CAC/MSOS/TREE/RCM I – NFAAT - 1

Reference:

Alternatives to Advancement of the Wuskwatim Generating Station, prepared by Ralph D. Torrie, Torrie Smith Associates, February 10, 2004 (The TREE/RCM Submission), page 15, lines 8-14 and 18-21.

Question:

a) Please provide the "business as usual" (pre-DSM) scenario developed by the consultant Ralph Torrie by sector in a format comparable to Manitoba Hydro's sector load forecasts (reference: CCC/NFAAT/S/15, Table 2) through to 2017/18.

b) For each sector, please indicate the key drivers used to develop the scenario and the values assumed through 2018.

c) Please define industrial segment electricity productivity and provide the formula.

d) Please provide sample calculations for 2003, 20011/12 and 2017/18 of industrial electricity productivity based on Manitoba Hydro's load forecast and Mr. Torrie's revised load forecast for the industrial sector.

RESPONSE:

The "business as usual" scenario is described in CNF/TREE/RCM I NFAAT – 4. It is based on the same key drivers as the Manitoba Hydro 2002 Basic Load Forecast, with the adjustments to commercial floor area and to industrial sector productivity described in CNF/TREE/RCM I NFAAT – 4.

Electricity productivity is defined as the ratio of value added to electricity consump tion. At the individual industry level, it is the value added for that industry divided by the electricity consumption for that industry. In the context of the analysis here, it is purchased electricity that is used for defining productivity. For industries with significant self-generation, this will overestimate their total electricity productivity.

We have assumed that in a business-as-usual scenario, electricity productivity would improve by 0.9% per year between 2002/03 and 2017/18, considerably slo wer than recent historical trends. A more sophisticated analysis would differentiate the rate of improvement by sector; this simpler method probably underestimates the likely productivity improvement for Manitoba, which has a concentration of industries in which electricity productivity improvement is a priority. It is not possible to compare our assumed productivity improvements with the Manitoba Hydro Load Forecast, or at least not with the published version. The forecast does not contain industrial level productivities; in fact Manitoba Hydro has stated that it is unable to provide historical time series for industry-specific output for the Manitoba economy (**TREE/RCM/MH/NCN II - NFAAT – 35a).**

The DSM Market Potential Study for the industrial sector does contain a table that appeared to have industry specific electricity intensities (Exhibit 3-1) in GWh/M$GDP but the information was not provided in a form that we could use. The DSM Market Potential Study for the industrial sector is not closely tied to the Manitoba Hydro Load Forecast. It uses economic growth rates taken from a completely independent source from Manitoba Hydro and appears to combine those growth rates with assumed declining industrial electricity productivity in every sector of the Manitoba economy, an assumption that runs contrary to the recent and historical (since 1990) trend in Canada toward improved industrial electricity productivity.

CAC/MSOS/TREE/RCM I – NFAAT - 2

Reference:

The TREE/RCM Submission, page 16, lines 1-6.

Question:

a) Please describe the additional economic benefits of DSM/DG resources that are not captured by the 6.15 cents/kWh.

b) Please provide a sample calculation of how the screening value could be adjusted to account for the unique value of a kWh saved and compare this to the value of 6.15 ¢/kWh used by Hydro's consultants in the DSM Potential screening studies.

RESPONSE:

The undervaluing of DSM is addressed in CNF/RCM/TREE I NFAAT – 5.

To properly capture the value of DSM and distributed generation would require a comprehensive and integrated scenario analysis of electricity supply and demand in Manitoba, the same type of analysis that would have been done by Manitoba Hydro had it considered alternatives to Wuskwatim as means for maintaining its capability to sell to the peak export market while ensuring domestic electricity service needs are met economically and sustainably.

Lovins estimates that distributed generation, including DSM, may be worth ten times more than the values obtained through the type of measure-specific engineering financial calculations used by Manitoba Hydro.[1] It is unlikely the premium is nearly that large in a hydro-based system like Manitoba's as many of the costs and risks (which are also costs) in Lovins' analysis relate to the avoided costs and risks of fossil generation. But as described in CNF/RCM/TREE I NFAAT – 5, many of the hidden benefits of distributed generation and DSM do apply in Manitoba.

[1] Amory B. Lovins, Small Is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size, Rocky Mountain Institute, 2002. Available from www.rmi.org.

CAC/MSOS/TREE/RCM I – NFAAT - 3

Reference:

The TREE/RCM Submission, page 15, lines 20-21.

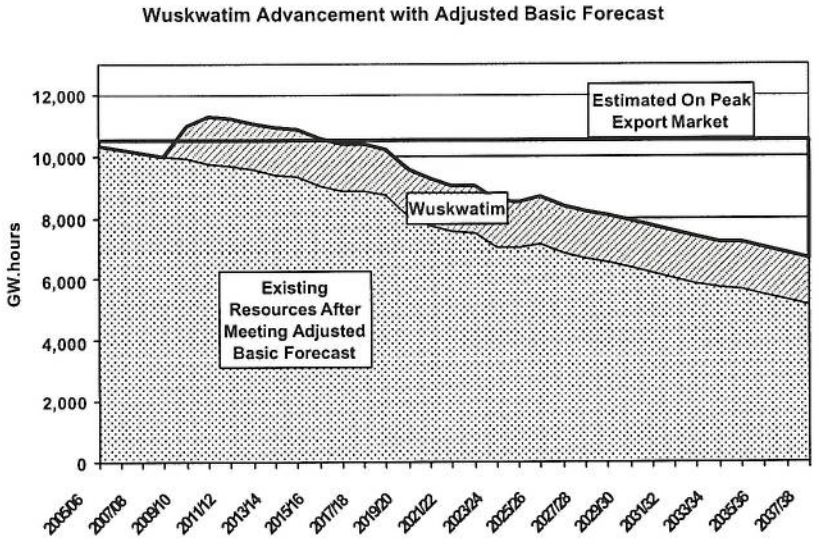
Question:

a) Please provide the baseline (pre DSM) sectoral results for your end use model for 2002/3, 2011/12 and 2017/18.
b) Please provide the results including DSM and compare to the existing Manitoba Hydro Baseline targets of 1272 GWh and 356 MW winter peak reduction in 2011/12 as per response CAC/MSOS/MH/NCN I-NFFAT 110a.

RESPONSE:

The "pre-DSM" results refer to the same projection referred to in CAC/MSOS/TREE/RCM I NFAAT -1 and described in CNF/TREE/RCM I NFAAT – 4.

The end use demand numbers in Table TREE/RCM CNF 4.2 in CNF/TREE/RCM I NFAAT – 4 are comparable to the end use sales figures in Manitoba Hydro's 2002 Load Forecast, including Winnipeg Hydro (net of distribution losses in the Winnipeg Hydro territory). Notwithstanding the fact that we adjusted the future demand to reflect altered assumptions about commercial floor area and industrial electricity productivity, these end use demand numbers implicitly reflect that portion of Manitoba Hydro's past and future DSM that is embedded in the Load Forecast. That portion of the 1,272 GW.hour target that is not embedded in the Load Forecast but is represented by the targeted programs in Manitoba Hydro's currently approved Power Smart program (i.e. 669 GW.hours at generation by 2017/18) has not been deducted from these demand numbers but it HAS been included in the calculation of the existing resources available for export AFTER meeting the adjusted load forecast that is portrayed in the figure from CNF/TREE/RCM I NFAAT – 4, reproduced here.



CAC/MSOS/TREE/RCM I – NFAAT - 4

Reference:

The TREE/RCM Submission, page 16, lines 19-20.

QUESTION:

a) Please provide your analysis of the DSM potential GWh and Peak MW that is available for each sector by year.

b) Please compare your results to the existing Manitoba Hydro Baseline targets of 1272 GWh and 356 MW winter peak reduction in 2011/12 as per response CAC/MSOS/MH/NCN I-NFFAT 110a.

c) Please provide a similar schedule that compares the results of your analyses to the data in response CAC/MSOS/MH/NCN I-NFAAT 111a (Residential) 111b (Commercial) and 111c (Industrial/Agriculture) in terms of Economic Potential, Achievable Potential in the years 2003, 2007/08,2012/13 and 2017/18.

d) List all key assumptions used in your analyses.

RESPONSE:

A description of our estimate of DSM economic potential is provided in CNF/TREE/RCM I NFAAT – 9, including the assumptions in the analysis. Our DSM potential estimates are provided in GW.hours for the year 2018. We have not analyzed the corresponding capacity savings, but the overall load factor of the DSM in our scenario would not be very different from that in the DSM Market Potential Study. Table TREE/RCM I NFAAT CAC 4.1 compares both the electricity demand and DSM levels in 2018 in a manner that is directly comparable with the tables in CAC/MSOS/MH/NCN/ I-NFAAT 110 and 111. CNF/TREE/RCM I NFAAT – 13 contains a description of a number of scenarios showing DSM/DG alternatives to Wuskwatim that combine different levels of "achievable" DSM and wind power resources.

Figure TREE/RCM CAC 4.1

	Reference Demand in 2018	Demand in 2018 with Economic Potential	Economic Potential DSM	DSM as % of Reference Demand
RESIDENTIAL				
Manitoba Hydro (MPS)	6,553	5,016	1,537	23.5%
Manitoba Hydro Adjusted	6,553	5,016	1,537	23.5%
Torrie Smith	6,553	4,250	2,303	35.1%
COMMERCIAL				
Manitoba Hydro (MPS)	6,107	4,868	1,239	20.3%
Manitoba Hydro Adjusted	5,131	4,145	986	19.2%
Torrie Smith	5,131	3,591	1,540	30.0%
INDUSTRIAL				
Manitoba Hydro (MPS)	10,157	9,407	750	7.4%
Manitoba Hydro Adjusted	8,338	7,704	634	7.6%
Torrie Smith	8,338	7,676	663	7.9%
TOTALS				
Manitoba Hydro (MPS)	**22,817**	**19,291**	**3,526**	**15.5%**
Manitoba Hydro Adjusted	**20,022**	**16,865**	**3,157**	**15.8%**
Torrie Smith	**20,022**	**15,516**	**4,506**	**22.5%**

CAC/MSOS/TREE/RCM I – NFAAT - 5

Reference:

The TREE/RCM Submission, page 17, lines 16-17.

QUESTION:

a) Please provide documentation on the scenario as indicated.

b) Does Mr. Torrie have a recommendation for a revised set of DSM targets by sector and overall?

c) If so, please provide the recommended targets by year.

d) Please compare the recommended targets to the Scenarios set out in response CAC/MSOS/MH/NCN I-NFAAT 121b in terms of Achievable Potential, and a 2X DSM Scenario.

RESPONSE:

Please refer to CNF/TREE/RCM I NFAAT – 9 for a description of our estimate of DSM potential and to CNF/TREE/RCM I NFAAT - 13 for a description of a number of scenarios that present alternatives to Wuskwatim Advancement by combining different levels of achievable DSM and wind power development. The "2X DSM" level in our analysis is identical to the amount in the "2xDSM" column in CAC/MSOS/MH/NCN I- NFAAT – 121b.

CAC/MSOS/TREE/RCM I – NFAAT - 6

Reference:

The TREE/RCM Submission, page 17, lines 26-28.

QUESTION:

a) Please explain why the RIM test is not an appropriate screening tool either alone or in conjunction with other tests such as the Societal Cost Test (SCT)?

RESPONSE:

As with any system of screens or filters, the limiting screen is the one with the finest mesh, the one that places the most restrictive conditions on the DSM programs that pass through the screen. While it is advantageous to conduct a variety of tests for the different insights they provide, if the more restrictive screen is the one that is used to determine which measures are included in the utility's DSM program, then for practical purposes it is being *applied* alone and not in conjunction with other, less restrictive screens.

Manitoba Hydro states that it will develop "all economic DSM" opportunities that do not have "unacceptable rate impacts" and has made it clear that this excludes DSM that is economic but for which the RIM test benefit/cost ratio is less than one, or significantly less than one. While the Total Resource Cost and other tests are conducted by Manitoba Hydro, the RIM test is the limiting screen. From the perspective of an energy services orientation (see CNF/TREE/RCM I NFAAT - 15), this means that economic DSM will be excluded if it puts the utility in a position where it must increase the price per kilowatt-hour of electricity to any of its customers. This may be an appropriate if blunt approach for a utility with a mandate to minimize the price of electricity, but it is clearly inappropriate in the context of minimizing the cost of energy services. (It also underscores one of the downsides of the "lumpiness" of megaproject-based supply side orientation represented by the Wuskwatim Advancement proposal and one of the advantages of the smoother, "grainier" approach represented by DSM/DG alternatives.)

For capital intensive utilities like Manitoba Hydro, a DSM portfolio with a RIM test benefit/cost ratio less than one can pose a difficult challenge to maintaining revenue sufficient to cover debt repayment, but Manitoba Hydro also enjoys a number of advantages that would permit alternative strategies. As a publicly owned utility with a virtual monopoly on electricity supply, with a billing system that extends to every home and business in the province, with an opportunity to pursue demand side investments that are truly comprehensive in scope (encompassing electricity and natural gas), with a mandate that encourages a shift toward an energy services orientation, and with ready buyers for the saved kilowatt-hours in the peak export market, Manitoba Hydro is better positioned than most utilities to develop the economic potential for DSM without restricting their efforts to a program limited by the RIM or "no losers" test.

Even in the narrow context of a supply-oriented business strategy, the RIM test is often defended in the context of equity considerations. There will always be some customers who are either unwilling or unable to improve the efficiency with which they use electricity, and it is argued

that it would be unfair to these customers for the price of electricity to go up as the result of an overall reduction in demand for kilowatt-hours from those customers who are willing and able to partake of DSM measures. The higher incentives associated with third generation DSM programs will change the distribution of net benefits on the utility system, but countervailing action can be taken in both program design and rate design. (It is interesting to note that all ratepayers pay for supply-side expansion, regardless of whether their demand causes the need for additional capacity, and yet equity issues are rarely considered directly when deciding between competing supply options.)

Plunkett has described a number of alternatives for distributing the benefits and costs of demand-management resources "independently of the amounts of resources acquired and of the methods used to acquire them":[2]

- *"Setting incentive levels is only one way to share benefits. Benefits can be redistributed outside the program design process – what can be given directly through program design can always be taken away indirectly through cost allocation. One way is to adjust budgets to equalize opportunities for participation (e.g. scaling up programs aimed at those deemed less likely to participate).*

- *"Another approach is to reallocate system costs between customers based in part on their expected share of total benefits.*[3]

- *"Seeking to minimize transfers between customers is valid goal. Re-aligning participant benefits through program design should focus on recovering incentive expenditures. This is consistent with the goal of making participants no better off than if they pursued program measures on their own. From the standpoint of least-cost planning, it is desirable to pursue this goal without sacrificing economic efficiency.*

- *"Aside from sacrificing economic efficiency, lowering incentives could ironically worsen, not improve, distributional equity. The customers most likely to be non-participants if utilities set incentive levels too low are also likely to be those least able to bear bill increases. The customers the utility fails to reach will suffer on two counts – once as they share costs of programs they are unable to participate in, and twice as they bear higher supply costs resulting form lower savings."*

[2] John Plunkett, "Demand Management Program Design for Least Cost Planning", Vol. II of Building Ontario Hydro's Conservation Power Plant, prepared for Coalition of Environmental Groups and submitted to the Ontario Environmental Assessment Board, Ontario Hydro Demand/Supply Plan Hearings, Toronto, November 1992.
[3] Plunkett and Chernick, "Lost Revenues and Other Issues in Demand-Side Resource Evaluation: An Economic Reappraisal," 1988 Summer Study on Energy Efficiency in Buildings, American Council for an Energy Efficient Economy, Pacific Grove, CA, 1988.

CAC/MSOS/TREE/RCM I – NFAAT - 7

Reference:

The TREE/RCM Submission, page 19, lines 16-17.

QUESTION:

a) Please provide a list of Canadian DSM programs that conform to "best practices".

b) Please provide Documentation or references to support your answer to a)

RESPONSE:

Please refer to CNF/TREE/RCM I NFAAT - 10 and CNF/TREE/RCM I NFAAT - 11 for a discussion of DSM best practices.

CAC/MSOS/TREE/RCM I – NFAAT – 8

Reference:

The TREE/RCM Submission, page 20, lines 6-7.

QUESTION:

Is Mr Torrie advocating that electricity prices be increased to stimulate Demand Side Management and Distributed Generation? Please explain.

RESPONSE:

Although the question is addressed to Mr. Torrie, as it is an inquiry about whether a particular position is being advocated, the response has been prepared by Dr. Peter Miller in his capacity as a representative of TREE/RCM. See CNF/TREE/RCM I NFAAT – 12 for some additional comments of electricity price and DSM.

The statement that "DSM programs will be more effective when delivered against a backdrop of rising electricity prices" is an economic truth illustrated by the significantly greater successes of conservation programs during the supply and price crises of 2000-2001 in California and elsewhere on the West Coast. This economic truth can be applied as a matter of deliberate policy, rather than crisis, to achieve the net social benefits that economic and energy efficiency provide by ensuring that electrical rate subsidies are reduced and the true costs of electricity are increasingly reflected in the rates, particularly for incremental usage.

The "true costs of electricity" can be approached through a number of avenues considered together including:

- The cost/kW.h for new generation, transmission, and distribution
- The economic opportunity cost of increased usage limiting the power available for export earnings
- An environmental premium for environmental impacts of electricity generation, transmission and distribution and for resultant socio-economic impacts
- The climate change mitigation opportunity cost of inefficient usage that limits the power available for fossil fuel displacement
- Appropriate rents for a finite, if renewable, hydrological resource and for land use
- A social equity premium to insure that a basic level of electricity is available and affordable to meet basic necessities
- The electrical sector bearing an appropriate burden of taxation rather than having other sectors bear a disproportionate burden
- An appropriate return on capital to the owners of Manitoba Hydro
- The financial health of Manitoba Hydro
- Removal of consumption subsidies

Pricing the true costs of electricity, as identified by an analysis of factors such as those above, can be reconciled with the mandate to meet basic energy needs by a variety of methods. In their PUB Final Argument, TREE and RCM have recommended the redirection of subsidies from

consumption to conservation measures that reduce utility bills through reduced consumption rather than lo w rates. TREE and RCM have also recommended an inverted rate structure, in which a baseline level of electricity is supplied at modest cost, but incremental usage is priced closer to the true costs. Other jurisdictions have also identified special rates for low income consumers and/or consumers with limited alternatives.

If policies like these are developed, electrical costs might decline for modest users of electricity and those who implemented appropriate conservation measures, but would increase for larger users who failed to increase their efficiency. This shift would remove some of the perversity and inequity of current consumption subsidies that distribute the wealth of Manitoba's hydroelectric resource on the basis of how much electrical energy is consumed.

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CAC/MSOS/TREE/RCM I – NFAAT – 8

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CAC/MSOS/TREE/RCM I – NFAAT - 9

Reference:

The TREE/RCM Submission, page 20, lines 15-16.

QUESTION:

a) Please provide documentation on the scenario as indicated

RESPONSE:

Please refer to CNF/TREE/RCM I NFAAT – 13 for a description of a number of scenarios that combine different levels of wind power and "achievable" DSM to provide alternatives to Wuskwatim Advancement.