| MINNESOTA MUNICIPAL POWER AGENCY | 60/3( | x | | | | | | | | | | | | | | | | | |
| Total Load | | x | 4704 | 4744 | 4784 | 4824 | 4864 | 4904 | 4944 | 4984 | 5024 | 5064 | 5104 | 5144 | 5184 | 5224 | 5264 | 5304 | 5344 |
| Reserve | | NR R | 534 | 540 | 545 | 551 | 556 | 561 | 566 | 570 | 575 | 580 | 585 | 590 | 594 | 599 | 604 | 609 | 614 |
| TOTAL DEMAND | | | 5238 | 5284 | 5329 | 5375 | 5420 | 5465 | 5510 | 5554 | 5599 | 5644 | 5689 | 5734 | 5778 | 5823 | 5868 | 5913 | 5958 |
| SURPLUS | | | **545** | **491** | **437** | **387** | **339** | **292** | **248** | **204** | **159** | **115** | **70** | **25** | **-20** | **-65** | **-109** | **-154** | **-199** |