CEC/TREE/RCM NFAAT - 1

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, Pages 4-7, Point 3

QUESTION:

(a) Does MH have a need to develop Wuskwatim in 2009/10 based on MH's stated mandate to export power? Please explain your answer.

(b) Is there a need to develop Wuskwatim in 2019/20? Please explain your answer.

RESPONSE:

(a) Manitoba Hydro has not demonstrated that Wuskwatim needs to be developed for a 2009/10 in-service date in order to fulfill its mandate to export power. Advancing Wuskwatim to 2009/10 is not the only way to maintain the ability to take full advantage of the peak export market. Whether or not it is the best way has not been seriously addressed by the proponent; in fact, alternative ways of meeting the "need" for Wuskwatim Advancement have not even been systematically identified and analyzed in the submissions of MH/NCN. It is not and should not be the role of intervenors to do that work for the proponent, but we believe that there is a plausible case that there are alternatives to Wuskwatim Advancement as ways of meeting the underlying export objectives.

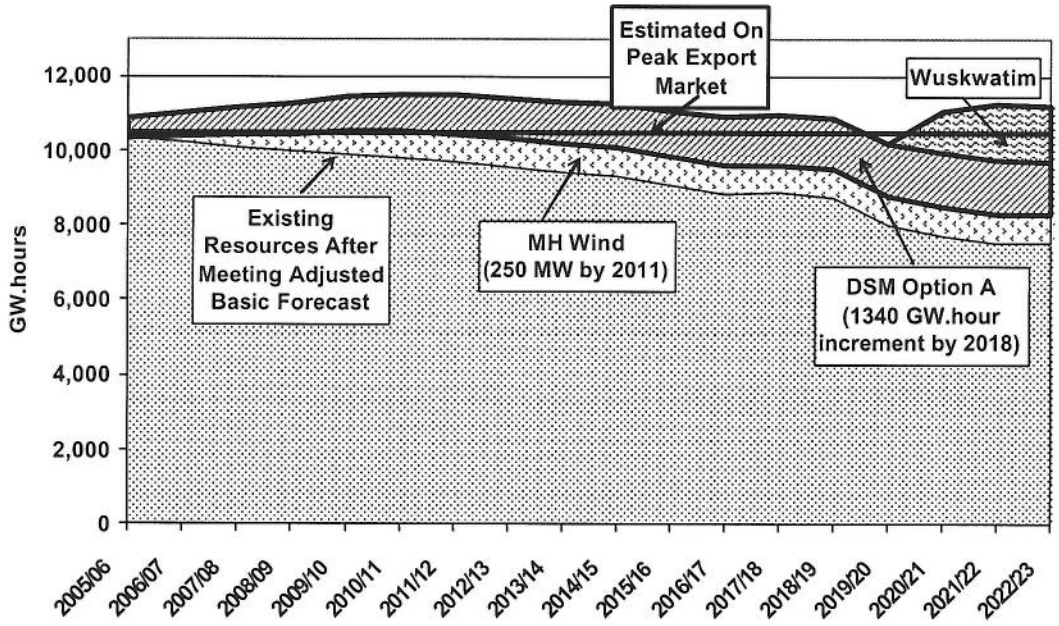
Manitoba Hydro load forecast overestimates the electricity demand that would result from the GDP growth contained in the Economic Outlook. In the most recent Load Forecast (2003), the annual demand from the Top Customer category is 1600 GW.hours higher in 2017/18 than it was in 2002/03, a 30% increase. This projection is made without the use of any modeling and no analysis of its plausibility is presented. It represents 46% of all the growth in the forecast and an annual growth rate of 1.8%. Meanwhile, the Mass Market portion of the forecast grows at 1.2%, compared with the 1.6% assumed in the DSM Market Potential Study for the commercial and institutional markets that represent about half of the Mass Market category. But such growth in the commercial/institutional sector would therefore imply only 0.75% per year growth in the rest of the Mass Market category – all other industry except the Top Customers. It just doesn't add up. In the adjustment we have made to the Basic Forecast (described in CNF/TREE/RCM I NFAAT – 4), we have brought industry-specific growth rates in line with the historical rates that correspond to the GDP growth in the Forecast, we have adjusted the industry-specific electricity productivities to reflect a continuing slight improvement, and we have adjusted the assumed building floor areas to levels that are more in line with the forecast population and economic growth. Manitoba Hydro produces its Medium Low Forecast by adjusting the population, economic growth and electricity price *inputs*. However, the Forecast is equally or more sensitive to changes in the relationship *between* electricity demand and these inputs. As our adjusted Basic Forecast illustrates, demand levels that are lower than Medium Low forecast come about with the same economic growth that is reflected in the Basic Forecast, but with more credible assumptions about the relation between electricity demand and economic growth.

Further, there is more DSM that can and likely will be delivered than the amount contained in the current Power Smart program. The DSM Market Potential Study concluded that about 40% of the identified economic potential for DSM could be achieved by 2018, which would represent an incremental amount of DSM by 2018 in the range of 800 GW.hours per year, over and above the current approved program. Combining this same percentage with a less conservative estimate of the economic potential would inc rease the incremental DSM to 1,200 GW.hours and would represent a tripling of the current program.

Finally, the development of 250 MW of wind power between now and 2011 provides a significant increment to the amount of power that would be available for export. Continuing growth of wind power after 2011 could double this contribution.

There are many possible combinations of load growth, DSM and distributed generation that could be analyzed as possible alternatives to Wuskwatim Advancement; one illustrative example is provided below to illustrate the point. This illustrative scenario includes an adjustment to the Basic Forecast (with no reduction in population or economic growth, and with no acceleration of the service sector relative to manufacturing), 250 MW of wind power, and an increment of 1,340 GW.hours of DSM by 2018. DSM Option A is equal to 3X the current DSM program. It represents the amount of DSM that would be achieved using the higher estimate of economic potential, but accepting the DSM Market Potential Study estimates of the percent of the economic potential that is achievable.

Alternative to Wuskwatim Advancement with Adjusted Forecast, 250 MW of Wind and DSM Option A



This particular scenario is put forward to illustrate the type of alternative to Wuskwatim Advancement that should be assessed in the context of the NFAAT question. The issue is not whether Wuskwatim Advancement will still (eventually) yield a 10% return even with increased DSM and distributed generation, but whether Wuskwatim Advancement constitutes the best alternative for fulfilling Manitoba Hydro's mandate to export electricity. Scenarios such as the one illustrated above need to be compared in detail to Wuskwatim Advancement, with full consideration of the unique benefits offered by DSM and distributed generation (see CNF/TREE/RCM I NFAAT – 5) and with respect to the risks they present under different export price scenarios.

(b) The need for Wuskwatim by 2019/20 for the domestic market has not yet been demonstrated. Our analysis indicates that the domestic need date is likely much further out. In any event, given that the dam can be built in six years, whether the dam is needed for that date is a question that does not have to be answered for nearly ten more years. The estimated need date is very sensitive to DSM, wind power development and changes in the growth and structure of electricity demand in the province. The adjusted load forecast we produced would move the domestic need date into the late 2030's, even without incremental DSM or any wind power.

CEC/TREE/RCM NFAAT - 2

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, Page 15, Point 10

QUESTION:

(a) Please list the assumptions included in the "end use model" and explain why each assumption was used.

(b) Please provide the calculations performed using the "end use model".

(c) Based on your analysis, when is Wuskwatim required for domestic load? Please explain your answer.

RESPONSE:

The assumptions used in our end use model are described in CNF/TREE/RCM I NFAAT – 3 and our adjustments to the Basic Load Forecast are described in CNF/TREE/RCM I NFAAT – 4.

The date by which Wuskwatim might be needed for domestic load is highly sensitive to changes in load growth rates and deployment of DSM and distributed generation. There is a fifteen year difference (2020 vs. 2035) between Manitoba Hydro's Basic and Medium Low forecasts, and we have shown that there could be even greater swings in the load forecast than the difference between Basic and Medium Low that come about as the result of changes in the electricity intensity of Manitoba GDP. And even this is not a question of predicting a future over which government and Manitoba Hydro have no control, as the electricity intensity of Manitoba GDP, especially at the margin, will depend in no small way on the province's and the utility's policies and practices with regard to using low electricity prices and/or other incentives to lure electricity intensive industries to the province.

CEC/TREE/RCM NFAAT - 3

Reference: Alternatives to Advancement of the Wuskwatim Generating Statio n, Page 16, Lines 1-6

QUESTION:

Please expand on the statement "there are economic benefits associated with the DSM/DG resource that are not captured in the 6.15 cents/kW.hour evaluation".

RESPONSE:

Please refer to CNF/TREE/RCM I NFAAT – 5.

CEC/TREE/RCM NFAAT - 4

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, Page 16, Lines 15-20

QUESTION:

Please list the technologies that have not been included in the "roll-up" analysis and estimate the impact (i.e., MW, MW.h), where possible.

RESPONSE:

Please refer to CNF/TREE/RCM I NFAAT – 6 for our review of the DSM Market Potential Study, including reference to the "roll-up" factor.

CEC/TREE/RCM NFAAT - 5

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, Page 17, Line 2

QUESTION:

Please provide documentation in summary form of the "questionable assumptions" and "other points", and quantify the impact, where possible.

RESPONSE:

Please refer to CNF/TREE/RCM I NFAAT – 6 for our review of the DSM Market Potential Study, as well as to CNF/TREE/RCM I NFAAT – 9 for our estimate by sector of DSM potential. CNF/TREE/RCM I NFAAT – 5 provides additional reasons why we believe the CCE approach is too narrowly focused to capture the full economic potential for DSM.

CEC/TREE/RCM NFAAT - 6

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, Page 17, Line 10 -11

QUESTION:

Please segregate the results of the modified load forecast showing separately (1) the adjustments to the baseline level of demand and (2) the application of the DSM opportunities identified as being economic.

RESPONSE:

Please refer to CNF/TREE/RCM I NFAAT – 4 for a detailed description of the adjustments to the Basic Load Forecast. In CNF/TREE/RCM I NFAAT – 13, where we provide a number of illustrative scenarios of the application of different levels wind power and achievable DSM, the impacts are measured relative to this adjusted load forecast, and in all the figures in CNF/TREE/RCM I NFAAT – 13, the "Existing Resources Available After Meeting Adjusted Load Forecast" refers to the resources available after meeting this adjusted forecast, and after allowing for the DSM already embedded in that forecast and the current Power Smart program.

CEC/TREE/RCM NFAAT - 7

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, Page 17, Lines 16-17

QUESTION:

Please provide the documentation of the scenario, in summary form.

RESPONSE:

Please refer to CNF/TREE/RCM I NFAAT – 9 for a description of our estimate of the economic DSM potential, and to CNF/TREE/RCM I NFAAT – 13 for a number of illustrative scenarios that combine different quantities of wind power and achievable DSM in ways that provide alternatives to Wuskwatim Advancement.

CEC/TREE/RCM NFAAT - 8

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, Page 18, Lines 14-21

QUESTION:

(a) Please explain how other investors will tap into the DSM resource.

(b) Please explain what is meant by "well known" consequences to utility supply side programs" in light of MH's ability to export power at a premium.

RESPONSE:

(a) The DSM market suffered a major setback in the 1990's, with many utilities abandoning the field and others, like Manitoba Hydro, staying in but with significantly reduced levels of commitment. As summarized by York and Kushler for the U.S.,

> "As restructuring initiatives spread around the United States in the latter half of the 1990s, spending on energy efficiency in the form of utility DSM programs fell dramatically, from a peak of over $1.6 billion in 1993 to about $900 million by 1997. This rapid drop resulted in large part from elimination of requirements by state public service commissions and legislatures for utilities to conduct integrated resource planning (IRP) and implement associated DSM programs. The over-riding policy model seemed to be that IRP and DSM were not appropriate under restructured, competitive electricity markets. Investments and related spending on energy efficiency would be left principally to market forces.
>
> "Unfortunately, recent research suggested that utility energy efficiency programs and services are not likely to be replaced by private entities in the competitive market, especially for certain market segments and end-use technologies. As a result, the pace of improvement in the energy efficiency of our economy would likely be slowed if public support for energy efficiency programs were reduced."[1]

The trend was similar in Canada; in some provinces (e.g. Ontario) DSM fell victim to utility restructuring, and in others (like Manitoba) to the underlying fundamental problems in the utility sector. DSM spending is on the rise again, but it is still far short of the levels achieved in the early 1990's. The emergence of "public benefits" charges levied on the restructured industry represents a major new phenomenon in the DSM industry, and in the U.S. public benefits charges are now estimated to fund more DSM activity than traditional utility DSM investment. However, utilities are still the primary delivery agents for DSM, including DSM funded by

[1] Dan York and Marty Kushler, "State Scorecard on Utility and Public Benefits Energy Efficiency Programs and Update", American Association for an Energy Efficient Economy (ACEEE), Report U023, Washington, December 2002. Available at www.aceee.org.

public benefits charges.

The DSM resource is already being developed by other investors, from homeowners who independently upgrade the efficiency of their homes and appliances to businesses that acquire new technologies and adopt new practices that are more efficient than the incremental improvements reflected in Manitoba Hydro's load forecast. Energy service companies that undertake the financing and implementation of energy efficiency improvements for their clients are deliberately and strategically tapping the DSM resource. Depending on the still-to-be determined mandate of Efficiency Manitoba, the new agency could represent the entry of a significant new public investor with a focus on the DSM resource, and with many of the same advantages as Manitoba Hydro. At this point, however, Manitoba Hydro has a clear advantage in the DSM market in Manitoba by virtue of its status as an integrated energy services company (delivering gas, electricity and DSM), its knowledge of end use consumption patterns and DSM opportunities, its publicly backed access to investment capital, its access to ready buyers for surplus electricity in the relatively high-priced export market, and its government mandate to market energy services within and outside the province.

The crux of whether Manitoba Hydro will be able to deliver on its potential in this regard is whether it will successfully make the transition to a business strategy focused on energy services rather than electricity supply. Although its mandate has been revised (the word "electricity" no longer appears in the utility's central mission statement), the company's business focus and revenue base is still commodity supply, with all the barriers that represents to exploitation of the economic potential for energy efficiency.

Meanwhile, the DSM resource itself continues to grow as research and development of new processes and technologies proceeds and as businesses develop financial and organizational innovations for acquiring end use services with less electricity. The motivation for the development of such processes and technologies is particularly strong in jurisdictions where electricity prices are higher than in Manitoba (almost everywhere else) and in industries with electricity intensive production. Once developed, however, such technologies rapidly disseminate in the globalized market, transforming "business as usual" in all jurisdictions, including those with relatively low priced electricity.

(b) The "well known" consequences is a reference to the stranded investments that result when utilities overshoot supply-side investments because of a misreading of their markets, an underestimation of the demand side resource, and an inability or unwillingness to develop business strategies that focus on the most economical resources first. This happened throughout North America in the 1970's and 1980's and the resulting shock waves are still reverberating throughout the electric utility sector. The electricity sector is still in a very dynamic state and it would be a mistake to dismiss the experiences of the 1970's and 80's as a one time event or as "ancient history," without at least carefully identifying and assessing the demand side and distributed generation alternatives for meeting fundamental business objectives. This is why the failure of Manitoba Hydro to conduct a NFAAT analysis of Wuskwatim Advancement represents a serious weakness in their business planning.

Manitoba Hydro does have the ability to export power at a premium, but its access to the export market is constrained by the intertie. Even accepting the estimate contained in Manitoba Hydro's DSM Market Potential Study (which we believe is low, as discussed in CNF/TREE/RCM I NFAAT - 6), the economic potential for DSM in Manitoba is large. When combined with the apparent overestimation of electricity demand in the Basic Forecast and the expected growth of distributed generation (particularly wind power), the gap between the surplus electricity Manitoba has available for export and the capacity-defined limit to supply that market will probably be much smaller than Manitoba Hydro has predicted. By committing to the advanced construction of a billion dollar hydro megaproject in the shadow of the large, overhanging and pent-up economic potential for DSM, Manitoba Hydro runs the unnecessary risk of returning to the situation they found themselves in ten years ago when DSM budgets were growing, only to be curtailed when the DSM wasn't "needed". More importantly, it represents a failure to make a transition to an energy services orientation in their business planning, utilizing least cost planning and scenario analysis to develop a business plan for a sustainable energy future for Manitoba.

CEC/TREE/RCM NFAAT - 9

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, Page 19, Lines 1-13

QUESTION:

For each of the traits listed, please rate MH's DSM program. Please provide specific program examples and relate them to other jurisdictions, where possible.

RESPONSE:

The list of characteristics of advanced DSM approaches put forward by Kushler in the referenced passage have been described in more detail in CNF/TREE/RCM I NFAAT – 10, with illustrative examples of programmes from other jurisdictions, and CNF/TREE/RCM I NFAAT - 11 includes additional comments on Manitoba Hydro's DSM programs in the context of current best practice as well as Manitoba Hydro's own past targets and spending levels. Further comments on Manitoba Hydro's approach to DSM are provided in CEC/TREE/RCM I NFAAT – 8 and CEC/TREE/RCM I NFAAT – 11.

In terms of how Manitoba Hydro's DSM activity compares with leading North American efforts, we have compared the data in "Power Smart Resource Options for the 2001 Corporate Plan" to the indicators tracked in the ACEEE's "scorecard" for U.S. state and utility DSM activity.[2]

With regard to DSM spending, Manitoba Hydro's 2000/01 DSM spending of US$2.01 per capita puts it below the U.S. average of US$3.88 per capita, and would rank it 20th from the top when compared with the 50 States (plus the District of Columbia) tracked in the ACEEE database. DSM spending varies widely in the U.S., with the top ten states spending from US$8.43 to US$19.48 per capita, nearly ten times more than Manitoba Hydro (see Figure TREE/RCM CEC 9.1).

With regard to per capita kW.hour savings, at 389 kW.hour per capita Manitoba Hydro ranks behind 20% of the states in the ACEEE database. Per capita savings in the top ten U.S. States for this indicator range from 412–670 kW.hour per capita. At 662 kW.hour per capita, Minnesota ranks 2nd, second only to Wisconsin.

Manitoba Hydro spending on DSM represents 0.27% of its revenues from electricity sales including exports and 0.44% of revenues from electricity sales within Manitoba, in either case below the U.S. average of 0.5% of sales and well back of the lead group. DSM spending in the top ten U.S. States ranges from 0.9% to 2.3% of revenues from electricity sales.

[2] Dan York and Marty Kushler, "State Scorecard on Utility and Public Benefits Energy Efficiency Programs and Update", American Association for an Energy Efficient Economy (ACEEE), Report U023, Washington, December 2002. Available at www.aceee.org.

The final indicator tracked in the ACEEE database is electricity savings as a percent of electricity sales (i.e. kW.hour savings per kW.hour sold). Excluding export sales, Manitoba's DSM savings in 2000/01 were 2.5% of sales, placing it behind the 12 leading U.S. States for this indicator. The top ten States for this indicator have DSM savings in the range of 3.6% to 6.8% of sales.

Figure TREE/RCM CEC 9.1

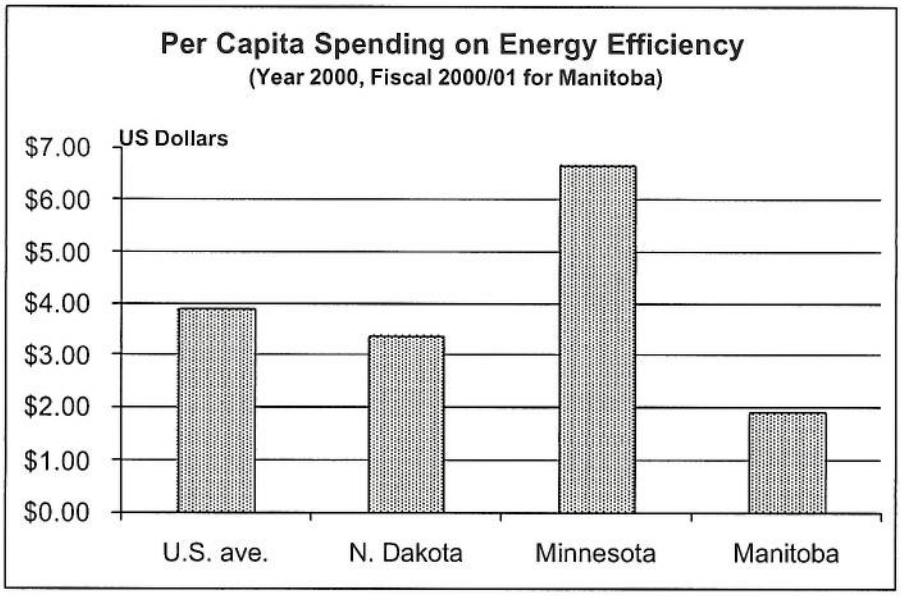
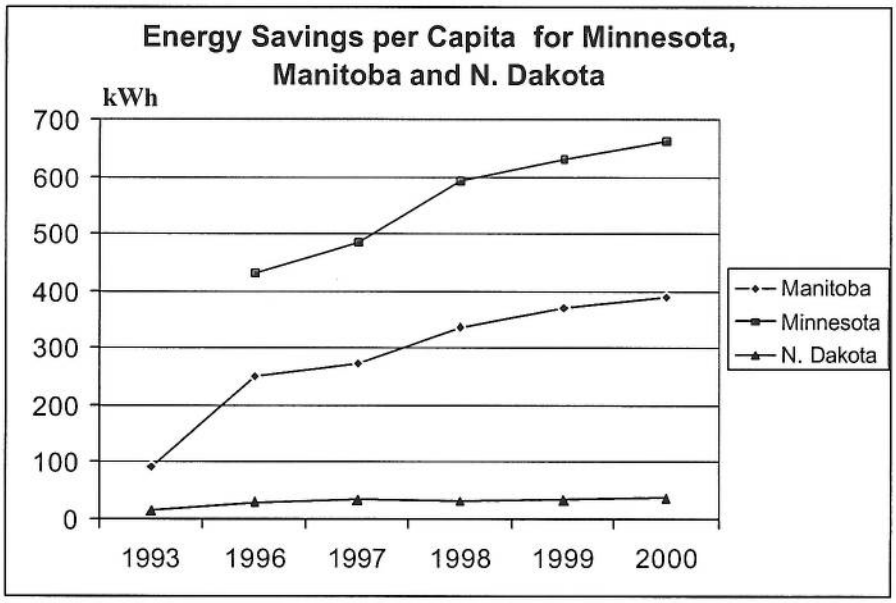


Figure TREE/RCM CEC 9.2



Comprehensive DSM is characterized two ways; first in the thoroughness of the DSM plan to:

- scope the needs of a client group,
- reach it through the networks that work within that grouping,
- deliver solidly the package of energy efficiency goods and services specific to the needs of that group and
- provide on-going training, maintenance and follow up to ensure the efficiencies implemented are maintained and new opportunities to replace equipment and shift to more efficient activities are not lost.

Secondly, comprehensive DSM is the delivery of the measures on a *customer-by-customer* basis rather than on a *measure-by-measure* basis. Implementing less than the full set of cost effective measures with each customer increases the cost of DSM by having to reengage the customer, adding to marketing and promotion costs and the added cost of another visit.

Not taking full advantage of the opportunity to deliver all cost-effective DSM at once also leads to 'cream-skimming' -- taking the low-cost measures and leaving behind the measures that would still be cost effective but which are more effectively captured when bundled with cheaper initiatives. (Two of Manitoba Hydro's programs -- a home audit program for Seniors called "WISE", and the Power Smart Energy Manager Program (pilot) – which have as their stated purpose the identification of low cost and no cost options to reduce energy bills.) Experience with programs that do a few simple measures is that lost opportunities result.

As noted above, we have referenced examples of exemplary and comprehensive DSM programs in other interrogatory responses, but here are two examples, with descriptions quoted directly from the utilities' program descriptions:

Massachusetts Electric's Small Business Program

For business customers with an average demand use of 100 kilowatts or less (or 25,000 kilowatt-hours or less) per month, we can help you reduce your company's energy costs by installing energy efficient equipment

- We can provide a free energy audit and report of recommended energy efficiency improvements
- We pay 80% of the cost of the installation of energy efficient equipment and you can finance the remaining 20% interest free for up to 24 months.
- Cost-cutting, energy efficient equipment available through this program includes:
    - Lighting Upgrades
    - Energy Efficient Time Clocks
    - Photo Cells For Outdoor Lighting
    - Occupancy Sensors
    - Programmable Thermostats
    - Walk-in Cooler Measures

Nantucket Electric's Residential and Multi-family Program:

Home Energy Service

We provide incentives to help you increase the energy efficiency for your home. If you live in a one-, two-, three- or four-unit building, which is not part of a larger facility or condominium, this program is for you! (For multi-family and condominium facilities, see the EnergyWise program below).

We will pay 50% of the cost up to $1500 for additional insulation, air sealing, and other measures. Incentives are also available to replace inefficient lighting, refrigerators, and heating systems.

EnergyWise

Our EnergyWise service is available for customers living in one of the following structures:

- a multi-family facility
- a condominium
- a facility consisting of five or greater dwelling units.

We will provide services to the entire complex in coordination with the owner, property manager, or condominium association. Through this program, your facility may qualify for a free energy analysis, lighting system upgrades or other electric efficiency measures. If the facility is electrically heated, your facility may qualify for insulation and air sealing.

Installation of some energy efficiency measures requires a customer co-payment.

Manitoba Hydro's Commercial Construction Program and the Industrial Performance Optimization Program come closest to being comprehensive DSM programs. They don't offer the level of incentives needed for high participation but they are comprehensive insofar as they involve installing several measures at once, thus preventing lost opportunities. The timing of opportunities varies for different measures, however, and programs should be designed to maximize energy savings. In the residential sector, existing homes seem to get short shrift when it comes to comprehensive programming. Currently there is only one program to insulate basements in all-electric homes. It could be combined with other weatherization features at the same time since it is likely that there will be a need to insulate elsewhere in the house if the basement has not been done.

There is also a lack of continuity from year-to-year in the Power Smart program offerings. In fact, except for some small examples such as the automobile timer program which seems to have

continued for at least 10 years, no program in the residential sector 'new' or 'existing' seems to have survived from one year to the next. In the commercial sector, spending on the Commercial Lighting program seems disconnected from the approved Corporate Power Smart budgets starting with the first year of implementation.

In CNF/TREE/RCM I NFAAT – 11, DSM programs are described in terms of first, second and third generation programs. In Table TREE/RCM CEC 9.1, we have provided an assessment of the DSM programs described in CEC/MH/NCN 1 –NFAAT – 21b according to whether they are first, second or third generation.

Table TREE/RCM CEC 9.1 Manitoba Hydro DSM Programs				
RATING	**SECTOR**	**PROGRAM**	**DESCRIPTION**	**NOTES**
Moderate Second Generation	Residential	Power Smart Residential (Home Comfort & Energy Savings Program)	Offers low cost financing to encourage home owners to retrofit with the maximum cost-effective levels of insulation and other energy efficient measures in their existing homes.	6.5% 5 year loan from $500 to 5,000
Moderate Second Generation	Residential	EnerGuide for Houses Assessment & Grant Program	Manitoba Hydro partnered with the Government of Canada Office of Energy Efficiency to offer the EnerGuide for Houses (EGH) Assessment in Manitoba. Manitoba Hydro provides qualified energy evaluations assessing a home's energy-use characteristics, identifies possible energy upgrade recommendations and provides an energy rating label for the house. Manitoba Hydro partnered with the Government of Canada Office of Energy Efficiency to offer the EnerGuide for Houses (EGH) Assessment in Manitoba. Manitoba Hydro provides qualified energy evaluations assessing a home's energy-use characteristics, identifies possible energy upgrade recommendations and provides an energy rating label for the house. Customers implementing the energy efficiency upgrades are eligible for the Federal EnerGuide Grant based upon the point improvement in the EGH rating of the home resulting from implementing some or all of the assessment recommendations.	Cost sharing on walk-through audit $75.00 pd by customer, free on-line audit, $20 for a mail-in audit
Low First Generation	Residential	WISE Program	Operating jointly with the Manitoba Society of Seniors, the program offers no-cost in-home walk-through assessments to assist seniors in identifying low cost/no cost opportunities to reduce their energy bills.	Low cost/ No cost leads to cream skimming

Table TREE/RCM CEC 9.1 Manitoba Hydro DSM Programs				
RATING	**SECTOR**	**PROGRAM**	**DESCRIPTION**	**NOTES**
Low First Generation (MH) Moderate Second Generation (Fed Govt)	Residential	Power Smart R-2000 Program	Manitoba Hydro partnered with the Government of Canada Office of Energy Efficiency to provide the Power Smart R-2000 New Home Program in Manitoba. Manitoba Hydro provides information and technical assistance to customers aspiring to construct homes that are built to a higher level of energy-efficiency and incorporate healthier and more environmentally friendly features.	
Low First Generation	Residential	Home Energy Workshops	Workshops offer consumers information and advice regarding energy efficient construction options for new homes and energy-efficient retrofit options for existing homes to reduce their energy costs and improve the comfort and health of their homes as well as offering tips for conserving energy within the home.	
Moderate Second Generation	Residential	Geothermal Earth Energy Program	Offers low cost financing to encourage homeowners to install geothermal heat pumps in their new and existing homes. Also sponsor contractor/installer training through the International Ground Source Heat Pump Association (IGSHPA).	
Low First Generation	Residential	Consumer Information Services	Serving as an energy information resource, Manitoba Hydro provides detailed brochures and data sheets on selecting and installing POWER SMART* measures to guide homeowners through the renovation process, building a new home, purchasing appliances and/or in operating the systems within their homes.	
Low First Generation	Residential	Power Smart "Energy Expert"	Through a Toll-free dedicated phone line or on-line through Manitoba Hydro's web site, Power Smart Energy Experts are available to answer customer inquiries regarding home comfort needs, Power Smart Programs, energy efficient products and energy efficiency questions.	

Table TREE/RCM CEC 9.1 Manitoba Hydro DSM Programs				
RATING	**SECTOR**	**PROGRAM**	**DESCRIPTION**	**NOTES**
Moderate Second Generation	Residential	Codes and Standards	Manitoba Hydro actively pursues energy efficiency improvements through the adoption and implementation of Federal and Provincial codes and standards. Manitoba Hydro is an active participant, and in many cases a driving force, on a number of Provincial and National energy efficiency code and standards committees, such as the CSA Strategic Steering Committee on Performance, Energy Efficiency, and Renewables (SCOPEER). Manitoba Hydro representatives often chair these committees which undertake three functions: provide industry with assistance in the development of technologies; develop standards; and assist in industry, market and government acceptance of the codes and standards.	Helps eliminate barriers to implementation by making it easier for customers to obtain energy efficiency products
Moderate Second Generation	Commercial	Energy Efficiency Commercial Lighting Program	Through financial incentives, encourages commercial/institutional and industrial customers to install cost-effective energy efficient lighting systems; involves lighting distributors, installers, contractors, and manufacturers in helping customers save electricity.	Approximately 30% of the cost of material
Moderate Second Generation	Commercial	Commercial Construction Program -- Air Barriers	Through financial incentives, encourages customers who are renovating or building new facilities to incorporate improved air barrier technologies and practices.	
Moderate Second Generation	Commercial	Commercial Construction Program -- High Efficiency Windows	Through financial incentives, encourages customers who are renovating or building new facilities to incorporate energy efficient windows that are cost-effective and reduce operating costs.	
Moderate Second Generation	Commercial	Commercial Construction Program -- HVAC	these types of systems are used, encourages commercial and industrial customers to select energy efficient equipment for new construction or when replacing existing equipment.	
Moderate Second Generation	Commercial	Commercial Construction Program -- Parking Lot Controllers	Through financial incentives, encourages customers to install Parking Lot Control Systems in new and existing installations.	

Table TREE/RCM CEC 9.1 Manitoba Hydro DSM Programs				
RATING	**SECTOR**	**PROGRAM**	**DESCRIPTION**	**NOTES**
Moderate to High Second & Third Generation	Commercial	Commercial Construction Program -- High Efficiency Chillers	Through feasibility study assistance and financial incentives, encourages the installation of energy efficient water-cooled chillers in the commercial sector through aggressive financial incentives and technical guidance.	
Moderate to High Second & Third Generation	Commercial	Commercial Construction Program -- Custom Measures	Through feasibility study assistance and financial incentives, encourages customers who are renovating or building new commercial/institutional facilities to incorporate custom energy efficient measures such as ground source heat pumps and direct digital controllers.	Examples seem to indicate incentives off set about 20 - 30% of costs. Comprehensive measures, and customer orientation
Low First Generation (MH) Moderate Second Generation (Fed Gov't)	Commercial	Power Smart Design Standards	Design standards prepared to help owners and engineering/ architectural teams develop building designs that qualify new or renovated buildings for designation as Power Smart. The Design Standards match the requirements for the Federal CBIP program which allows buildings owners to also qualify for Federal incentives of up to two times the annual energy savings.	
Moderate Second Generation	Commercial	Religious Building Initiative	Assists religious buildings in managing the high cost of energy by offering an affordable energy audit and financing to assist in implementing energy saving measures.	8.5% loan for a max. of 10 years for max of $15,000 to $30,000 depending on building size. Audit costs $325 to $2,000

Table TREE/RCM CEC 9.1 Manitoba Hydro DSM Programs				
RATING	**SECTOR**	**PROGRAM**	**DESCRIPTION**	**NOTES**
Low First Generation	Commercial	Recreation Facility Mail-In Energy Assessment	The mail-in assessment is a comprehensive examination of the energy use in a facility that is filled in by the facility operator and reviewed by an engineer. The assessment report provided compares energy use with other similar facilities in Manitoba and includes possible energy savings opportunities or recommendations applicable to the facility.	
Low First Generation	Commercial	Guidelines for Operators of Manitoba's Rinks and Arenas	Designed to assist operators of Manitoba's rinks and arenas save money through energy efficiency, the guidelines present practical ideas for reducing the use of energy in ice arenas, curling rinks and similar recreational complexes.	
Low First Generation	Commercial	Power Smart Energy Manager – Pilot Program	A pilot customer service initiative involving the hiring, training, and placement of a Power Smart Energy Manager (PSEM) in school divisions. The PSEM is responsible for reducing facility resource costs through low/no cost changes to staff/student behaviours, custodial operating procedures and various retrofit opportunities.	Low cost/ No cost leads to cream skimming
n/a	Commercial	Internal Retrofit of Manitoba Hydro Facilities	Achieves energy efficiency savings at Manitoba Hydro through such measures as: retrofitting buildings to energy efficient Power Smart levels, converting lighting in parking lots to high pressure sodium, and cycling of power in parking lots.	About 25% more efficient not to C2000 level
Moderate Second Generation	Commercial	Agricultural Heat Pads	Through financial incentives, encourages swine farrowing operations to use energy efficient heat pads rather than heat lamps for creep heating to reduce demand and energy consumption.	
Moderate Second Generation	Industrial	Performance Optimization	Through feasibility study assistance and financial incentives, encourages commercial and industrial customers to achieve energy savings by optimizing fans, pumps, compressors, and other motor systems. Also encourage these customers to achieve savings by improving the efficiency of non-motor electrical equipment and systems.	Complicated incentives package paying out the lesser of several options

Table TREE/RCM CEC 9.1 Manitoba Hydro DSM Programs				
RATING	**SECTOR**	**PROGRAM**	**DESCRIPTION**	**NOTES**
Low First Generation	Industrial	Eco-Efficiency Program	The program provides Manitoba businesses with the technical and financial assistance to assist in identifying process and energy efficiency improvements for customers in the manufacturing and processing sector. Detailed assessments identify process improvement opportunities that could result in the reduction of energy and water use, solid waste outputs, greenhouse gas and other air emissions.	Walk through Audit program emphasis is on the industrial customer to follow up on their own
n/a	Industrial	Curtailable Rates (Options C and AE)	Encourages large industrial customers to allow Manitoba Hydro to curtail electricity supplied to them for up to 4 hours on 1 hour notice (option C) or up to 10 days on 48-hours notice (option AE) by offering credits on their monthly bills.	

CEC/TREE/RCM NFAAT - 10

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, Page 20, Lines 12-13

QUESTION:

(a) Please list the specific additional programs and initiatives by which MH could achieve equivalent energy to Wuskwatim.

Reference: Alternatives to Advancement of Wuskwatim Generating Station, Lines 15 – 16

(b) Please provide the further documentation, in summary form.

RESPONSE:

Please refer to CNF/TREE/RCM I NFAAT – 13 for summary descriptions of a number of alternative combinations of wind power and achievable DSM that would constitute alternatives to Wuskwatim Advancement.

The scenarios presented in CNF/TREE/RCM I NFAAT – 13 constitute the types of alternatives to Wuskwatim Advancement that should have been, and still should be, identified and analyzed by Manitoba Hydro with respect to their overall rate and financial impacts, risk factors and other costs and benefits. The rate impacts that would result from the DSM and DG components of these scenarios would depend on the export price assumptions and on whether or not the utility was in a position where it had more energy available for export than it could sell into the high priced peak market, a situation which the advancement of Wuskwatim could very well exacerbate.

CEC/TREE/RCM NFAAT - 11

Reference: Alternatives to Advancement of the Wuskwatim Generating Station, General

QUESTION:

(a) Do DSM alternatives have higher risk when compared to generation alternatives given that MH cannot entirely control acceptance and utilization by MH consumers? Please explain your answer.

(b) What initiatives can MH take to improve the acceptance and utilization of DSM programs?

(c) Is it appropriate for MH to put forward an aggressive load forecast (i.e., potentially too high) so that it can be assured that power will be available for use? Please explain your answer.

RESPONSE:

(a) The risks associated with DSM are of a different nature than those associated with building a central power plant. In general, as described in CNF/TREE/RCM I NFAAT – 5, there are many types of risks and costs that are reduced with DSM and distributed generation, largely because of how quickly they can be built, how they can be matched in size and timing to demand, and how they contribute to the resilience of the system. While it is true that Manitoba Hydro has limited control over the acceptance and utilization of DSM by any one of its customers, the risk is diversified and lowered by the large number of customers – the reliability of an interconnected system increase with the number of nodes. Further, the acceptance and utilization of DSM by its customers is something over which Manitoba Hydro can exercise a great deal of control through program design, incentive levels, and rate making strategies.

(b) Some elements of actions Manitoba Hydro could take that would improve the acceptance and utilization of DSM programs:

- Increase what it pays for DSM resources up to the full cost or nearly the full cost, as it does for supply side resources.
- Redesign its business strategy, including its revenue base and its commodity pricing strategy, around the provision of least cost energy services. Abandon the RIM test in favour of a solution that focuses on the cost of service provision.
- Manage its supply/demand balance to maximize the revenue from export sales and minimize the risk of repeating the downturn in DSM activity of the mid 1990's
- Put Wuskwatim aside and concentrate on the development of a DSM/DG strategy for maintaining peak export capability while putting the province on a path to a sustainable energy future.
- Adopt a customer-oriented business philosophy. Develop comprehensive solutions to customers end use needs for energy services, incorporating efficiency, gas and electricity in an integrated approach.
- Provide high levels of technical assistance, up to and including direct installation where appropriate

- Develop and maintain in-house databases and models of end use energy in Manitoba for use in scenario planning, market identification, and demand side program development.
- Form collaboratives with industry, NGO, government and community groups to achieve common objectives.
- Actively support the development of a Manitoba wind energy industry
- Assist with the development of and advocate the adoption of minimum energy efficiency standards for buildings and equipment.

As Manitoba Hydro has indicated, "achievable savings are driven in large part by the financial attractiveness to the customer". There are other important factors that contribute to DSM uptake rates, but the most important thing Manitoba Hydro could do to improve the acceptance and utilization of DSM would be to make it more financially attractive to the customer. Table TREE/RCM CEC 11.1 summarizes the relation between incentive levels and participation rates – in general, the higher the level of financial incentives offered, the higher the participation rate and the higher the measure penetration. As the table shows, low incentives correspond with low participation rates and high incentives of 75% to 100% of the cost of the measure correspond to high participation rates of 50% to 85%. Moderate incentives can cause moderate or low participation rates.

Table TREE/RCM CEC 11.1

The Effect Incentive Levels on the Participation Rate in Utility DSM Programs[3]			
	INCENTIVE LEVEL		
PARTICIPATION RATE	**SMALL** (0-5% of total cost)	**MODERATE** (25-50% of total cost)	**HIGH** (75 to 100% of total cost)
LOW (0-5%)	**The result is participation less than 5%**	**May result in participation less than 5%**	No evidence of low participation rates
MODERATE (5-25%)	No evidence that participation will be higher than 5%	Usually results in participation between 5 to 25%	Rare to have moderate participation rates.
HIGH (50-85%)	No high participation experience.	No evidence of high participation	**The result is high participation rates of 50 to 85%**

[3] The table is a modified version of one found in 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. Ref p. 95-114.

Programs with high incentives can often be designed with simpler administration and support requirements, resulting in lower overall costs per kilowatt-hour saved.[4] Administrative costs are likely to be higher for information-only programs than for programs that pay the full cost of installing measures. In comprehensive energy efficiency programs, a range of 20- to 40 cents for program overhead is typical for every dollar spent on incentives, with incentives comprising 70-85% of utility program costs.

In Manitoba Hydro's current Power Smart program, administrative costs are larger than the budget for actual measures, with administrative costs accumulating to $87.8 million by 2012, compared to $82.3 million for measure incentives. The "Option 1" administrative budget (for basic customer information and services, and standard) is itself larger than the administrative budget for all the program-specific DSM spending, accumulating to $41.9 million by 2012, compared to $31.2 million in program-specific administration. Table TREE/RCM CEC 11.2 shows the contribution of administrative costs to total utility costs for the five key programs (which comprise over 90% of the anticipated energy savings) in the current Power Smart program, counting only the administrative costs attributed directly to those programs. The budgets for these programs indicate that marketing and delivery costs are high relative to direct expenditures on the measures.

Table TREE/RCM CEC 11.2

Administrative Costs in Manitoba Hydro DSM Programs (Power Smart 2001)	
Program	**Administrative Costs as Percent of Utility Costs**
Existing Housing	33%
New Housing – Insulation	36%
Commercial Lighting	25%
Commercial Custom	10%
Performance Optimization	56%
Power Smart 2001	51%

High incentives can also lower incentive spending in the long term by driving a market transition such that incentives for that particular program are no longer needed. Over the past twelve years dozens of energy efficiency programs and technologies have gone from being incentive-driven to being standard, low cost measures that no longer require financial incentives. Examples include the Upstream Residential Lighting Program (or Residential Lighting Instant Discount Program) of Pacific Gas and Electric Company and the Light Emitting Diode (LED) Traffic Signal Grant Programs of the California Energy Commission and California's Investor-Owned Utilities: Pacific Gas & Electric, Sempra Utilities, and Southern California Edison.

Pacific Gas and Electric paid for 88% of the cost of traffic lights to be switched to LED lights in 2000 to 2001. The total cost to PG&E was 4 ¢/kWh. The outcome in California is

4 Linda Berry, "The Market Penetration of Energy Efficiency Programs", Oak ORNL/CON-299 (1990):40 pgs 377-38 and p.3 and p.30-33.

> "that prices for LED traffic declined significantly. Prices in 2003 are about 30 percent less than they were in 2001. As a result, most cities in California have converted some or all of their signals to LEDs. Since converting to LED traffic signals can reduce the energy use of an intersection by 80 percent, the California Energy Commission was successful in approving regulations for traffic signals. These regulations require that any traffic signal manufactured after March 1, 2003 not exceed a certain energy use for the red, amber, and green indications. Currently, the only traffic signals that will meet the maximum energy usage requirements are LEDs. Due to the new regulations, the commission is no longer providing grants to local governments for converting their incandescent signals to LEDs. However, the commission will still be providing loans for LED traffic signal conversion."[5]

This example illustrates that to continue to squeeze more efficiency out of the system there needs to be a continuous drive towards more improvement of efficiency.

Areas where energy efficiency is nearing market transformation in the US include residential air conditioners (SEER 12/13), TP-1 dry-type distribution transformers, building operator training certification, Energy Star residential appliances, commercial package air conditioners, commercial clothes washers, cold climate condensing furnaces, and LED traffic signals.[6]

(c) Deliberately overestimating the future demand for electricity is not generally considered an appropriate strategy for ensuring reliability of supply, just as deliberately creating a shortage of electricity is not an appropriate strategy for stimulating conservation. The consequences of overestimating the future demand for electricity and over-investing supply projects can be severe, as discussed CEC/TREE/RCM I NFAAT – 8. It should also be noted that the risk of overbuilding is greater in a megaproject, supply-oriented planning framework in which large blocks of electricity and hundreds of millions of dollars of investment must be committed years ahead of the guessed date that the power will be needed. The relative advantage of the DSM/DG alternative is clear in this regard, and is discussed in more detail in CNF/TREE/RCM I NFAAT-5.

[5] www.aceee.org/utility/bledtrafficca.pdf

[6] Steve Nadel, "Market Transformation: Substantial Progress from a Dozen Years of Work", American Association for an Energy Efficient Economy, Washington, March 2004. Available from www.aceee.org.

CEC/TREE/RCM NFAAT - 12

Reference: Alternatives to Advancement of the Wuskwatim Generation Sites, General

QUESTION:

Have you conducted an actual quantitative comparison of the environmental effects (i.e., changes in the environment caused by the project) for the various alternatives to the Wuskwatim generation station? If yes, what are the results of the comparison and where are they located? If no, why not? What would be the likely results of such a comparison?

RESPONSE:

No, our work was restricted to the NFAAT aspects of the case. It is generally acknowledged, however, including by MH/NCN, that the environmental impacts of DSM and wind are as low as or lower than those of Wuskwatim. To the extent that alternatives to Wuskwatim would be comprised of these options, it is likely that the type of comparison referred to would indicate that they are preferable. Please see CNF/TREE/RCM I NFAAT – 5 for a list of some of the other benefits of the DSM and distributed generation alternatives.