



**REPORT TO  
THE PUBLIC UTILITIES BOARD**

**CURTAILABLE RATE PROGRAM**

**APRIL 1, 2008 – MARCH 31, 2009**

**JUNE 2009**

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**BACKGROUND**

The Curtailable Rate Program (CRP) Terms and Conditions applicable during the reporting period April 1, 2008 to March 31, 2009 took effect April 1, 2005 in accordance with Board Order No. 28/05 dated February 17, 2005.

The Terms and Conditions allow Manitoba Hydro to reserve the right to limit the amount of total curtailable load used for maintaining planning and contingency reserves. The current limit is set at 230 MW under the Options A and C and 100 MW under Option R. There is no limit for Option E load. The caps have been beneficial to both Manitoba Hydro and curtailable customers by ensuring the value of curtailable load does not depreciate. A decreased value would result in lower discounts paid to customers making the program less attractive to them.

Four customers participated in the Curtailable Rate Program during the April 1, 2008 to March 31, 2009 period. These customers have designated a total of 230 MW to Manitoba Hydro's planning reserves and 40 MW to Manitoba Hydro's contingency reserves. Curtailable load for planning reserves is allocated as 80 MW Option AE, 119 MW Option A, and 31 MW Option C. All 40 MW of contingency reserves are Option R.

Manitoba Hydro maintains contingency reserves to minimize disruption to firm customers in the event of loss of generation or transmission. The role of planning reserves is to ensure that there is excess capacity to replenish contingency reserves in a timely fashion after a deployment. Manitoba Hydro, among other measures, uses curtailable load to maintain planning and operating reserves.

**DESCRIPTION OF PROGRAM**

The Curtailable Rate Program consists of four base curtailment options and three combinations there of. Options vary dependent on: minimum notice to curtail, maximum

duration per curtailment, maximum daily hours of curtailment, maximum number of curtailments per year, and maximum annual hours of curtailment.

Load designated under Option R must be nominated as a Guaranteed Curtailment, that is, the customer must agree to shed a specified number of MW in order to be compliant with the curtailment request. Under all the other curtailment options, customers can nominate curtailable load as Guaranteed Curtailment or Curtail to Protected Firm Load.

Dependent on the curtailment option selected, Manitoba Hydro will curtail customers for the following reasons:

(i) Options A and C Curtailable Load

Manitoba Hydro will use curtailable load designated under Options A and C, to meet reliability obligations only. These include:

- to re-establish Manitoba Hydro's Mid-Continent Area Power Pool Generation Reserve Sharing Pool (MAPP GRSP) or successor organization's contingency reserves<sup>1</sup>. Once Manitoba Hydro's contingency reserves are committed to a MAPP GRSP or successor organization's contingency, Manitoba Hydro is required to re-establish its contingency reserves within 45 minutes of the event that triggered the commitment to supply the contingency reserve. A curtailment may be called to reestablish those reserves;
- to maintain Manitoba Hydro's MAPP GRSP or successor organization's planning reserve<sup>2</sup> obligations. If domestic peak load increased to such a point that Manitoba Hydro were in immediate danger of failing to meet its MAPP GRSP or successor organization's planning reserve obligations, a curtailment would be called to protect that reserve;

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<sup>1</sup> Contingency Reserves: a component of Operating Reserves which are sufficient in magnitude and response and meet the North American Electric Reliability Council's (NERC) disturbance control standards. Contingency reserves are comprised of spinning and non-spinning reserves.

<sup>2</sup> Planning Reserves: The reserves needed to ensure that load obligations at times of peak demand do not exceed supply resources.

- to protect firm Manitoba load when operating reserves<sup>3</sup> are insufficient to avoid curtailing firm load. (This curtailment would be called prior to Manitoba Hydro curtailing firm load).

(ii) Option R Curtailable Load

The MAPP GRSP (or successor organization) requires participants to maintain contingency reserves comprised of spinning reserve and non-spinning reserves. Manitoba Hydro uses curtailable load designated under Option R to meet Manitoba Hydro's non-spinning reserves" to the extent necessary, having first dispatched its own generation resources.

(iii) Option E Curtailable Load

Curtailments under Option E are initiated to meet firm energy requirements in the event that Manitoba Hydro expects to be short of firm energy supplies. Option E customers would be curtailed prior to firm Manitoba load and firm export sales.

The highest valued single options are Options A and R. Both options have a minimum five minutes notice to curtail and a maximum duration of 4.25 hours per curtailment. However, Option A allows for 15 curtailments per year while Option R allows for up to 25 curtailments per year. The highest valued option-combinations, Options AE and RE, add further provision for up to three annual curtailments of a maximum duration of ten days each with 48 hours notice. Option C allows for up to 15 interruptions per year with a minimum 60 minutes notice to curtail and a maximum duration of 4.00 hours per curtailment.

Options A, C or R cannot be combined with each other, but may be combined with Option E to increase the discount. The terms and conditions of combined Options AE, CE and RE are combinations of the individual options (e.g. notice to curtail for AE would be five minutes for Option A curtailments and 48 hours for Option E curtailments).

Customers may elect to designate part of their load as Option A and another part of their load as Option R provided the loads designated under each option are distinct from each other. Although the customer designates a specific portion of their load as Option R, Manitoba

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<sup>3</sup> Operating Reserves: The reserves needed to protect Manitoba Hydro and its obligations to the MAPP Generation Reserve Sharing Pool's power systems against loss of supply caused by major generating or transmission outages. Operating reserves consist of various types of reserves including contingency reserves.

Hydro's System Control Department may request a curtailment of less than the amount designated by the customer. The minimum load System Control can request under Option R is 5 MW. Manitoba Hydro will make best efforts to request a curtailment equal to the customer's contracted amount.

The maximum discount available to a participating customer is called the "Reference Discount." The Reference Discount is related to the marginal value of capacity, expressed in Canadian Dollars, and was set at \$2.75 per kW/month as of April 1, 2004. This amount is adjusted on April 1 of each year by the inflation factor (the change in Manitoba Consumer Price Index as recorded for the most recent 12 months). Each year Manitoba Hydro submits an application for the adjusted Reference Discount to the PUB for *ex parte* approval. The Reference Discount in effect for the reporting period April 1, 2008 to March 31, 2009 was \$3.00/kW/month.

The actual amount of the 'Reference Discount' received by customers depends on the option or option-combination chosen and whether curtailable load was nominated as a Guaranteed Curtailment or Curtail to Protected Firm Load. For loads nominated as Curtail to Protected Firm Load, the actual amount of the discount will also depend on the level of protected firm load and the customer's on-peak load factor. Options A and R customers' discount are equal to 70% of the Reference Discount whereas Option C customers' discount is equal to 40% of the Reference Discount. If combined with Option E the Reference Discount increases to 100% for an AE and RE customer, and 70% for a CE customer.

Customers selecting Curtailment Option R will, in addition to the Reference Discount, receive a Reserve Discount for each curtailment initiated and successfully completed, as Option R load is of more value to Manitoba Hydro. The Reserve Discount which is currently set at \$0.04/kW.h represents the value of carrying contingency reserves. The actual amount of the Reserve Discount that customers receive depends on the amount of load reduction (in kW) requested by Manitoba Hydro's System Control and the duration of the curtailment.

Customers may nominate different quantities of curtailable or firm load for each month provided that a minimum of 5 MW of curtailable load is available in each month. Customers must specify the 12 months Guaranteed Load or 12 months Protected Firm Load prior to participation in the program and must provide 12 months' written notice to Manitoba Hydro should they wish to increase or decrease their load in any month. This may be subject to capacity limitations and will be at the discretion of Manitoba Hydro. To date no customers have elected to differentiate their monthly load.

## **PERFORMANCE FOR 2008/09**

Of the four customers participating in the program, only one customer diversified their curtailable load into three options; A, R, and E. The remaining customers assigned their load to only one option. The amount each customer designated as curtailable load in relation to their total load varies, and therefore impacts their curtailable credit, as shown on the following table.

<b>Summary of Curtailment Credit Data April 1, 2008 to March 31, 2009</b>					
<b>Customer</b>	<b>Option</b>	<b>Curt Load as % of Total Load</b>	<b>Average On-Peak MW</b>	<b>Average On-Peak LF</b>	<b>Average Mthly Cr.</b>
1	A & R & E	83% *	189.5	92.5%	\$377,252
2	A	70%	74.4	77.8%	\$82,126
3	A	94%	25.8	90.2%	\$46,347
4	C	45%	59.7	80.3%	\$25,713

\*Customer 1: 83% total load represents 42% Option AE, 21% Option R and 20% Option A.

A monthly detailed report for each customer is provided on Page 8.

## **COMMUNICATION**

Manitoba Hydro continues to use manual telephone to communicate curtailment requirements to the four customers on the program. This procedure is manageable and provides the additional security the curtailment will be initiated by confirmation from an agent of the customer. Manitoba Hydro experienced no difficulties in communications with the customer on the one curtailment during this reporting period.

A situation did arise however where notification was not provided to Manitoba Hydro with regards to guaranteed load being unavailable due to an unplanned interruption. The Terms and Conditions require customers to provide Manitoba Hydro 48 hours verbal notice of an anticipated plant shutdown and immediate notification of any unanticipated shutdowns. Manitoba Hydro confirmed that the load was not needed for curtailment purposes but it was

critical in meeting operating reserve requirements filed with the CRSG<sup>4</sup>. Consultations between Manitoba Hydro and the customer were made to improve communication thereby ensuring there would not be a repeat occurrence.

## **MONITORING AND EVALUATION ISSUES**

### **1. Implementation and Size of Curtailments:**

There was only one curtailment during the April 1, 2008 to March 31, 2009 period. An Option R curtailment was called on January 14, 2009 lasting 1.07 hours and resulting in a 40 MW load reduction. It was initiated to provide operating reserves due to a system disturbance resulting in loss of resources.

The customer did not use an alternative power source to supply their load during the curtailment.

### **2. Benefits of Curtailable Load:**

To Manitoba Hydro:

Manitoba Hydro's system is enhanced by having curtailable load available to assist in maintaining planning reserve obligations, serving firm load in emergencies and for maintaining and re-establishing contingency reserves.

Curtailable load provides value to Manitoba Hydro all year round, as curtailments for system emergencies can occur at any time of the year. However, it has the greatest value during peak times as it is during the peak periods that Manitoba Hydro's accredited surplus with the MAPP GRSP is the least. Additional Options A and C curtailable load in these hours increases the amount of capacity for sale in the firm export markets while additional Option R load can allow Manitoba Hydro to meet its contingency reserve obligations at a lower cost.

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<sup>4</sup> CRSG - Midwest Contingency Reserve Sharing Group is an evolution of the MAPP Contingency Reserve Sharing Group. It is an amalgamation of three contingency groups which started operating in January 1, 2007. It took on a new form under the Amended and Restated GRSG Agreement on January 6, 2009.

When the rate schedules were designed, Manitoba Hydro's need for surplus capacity was also an enforced requirement of the MAPP GRSP. This requirement is dependant upon the capacity of Manitoba Hydro's generating assets and its portfolio of firm load obligations. It is not energy dependant. Hence whether Manitoba Hydro is experiencing low or high water flows Manitoba Hydro may be required to utilize Options A or C curtailable load to maintain a surplus capacity position with the MAPP GRSP. It is important to note that there were potentially significant MAPP penalties for having insufficient capacity reserves. The MAPP charges can be up to \$US 111,990 for every deficient planning reserve MW recorded during the six month season (summer or winter) but have been set to zero since May 01, 2008. Whether MAPP itself or successor organizations will re-active penalties is not currently known.

A significant risk mitigation benefit of the curtailable load program is the avoidance of the need to shed firm load occasionally should Manitoba Hydro be in a situation where it would otherwise be the cause of the Midwest contingency Reserve Sharing Group not be able to meet generation performance standards associated with NERC disturbance recovery. As NERC's penalty is increased if the organization makes an economic choice, the fine could be up to \$1 M US per occurrence, Should Manitoba Hydro be the cause of the reserve sharing group incurring such as penalty based on an economic assessment, Manitoba Hydro would expect that its future in being able to share reserves would be threatened. If an Option R customer's response was insufficient, Manitoba Hydro would then shed firm load.

Option R curtailable load, allows Manitoba Hydro to obtain increased value in the short-term opportunity energy market<sup>5</sup>. In this circumstance the benefits of having Option R available are dependent on Manitoba Hydro's water supply conditions as follows:

- High Water Supply - the generating capacity freed up for commercial use allows for increased hydraulic generation for export as idle generating units can be run to capture additional on peak sales. Without Option R capacity in place on peak energy would be spilled. With Option R load, the additional energy generated can be sold at on peak prices.

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<sup>5</sup> Opportunity export sales are sales of capacity and/or energy that are not backed by dependable energy and are incremental exports that arise from time to time as a result of water conditions that are better than the lowest historic.

- Average Water Supply - allows for additional hydraulic generation during on-peak hours that would otherwise be produced during off-peak hours (due to limited on-peak generating capability). In this case Manitoba Hydro captures the benefit of the price differential between on and off-peak periods.
- Low Water Supply - does not provide any significant benefits because Manitoba Hydro has sufficient shut down generating units that could be run temporarily for operating reserves purposes without relying on Option R load reductions.

Manitoba Hydro will not utilize curtailable load in order to facilitate a high value opportunity spot market sale<sup>6</sup>.

The Reference Discount of \$3.00 per kW (applicable throughout the entire reporting period) was set to approximate Manitoba Hydro's alternative cost to provide equivalent resources which could be used to maintain planning reserves and for supporting capacity exports. Refer to Attachment 1 regarding the Value of Curtailable Load at Manitoba Hydro.

To Customers:

The monthly Reference Discount continues to be beneficial to customers.

The CRP Reference Discount for April 1, 2008 to March 31, 2009 was \$3.00 per kW/month with customers under Option AE receiving 100% of the discount, while Option A and Option R customers received 70% or \$2.10 per kW/month and Option C customers received 40% or \$1.20 per kW/month.

For curtailable load nominated as 'Protect to Firm Load' the Reference Discount is calculated and credited to customers' bill each month as  $(A - B) \times C \times D$  where:

A = On-Peak Period Demand (kW)

B = Protected Firm Load (kW)

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<sup>6</sup> Spot market sales are sales that occur on a day ahead or real time bases. They are not considered to be a firm export sale.

C = On-Peak Period Load Factor

D = Discount Amount

For curtailable load designated as a ‘Guaranteed Curtailment’ the Reference Discount is calculated and credited to customers’ bill each month as  $GC \times D$  where,

GC = the customer’s guaranteed curtailable load

D = Discount Amount

The monthly Reference Discount Credit each customer received from April 1, 2008 to March 31, 2009 has been itemized in the following table as well as their maximum monthly On-Peak Demand and On-Peak Load Factor:

Monthly Reference Discount Credit for 2008/09												
2008 to 2009	Customer 1 Options AE, R, A			Customer 2 Option A			Customer 3 Option A			Customer 4 Option C		
	On Peak MW	LF %	Discount Paid \$	On Peak MW	LF %	Discount Paid \$	On Peak MW	LF %	Discount Paid \$	On Peak MW	LF %	Discount Paid \$
Apr	196.7	97.6	\$396,253	73.7	75.8	\$79,053	26.5	92.5	\$48,550	59.7	81.5	\$26,090
May	190.9	90.8	\$374,219	73.9	84.3	\$88,274	26.1	95.4	\$49,286	59.5	75.4	\$23,937
June	190.9	93.8	\$383,908	74.1	87.4	\$92,059	26.3	98.7	\$51,408	59.3	83.4	\$26,336
Jul	191.8	88.1	\$365,648	73.8	85.9	\$89,801	26.5	97.8	\$51,365	59.3	82.9	\$26,170
Aug	191.0	94.8	\$387,074	73.7	84.2	\$87,980	26.7	98.1	\$51,882	59.2	74.6	\$23,429
Sep	191.1	95.9	\$390,560	75.3	79.7	\$85,937	26.7	84.8	\$44,926	58.8	75.8	\$23,486
Oct	190.3	94.0	\$384,484	77.2	84.6	\$92,394	26.2	98.7	\$51,241	58.9	76.5	\$23,742
Nov	191.0	95.7	\$389,921	73.8	82.6	\$86,420	26.2	98.8	\$51,314	60.5	79.0	\$26,054
Dec	147.9	85.1	\$325,659	73.7	56.2	\$58,577	27.3	82.5	\$44,705	60.2	81.3	\$26,547
Jan	197.0	95.4	\$389,057	74.4	78.3	\$82,874	26.5	67.4	\$35,339	60.2	82.7	\$27,009
Feb	198.0	87.1	\$362,418	74.4	45.7	\$48,358	18.8	68.9	\$25,030	60.1	82.1	\$26,663
Mar	197.1	91.3	\$376,105	74.5	88.4	\$93,783	26.2	98.4	\$51,121	60.4	88.6	\$29,091
<b>Total</b>	<b>2,273.5</b>	<b>92.5</b>	<b>\$4,525,307</b>	<b>892.5</b>	<b>77.8</b>	<b>\$985,509</b>	<b>310.1</b>	<b>90.2</b>	<b>\$556,168</b>	<b>716.0</b>	<b>80.3</b>	<b>\$308,556</b>

\* Does not include \$1,712 paid to Customer 1 for the Option R Reserve Discount which is calculated and credited to customers’ bill for each successful curtailment as  $LR \times Du \times FD$  where,

LR = amount of load reduction (in kW) requested by Manitoba Hydro's System Control to the customer at the time of an Option R curtailment

Du = duration of the curtailment (in hours)

FD = fixed discount amount, currently set at \$0.04<sup>7</sup> per kW.h

### **3. Adequacy of Terms and Conditions:**

The Terms and Conditions which have been in place since April 1, 2005 continue to protect Manitoba Hydro's planning reserves and provide operating reserves which satisfy the requirements of the MAPP GRSP.

The cap limitation of 230 MW of Options A and C and 100 MW of Option R, made available during this reporting period, protected the value of curtailable load. However, going forward it may be necessary to increase the cap limitation, primarily of Option A load, for the following reasons.

- Manitoba Hydro's summer load continues to grow, diminishing the amount of surplus capacity that Manitoba Hydro can sell, which is necessary in rolling over network transmission service in the United States.
- Manitoba Hydro may have Module E delivery obligations to MISO associated with Manitoba Hydro export contracts beyond the contract provisions. This obligation could put Manitoba load at risk. Additional load will assist in managing the risk to firm load.

Manitoba Hydro is currently reviewing the terms and conditions of the program and the desire by customers for additional curtailable load. One customer has shown interest in designating a portion of their operation as curtailable load, however the current economic situation has resulted in the customer having to reduce their operating requirements thereby making them ineligible for the program due to their significantly reduced on-peak load factor.

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<sup>7</sup> The Fixed Discount amount is based on the value of carrying contingency reserves on Manitoba Hydro units.

Customer Experience with Curtailments:

The customer complied with the curtailment requested on January 14, 2009.

4. **Relationship of Customer's Monthly Peak Period Load Factor to Available Curtailable Load:**

Customers must have a minimum, nominal curtailable load of 5 MW. Other than Option R which must be nominated as Guaranteed Curtailment, Manitoba Hydro offers customers two choices for curtailing their nominated eligible load:

1. Guaranteed Curtailment - the customer can guarantee whenever Manitoba Hydro calls for a curtailment that a specified amount of load in kW will be available to shed; or
2. Curtail to Protected Firm Load - the customer will reduce its load to a specified maximum level in kW (Protected Firm Load) whenever Manitoba Hydro calls for a curtailment.

At Manitoba Hydro's discretion, customers with peak period load factors of less than 50% on the curtailable portion of the load may be required to guarantee their curtailable load.

For those customers selecting to curtail to a protected firm load, Manitoba Hydro is at risk that curtailable load may not be available since it is not guaranteed, meaning, at the time of a curtailment the customer may be operating at a reduced load factor. Manitoba Hydro, therefore uses the monthly on-peak load factor of the customer's total load as a proxy for available curtailable load (monthly curtailable load x On-Peak Load Factor).

During this reporting period, all four customers have curtailable load nominated as Curtail to Protected to Firm Load. In addition, Customer 1 also has Option R load which must be nominated as a Guaranteed Curtailment as defined in the Terms and Conditions.

## **CONCLUSION**

The Curtailable Rate Program facilitates in fulfilling Manitoba Hydro's commitment of planning reserves and contingency reserves as part of its reliability obligations with MAPP GRSP, and assists in minimizing disruption to Manitoba Hydro's firm customers.

The Terms and Conditions that came into effect April 1, 2005 continue to provide additional benefits over the previous program. The introduction of Option R load, the most valued option, has allowed both Manitoba Hydro and its customers to diversify load designated as curtailable. Option R load assists in Manitoba Hydro meeting its contingency reserve requirements as defined by MAPP.

The benefits of curtailable load to Manitoba Hydro are seen throughout the year. However, curtailable load has the greatest value during the peak times as it is during peak periods that Manitoba Hydro's accredited surplus with the MAPP GRSP is minimal and this lack of surplus may constrain Manitoba Hydro's ability to sell firm power.

The amount of curtailable load Manitoba Hydro has made available (230 MW for planning reserves and 100 MW for contingency reserves) has to date proven sufficient to meet Manitoba Hydro's requirements with respect to reserve obligations. Manitoba Hydro is however in the process of reviewing the cap limitation as changes are occurring within the MISO jurisdiction. In order to meet capacity obligations resulting from a Maximum Generation Event<sup>8</sup>, Manitoba Hydro will need to have approximately 400 MW of Option A load available for curtailment. In addition, changes appear imminent in Manitoba Hydro's contingency reserve sharing group, CRSP that may require additional Option R curtailable capacity. Manitoba Hydro continues to review the terms and conditions of the Curtailable Rate Program, and will advise the Public Utilities Board of any proposed changes and will seek confirmation of such.

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<sup>8</sup> An event triggered by an emergency in the MISO jurisdiction.

**ESTIMATE OF THE VALUE OF CURTAILABLE LOAD AT MANITOBA HYDRO**

The value of curtailable load to Manitoba Hydro is related to the Corporation's estimates of the marginal cost of capacity resources. Up until the year 2000, Manitoba Hydro estimated the marginal cost of capacity by adding together the winter benefits (related to deferring investment in new generation resources) and the summer benefits (related to the existence of a seasonal market for surplus capacity in MAPP). Both of these benefits were somewhat variable from year to year.

Beginning in the year 2000 Manitoba Hydro adopted a new approach to estimating the marginal cost of firm, long term capacity which incorporates both winter deferral and summer marketing benefits. Over the long term, a relatively stable value for capacity can be provided by separating out the capacity component from bundled long term firm export sales. This is done by estimating the annual carrying cost (assumes finance and depreciation costs but not operating/fuel costs) of the lowest cost resource required to provide capacity benefits in Manitoba, that being, a simple cycle combustion turbine (SCCT). This is estimated at \$78 per kW per year, or \$6.50 per kW per month, evaluated at load. This approach has the advantage of providing a clear transparent value, which is also stable over time and can be applied to evaluate the benefits of DSM resources which have a capacity component.

Curtailable load is however less valuable than a generation resource such as a SCCT. The SCCT can provide more flexibility in dispatch and also has the capability to deliver for longer time periods during extended emergency situations. Once in place a SCCT can be relied upon as a permanent long term resource. Curtailable load normally has more value in the summer months, when it can assist in supporting seasonal capacity exports, and in the peak winter months, when it may add reliability to Manitoba Hydro's generation resource. Curtailable load will provide more winter reliability benefits in years in which there is little capacity surplus on the system. When there is a significant capacity surplus on the Manitoba Hydro system, curtailable load provides less winter value than it would, for example, in the year 2015, when the requirement to add generation to serve domestic customers is forecast to be more pressing. The value of reliability benefits in a single year is not easily determined, which is why longer-term levelized values are used to infer the benefits of curtailable load.

In the year 2000, evaluation of the benefits of curtailable load was based on separate estimates of generation deferral benefits and summer seasonal sale benefits. This analysis yielded an estimate of annual aggregate benefits at \$33 per kW, or levelized over the year, \$2.75 per kW/month. This is equal to 42% of the carrying cost of a SCCT, which appears reasonable, based on relative dispatchability, sustainability, and long term reliability. This value would apply to the curtailable service option that provides the most value to Manitoba Hydro, that being Options AE and RE, for which the discount is set to return 100% of the estimated value of curtailable load, that is, \$3.00 per kW per month (applied throughout the reporting period), to the customer. Other options provide less flexibility and are accordingly worth less to Manitoba Hydro. These have been priced to reflect their lesser value to Manitoba Hydro but still to return the full estimated value of that option to the customer.

Manitoba Hydro normally markets its summer surplus capacity in the preceding February and will market curtailable load or other surpluses up to the point that there is still a low probability of breaching reserve obligations even in very warm weather conditions. Hence the summer weather does not impact on the value received for such sales. However, as noted earlier, year to year changes in conditions in the MAPP market can lead to considerable volatility in the value of capacity traded in that market.

In general terms Manitoba Hydro's objective for marketing curtailable capacity and energy is to utilize any excess in a manner that provides the greatest profits. This may involve the sale of additional short term 5 x 16 contracts (e.g. 48% capacity factor) if there is sufficient surplus energy, or the sale of peaking capacity which requires the supply of less energy during the on-peak period (e.g. 20% capacity factor).

**PUB INFORMATION REQUEST**

On June 4, 2008 Manitoba Hydro filed its 2007/08 annual Curtailable Rate Report with the PUB. The PUB in turn submitted a letter on January 26, 2009 requesting additional information on the CRP.

Manitoba Hydro has attempted to respond to the information requested. It should be noted however that the valuation of curtailable load options requires a complex study as these values are dependent on a number of uncertain parameters. These parameters include, but are not limited to: water conditions, market value, load, transmission or generation contingencies (on the Manitoba Hydro system or on a neighboring system), load forecast error, the operating behaviour of neighboring systems, etc.

The PUB requested Manitoba Hydro provide:

**1. A definition of the role of the CRP in supporting MH's power reserves.**

Options A and C

Contingency Reserves: Curtailable load can be used to re-establish Midwest Contingency Reserve Sharing Group (CRSG) contingency reserves, while CRSG deliveries are occurring. When re-establishing reserves, the curtailable load would be used as contingency reserves rather than curtailing the equivalent amount of transactions or importing power. The benefit associated with this resource is that it provides Manitoba with an option, in addition to generation or imports, to count towards re-establishing contingency reserves within the NERC required replenishment window, following a system disturbance. These reserves provide reliability benefits at potentially a lower cost than having surplus generation or increased imports. Access to these reserves lowers the risk of Manitoba Hydro contributing to a non-compliance to NERC standard BAL-002. Violations to this standard can result in the assessment of reserve sanctions (i.e., a requirement to carry more reserves in the future) which would translate into a lost opportunity cost to Manitoba Hydro because capacity could be withheld from export sales.

Planning Reserves: Curtailable load can be used to protect planning reserves. Having access to this resource allows Manitoba Hydro to export more firm capacity while

adhering to Midcontinent Area Power Pool (MAPP) planning reserve obligations. Access to these reserves reduces the risk of being short planning reserves and the associated penalties as determined after through after the fact reporting to MAPP. Historically after the fact planning reserve violations were subject to significant penalties as high as 106,330 \$US/MW-season based upon the MW amount of deficiency in any month of the six month season. Penalties have been suspended as of May 1, 2008 and will not likely be reinstated as the future of the MAPP GRSP is uncertain. The following table shows the history of penalties since 1999.

<b>Year</b>	<b>Penalty (\$US/MW - season)</b>
1999	\$87,720
2003	\$90,500
2004	\$93,750
2005	\$96,940
2006	\$99,500
2007	\$104,370
2008	\$106,330
2009	\$111,990 (not yet approved)

**Firm Load:** Curtailable load can be used to protect Manitoba firm load or firm exports. These reserves are a resource in Manitoba Hydro's capacity emergency plans and will be exercised prior to curtailing Manitoba firm load or firm exports.

### Option R

Option R curtailable load is used to meet Manitoba Hydro's contingency reserve obligation to CRSG. This resource reduces the amount of reserve generation capacity required on Manitoba Hydro's system, hence freeing up generation resources to supply Manitoba customers or export sales. The value of this resource to Manitoba Hydro is dependent on a number of factors, including but not limited to water conditions, market conditions, load, the operating behaviour of neighboring systems, etc. Access to these reserves lowers the risk of Manitoba Hydro contributing to non-compliance to NERC standard BAL-002. Violations to this standard can result in the assessment of reserve sanctions (i.e., a requirement to carry more reserves in the future) which would translate into a lost opportunity cost to Manitoba Hydro because of capacity withheld from export sales.

## Option E

Option E curtailable load can be used to meet firm energy requirements in the event that Manitoba Hydro expects to be short of firm energy supplies. Option E customers are to be curtailed prior to firm Manitoba load and firm export sales. This is normally only used for long term capacity shortages. These reserves are a resource in Manitoba Hydro's capacity emergency plans and will be used to avoid curtailing Manitoba firm load or firm exports.

### **2. A summary of the actual curtailments required and the avoided penalty payments over the last 8 years.**

The table in Appendix 1 provides a summary of curtailments which occurred over the past 8 years.

Beginning in 2001, the CRP was modified such that the number of curtailments was significantly reduced to only those required to respond to emergencies, re-establish operating reserves and or to maintain planning reserves. No records have been maintained by Manitoba Hydro on the avoided costs or penalties associated with each curtailment and it is now not possible to go back and determine what the alternative action would have been and it's cost or whether the alternative would have been to violate the reserve criteria and accept the regulatory penalty. As indicated previously the penalties associated with violations of operating or planning reserves are very significant.

### **3. A summary of the annual export contract revenues that were achievable over these 8 years as a result of the CRP being in place.**

The following table outlines the export benefits from the Curtailable Rates Program since 2004/05. The calculation of benefits for prior years is not possible as all the necessary information is unavailable.

Exports benefits arose from two sources:

1. Additional summer season capacity and energy revenues where Manitoba Hydro was able to sell capacity and associated energy in the forward markets

as a result of the additional capacity made available from load reductions under the Options A and C.

2. Additional export revenues resulting from the increased availability for commercial generation of hydraulic generation which would otherwise have been needed for Ready or Supplemental Operating Reserves. Option R curtailable load was used to provide these reserves instead.

<b>Fiscal Year</b>	<b>Additional Export Revenue (millions)</b>
2000/01	N/A
2001/02	N/A
2002/03	N/A
2003/04	N/A
2004/05	\$17.3
2005/06	\$16.9
2006/07	\$13.7
2007/08	\$9.8
2008/09	\$7.5
<b>Total</b>	<b>\$65.2</b>

In addition to the export benefits Manitoba Hydro and its customers also benefited from having the ability to curtail load for reliability and emergency reasons. These benefits have not been quantified.

#### 4. A summary of annual CRP credits received by customers for the 8-year period.

The following credits were paid out to customers participating in the Curtailable Rate Program.

<b>Fiscal Year</b>	<b>Customer Credit (millions)</b>
2000/01	\$2.0
2001/02	\$2.5
2002/03	\$4.1
2003/04	\$5.4
2004/05	\$5.6
2005/06	\$6.4
2006/07	\$6.4

<b>Fiscal Year</b>	<b>Customer Credit (millions)</b>
2007/08	\$6.4
2008/09	\$6.4
<b>Total</b>	<b>\$45.2</b>

**5. An annual cost/ benefit comparison.**

Benefits associated with curtailments for reliability and emergency reasons are difficult to quantify and are therefore not included in the figures shown below.

	<b>(in Millions)</b>		
<b>Fiscal Year</b>	<b>Cost*</b>	<b>Revenues</b>	<b>Net Benefit</b>
2000/01	\$2.0	N/A	N/A
2001/02	\$2.5	N/A	N/A
2002/03	\$4.1	N/A	N/A
2003/04	\$5.4	N/A	N/A
2004/05	\$5.6	\$17.3	\$11.7
2005/06	\$6.4	\$16.9	\$10.5
2006/07	\$6.4	\$13.7	\$7.3
2007/08	\$6.4	\$9.8	\$3.4
2008/09	\$6.4	\$7.5	\$1.1
<b>Total</b>	<b>\$45.2</b>	<b>\$65.2</b>	<b>N/A</b>
<b>Total(after 04/05)</b>	<b>\$31.2</b>	<b>\$65.2</b>	<b>\$34.0</b>

\*Based on the customer monthly credits.

**6. The net annual costs (presumably supported by rates).**

As shown by the benefits reported in response to question 5, there is no net annual costs post 2004/05.

**APPENDIX 1**

<b>Summary of Curtailments</b>							
<b>Date</b>	<b>Option A</b>		<b>Option C</b>		<b>Option R</b>		<b>Reason for Curtailments</b>
	<b>#Curt.</b>	<b>MW</b>	<b>#Curt.</b>	<b>MW</b>	<b>#Curt.</b>	<b>MW</b>	
Jul 31/00	1	60	1	20			Peak load shaving
Aug 11/00	1	60	1	29			Peak load shaving
Aug 24/00	1	61	1	24			Peak load shaving
Oct 13/00	2	60	2	53			Reduce Grand Rapids loading
Oct 14/00			2	43			Reduce Grand Rapids loading
Oct 16/00	2	120	2	18			Reduce Grand Rapids loading
Oct 17/00	1	60	2	26			Reduce Grand Rapids loading
Oct 18/00	1	59	2	33			Reduce Grand Rapids loading
Oct 19/00	1	60	2	36			Reduce Grand Rapids loading
Oct 20/00	2	118	1	26			Reduce Grand Rapids loading
Oct 23/00	1	61	1	21			Reduce Grand Rapids loading
Oct 24/00			1	21			Reduce Grand Rapids loading
Nov 14/00			1	17			Forecast error
Nov 17/00			2	42			Forecast error
Nov 20/00	1	70	2	41			Forecast error
Nov 21/00	1	68	2	54			Reduce import requirements
Nov 22/00	2	137	3	65			Reduce import requirements
Nov 24/00			2	27			Reduce import requirements
Nov 27/00	1	69	2	36			Reduce import requirements
Nov 28/00	2	138	2	26			Reduce import requirements
Nov 29/00	2	135	2	26			Reduce import requirements
Nov 30/00	2	134	2	25			Reduce import requirements
Dec 4/00	1	69	2	36			Reduce imp. req. & peak shaving
Dec 5/00	1	69	1	25			Reduce imp. req. & peak shaving
Dec 6/00	1	69	1	20			Reduce imp. req. & peak shaving
Dec 7/00			3	60			Reduce import requirements
Dec 8/00	1	70					Reduce import requirements
Dec 9/00	1	70	1	20			Reduce import requirements
Dec 10/00			1	21			Reduce import requirements
Dec 11/00	2	140	2	30			Reduce imp. req. & peak shaving
Dec 12/00	2	142	2	13			Reduce imp. req. & peak shaving
Dec 13/00	2	139	3	26			Reduce imp. req. & peak shaving
Dec 14/00	2	140					Reduce imp. req. & peak shaving
Dec 15/00	1	70	1	6			Forecast error
Dec 18/00			1	14			Reduce import requirements
Dec 19/00			2	27			Reduce import requirements
Dec 20/00			2	23			Reduce import requirements

Summary of Curtailments							
Date	Option A		Option C		Option R		Reason for Curtailments
	#Curt.	MW	#Curt.	MW	#Curt.	MW	
Dec 21/00	2	141	1	3			Forecast error
Feb 1/01	1	71	1	10			Forecast error
Aug 7/01	1	66	1				Protect sys. reserves due to high pk
Jul 2/03			2	22			Protect sys. reserves due to high pk
Aug 8/03	1	242					Protect sys. reserves due to high pk
Aug 11/03	2	287					Protect sys. reserves due to high pk
Aug 14/03	3	291					Protect sys. reserves due to high pk
Aug 15/03	4	170	2	35			Protect sys. reserves due to high pk
Aug 18/03	3	290					Protect sys. reserves due to high pk
Aug 19/03	3	286	2	39			Protect sys. reserves due to high pk
Aug 20/03	2	236					Protect sys. reserves due to high pk
Dec 22/04	1	94					Operate within HVDC secure limit
Dec 23/04	2	206					Operate within HVDC secure limit
Jan 4/05	2	155					Operate within HVDC secure limit
May20/05					1	40	Maintain op. reserves-loss of Pole2
Jun 19/05	3	146	1	20	1	40	Protect op res.- mult. contingencies
Jun 22/05	3	188					Protect planning & op. reserves
Jun 23/05	2	163					Protect planning reserves
Jul 12/05	1	49					Meet reserve obligations
Jul 13/05	1	23					Meet reserve obligations
Aug 2/05	1	118					Protect planning reserves
Aug 3/05					1	40	Restore op. reserves-loss Bipole 1
Nov 28/05					1	40	Supply operating reserves
Jul 12/06	2	72					Reduce firm load to protect reserve
Jul 24/06	1	122					Reduce firm load to protect reserve
Aug 31/06					1	40	Supply op res.-Dorsey 230kv fault
Jan 29/08					1	40	Supply op reserves - loss of import
Jan 14/09					1	40	Loss of Henday Pole 4
<b>Total</b>	<b>79</b>	<b>5,864</b>	<b>70</b>	<b>1,159</b>	<b>7</b>	<b>280</b>	