

# Memo

**To:** Darrell Nitschke

**CC:** PUD, Legal, Tamie Aberle, Dan Kuntz, Bernadeen Brutlag, Kim Pederson, Mark Bring, Bruce Gerhardson, John Breen and Carrie La Seur

**From:** Mike Diller *Mike Diller*

**Date:** January 14, 2010

**Re:** Recommendation on MDU's Electric Demand-Side Management and Energy Conservation Programs (Case No. PU-09-695)

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## Recommendation

Staff recommends that the commission approve the concept of MDU's proposed Residential Air Conditioning Cycling program and its Commercial Lighting Retrofit program. Both of these programs will have a significant impact on reducing peak demand and the need for additional generating capacity.

Staff recommends that the implementation of these programs coincide with MDU's next rate increase application expected to be filed in March, 2010. Staff believes that the extent of DSM deployment and amount of dollars invested should be determined as part of the upcoming rate case when all the other costs and expenses are reviewed and analyzed.

With regard to the proposed Load Management Tracking Adjustment Rate 54 tariff, the adjustment calculation appears reasonable but again the tariff can be submitted along with the upcoming rate case filing. If MDU prefers approval of the tariff in this proceeding, staff recommends replacing the "recovery of lost revenue" with the "recovery of lost margins" in the Applicability section of the tariff.

Staff agrees with MDU's recommendation to review and monitor the usefulness of these programs in conjunction with its Integrated Resource Plan. The costs and benefits of these programs should be systematically compared to other least cost supply-side options.

MDU desires a financial incentive for participating in Demand Side Management (DSM) and Energy Efficiency (EE) programs because such programs result in lost margins. Staff does not support MDU's request.

The largest program (A/C cycling) recommended by staff is a load shifting program and results in a very small amount of lost margins. The other program (Commercial Lighting Retrofit) results in more lost margins but the lost margins are easily calculated and compensated for in MDU's proposed Load Management Tracking Adjustment tariff. A tracker of this sort already reduces risk to the Company. Adding a kicker for participating in these programs is too much, absent the commission ordering a lower rate of return which could be considered in a general rate case proceeding.

Concerning education and outreach efforts, staff opposes. The media, schools, green vendors, green corporations, green products and so on provide more than enough exposure and promotion for conservation, energy or otherwise.

Staff recommends an informal hearing be scheduled to discuss the matter and to receive direction from the commission. This memo will be distributed to the parties of record in Big Stone II (Case Nos. PU-06-481 and PU-06-482), including Otter Tail Power Company and Dakota Resource Council.

#### Background Information and General Philosophy

Attached, is a memo written by staff member Jerry Lein in April, 2008. It provides some case file history and additional rationale for staff's preference for DSM programs as compared to EE programs. Generally speaking, EE programs cost money to administer and result in fewer sales. As a result, the higher costs associated with administering the programs combined with the lower sales results in lower earnings which then lead to rate increases. DSM programs generally provide mechanisms to reduce peak-load requirements so that building additional generation plants are delayed.

On July 1, 2009, MDU submitted its proposed demand-side management (DSM) and energy efficiency (EE) programs in compliance with the commission's Advanced Determination of Prudence Order for Big Stone II. MDU's filing proposes a DSM and EE portfolio of nine different programs over the course of the next 2 years using the Ratepayer Impact Test (RIM). Staff agrees with the Company's use of the RIM Test for identifying programs that are estimated to result in lower electric rates when implemented. Maintaining low electric rates in North Dakota provides an advantage for competing in the marketplace and ensures a higher standard of living.

Aside from the RIM test, MDU also includes the Utility, Societal and the Participant test results in its application for each program (please note that MDU transposes the Utility test for the RIM test and vice versa throughout its application). The Utility Test compares the Company's savings to the increase in revenue requirements resulting from a particular program. The Societal Test adds the estimated costs incurred by the participants as well as an assumed carbon tax of \$30 per ton. The Participant Test calculates the benefits of the program from the participant's view; total cost to the participants is compared to the savings expected by the participants in energy savings. Staff believes the Utility Test and Participant tests are too narrow and miss much of the economic analysis. The Societal Test runs afoul of North Dakota's purpose and law.

While staff prefers the use of the RIM test, each test provides a different perspective and way to look at a program and provides value to the overall review. The estimated benefit to cost ratios for each of the tests are based on fairly loose assumptions and are not adjusted for energy-conscious decisions the consumers would make without a rebate or incentive. As a result, the expected benefits are somewhat speculative and overstated and should be viewed with an eye of skepticism. Therefore, a lot of common sense is required before spending ratepayer dollars on a program just because its calculated benefit to cost ratio is 1 or greater.

Generally speaking, EE programs tend to be social programs that primarily benefit one segment of customers at a cost to all customers. On the other hand, DSM programs benefit both the participants (through demand reduction payments or in MDU's case--a free setback thermostat) and the entire ratepayer base by delaying the deployment of additional generation facilities to meet peak demand. EE programs also impact peak load but energy conservation is the focus, not reducing peak demand.

To illustrate the nature of EE programs, consider MDU's first proposed program, Energy Star Appliances. This program provides customers a \$15 rebate for those who buy and install an Energy Star rated refrigerator or freezer. Those customers who already have Energy Star appliances or cannot afford to buy one; do not have access to the rebate. Still, the cost of the program is passed through to all customers using electricity.

This same kind of inequity occurred during the federal government's Cash for Clunkers program in that only those who wanted a particular kind of car and

could afford to buy a new car could make use of the federal rebates. Staff remains opposed to this kind of backwards Robin Hood design whereby those who do not want or cannot afford to buy a new appliance are forced to pay for those who can and do.

Another philosophical challenge to EE programs exists with regard to the natural incentives that ratepayers have towards EE compared to the lack of incentives that naturally exist to self-regulate energy demand. Feeling the wind blowing under your door provides a reminder and natural incentive to do something to conserve energy and provide for a more comfortable living space. Similarly, comparing the annual estimated energy costs for a new appliance at the point of sale is a natural process of making a decision to buy one appliance over another.

On the other hand, customers lack the same kinds of natural incentives or progression of events that would lead them to seek out and invest in a load shifting device, such as the Steffes Brick Heater, to make use of off-peak energy prices and/or reduce the utility company's overall peak load.

In the end, the commissioners will have to weigh these and other philosophical and economic arguments. Following is staff's analysis of each program proposed by MDU.

#### Energy Star Appliances

According to MDU's filing, the Energy Star Appliances program provides a \$15 rebate for the purchase and installation of a qualifying Energy Star refrigerator or freezer. MDU calculates that the program yields a benefit/cost ratio of 2.5 using the RIM test. In other words, the avoided cost of providing higher energy and demand to less efficient refrigerators is 2.5 times the cost of the program and the estimated lost sales margins that are expected to occur.

MDU's proposal recommends that the commission approve \$9,800 per year in administrative and advertising costs and \$3,000 per year for 200 rebates. The \$15 rebate represents 50% of the cost differential between an assumed standard efficiency model and an Energy Star model.

According to an internal audit of the Department of Energy, the department has not developed a formal quality assurance program or effectively monitored the use of the Energy Star label. Apparently, some manufacturers have been misusing the Energy Star logo by pasting the star on appliances that aren't

energy efficient. In the past, manufacturers would self-report whether their products met the Energy Star guidelines.

Besides the uncertainties of Energy Star ratings, staff does not believe that energy efficiency concerns are the driving factor for replacing an old refrigerator or that a rebate of \$15 on a \$1,000-plus purchase hastens the decision. Whether replacing for whatever reason or buying for the first time, ratepayers have the opportunity and the wherewithal to consider the upfront \$30 price differential between the regular and efficient model compared to the annual energy savings expected from the more efficient model. In staff's opinion, it is not necessary to spend \$49 in administrative costs to give away \$15 in rebates in hopes of saving energy and demand costs that might well happen anyway through a free market transaction.

#### Residential High Efficiency Air Conditioning

According to MDU's filing, the Residential High Efficiency Air Conditioning program provides customers a \$175/ton rebate for the replacement of central air conditioners with a new higher efficiency model. MDU calculates that the program yields a benefit/cost ratio of 1.7 using the RIM test.

MDU's proposal recommends that the commission approve \$37 per unit in administrative and advertising costs to provide for an average rebate of \$525 per unit (assumes 3 ton units). The rebate represents 58% of the cost differential between a standard efficiency model with a 13 SEER rating and an Energy Star rated model with a 15 SEER rating. This program is different from the appliance rebate program in that the administrative costs are much smaller relative to the substantial rebate proposed.

Staff also opposes this program on grounds of inequity and the preferred natural allocation of resources in a free market society through customer choice.

Concerning inequity, approximately 50% of MDU's service territory does not have or use central air conditioning and therefore do not have access to the rebates that others would enjoy at their expense.

Concerning customer choice, each customer that has or wants an air conditioner is in the best position to determine what SEER rating is best for them at the point of sale based on their own usage patterns. It would make little cents for a consumer that uses central air two days a year to buy a slightly more energy efficient air conditioner for \$1,000 more, with or without the proposed rebate. In

such a situation, a few pennies more in energy costs each year would never cover the \$1,000 price differential. Each individual customer is in the best position to make their own resource allocation determinations without market interference from a rebate subsidy.

#### Refrigerator Round-Up

According to MDU's filing, the Refrigerator Round-Up program offers residential customers a \$35 incentive for the removal of an older less efficient refrigerator. MDU estimates that the program yields a benefit/cost ratio of 4.1 using the RIM test.

MDU's proposal recommends that the commission approve \$150 per unit in administrative, advertising and disposal costs to provide for an average rebate of \$35 per unit for a total cost of \$185 per unit.

The cost alone for rounding-up old inefficient refrigerators should be enough to cause apprehension in pursuing this program. However, there are a number of natural deterrents to getting rid of the beer fridge in the garage because: it still works; hauling it to the landfill is not easy; and it costs money to dispose of it.

Despite the conundrum, staff remains opposed to recommending this as a utility function and creating a free rider effect for those who just happen to have this kind of refrigerator. A more cost effective method may be for the commission to use its own bully pulpit to announce that the energy cost of maintaining beer in the garage could easily be a \$100 a year or more depending upon the vintage of the refrigerator. Equipped with that knowledge, the consumers would be armed and capable of making their own informed and economic decision without MDU spending \$185 per refrigerator hauled off.

#### Residential and Small Commercial Air Conditioning Cycling

The Residential Air Conditioning Cycling program is primarily a DSM program aimed at reducing peak load. It appears from the support documents that this program would also be available to Small Commercial customers. The program will provide a free controllable thermostat that allows the Company to control the customer's air conditioner during peak load periods. Because the program includes the installation of setback thermostats, reduction of energy is also assumed and included in MDU's analysis.

According to MDU's filing, this program yields a benefit/cost ratio of 1.71 using the RIM test. In this case, Staff believes the ratio may be understated because the Company uses the peaking plant capacity costs for its avoided demand cost but then uses its average marginal energy cost for its avoided energy costs. To be consistent with using peaking plant capacity costs, the energy cost assumption should be the avoided cost of running the expensive peaking units and not MDU's average marginal energy cost.

According to MDU's FERC Form 1 report, MDU's Miles City gas turbine ran at a cost of 70 cents/kWh for the year ending 2008, considerably more than the 3 cents/kWh used for MDU's 2010 avoided energy cost. Staff substituted the 70 cents for the 3 cents resulting in a RIM test ratio of 14.00.

Regardless of whether the RIM test calculated by MDU is low for its A/C cycling program in comparison to some of the other EE programs, MDU recognizes the benefit of controlling peak load growth and recommends that the commission approve nearly \$3 million in operating costs for the first two years or about 82% of the total proposed cost for all of its EE and DSM programs. Please note that while the cost of this program per kW is calculated by MDU to be higher than the other EE programs, A/C cycling is controllable and dispatch able making it a more valuable resource despite the straight cost comparison in Attachment C of MDU's filing. It is worth noting that the base load forecast in MDU's 2009 Integrated Resource Plan indicates MDU will be capacity deficient beginning in 2011.

This A/C cycling program minimizes the free rider effect common to EE programs discussed earlier because the participants receive very little benefit, other than a setback thermostat, yet the company gains control of their air conditioners during peak load periods. Doing so provides a hedge against expensive on-peak capacity and energy costs to the benefit of all ratepayers.

The cost of this program is \$900 per installation the first year and \$660 the second year due to startup costs incurred during year one. Staff also notes that MDU's second year costs are comparable to Otter Tail's estimated costs of \$600 per unit and that Otter Tail has been operating its air conditioning cycling program for many years.

According to MDU's filing, second year costs (to exclude start up costs in year 1) will reduce peak load at a cost of \$500,000 per megawatt which is considerably less than acquiring any supply side generation facility.

Staff supports this program and notes that according to MDU's model, MDU will lose margins of about \$20,000 a year after 2 years of implementation which is not material to its electric operations. However, using MDU's estimated 15 year life for these installs, annual depreciation expense of \$200,000 per year would occur along with about \$.5 million return on investment initially. While the investment on a per mw basis is sound, the cost of the program is substantial and likely could not be implemented without a rider or assurances of cost recovery in the next rate proceeding. While rates would go up under this program, rates would go up less than building a new plant to satisfy demand absent the program.

#### Commercial Lighting Retrofits

MDU's Commercial Lighting Retrofits Program provides a 20 cents/watt incentive for the replacement of existing T-12 (old florescent technology) lighting with new and more efficient lighting. MDU estimates that the rebate will average about \$8 for a four-foot four lamp florescent light fixture costing about \$55.

While staff is not inclined to support EE programs for various reasons already stated, MDU estimates that this program would have a big impact on peak demand as well.

MDU has included a budget for this program of \$162,450 per year or 9% of the total proposed budget for DSM and EE programs. Accordingly, the retrofit lighting program and the A/C cycling program account for 91% of the total proposal. Staff agrees with MDU's focus on demand side management initiatives rather than those that focus more on EE.

According to MDU's filing, this program yields a very high benefit/cost ratio of 8.65 using the RIM test. The high ratio is due to the significant demand reduction savings accumulating to the benefit of all ratepayers. Initially, staff was concerned that the low Participant Test benefit to cost ratio of 1.1 would result in either no participation or complaints after the fact that the investment in new lights failed to generate sufficient savings to pay for the upgrades.

However, it appears as though the calculated Participant Test is understated because MDU's model includes participant costs for 5 years and rebates for only 3 years. Staff removed the participant costs for the last 2 years to better match the rebate benefit assumption resulting in a Participant Test benefit ratio of 1.7

rather than 1.1. The ratio of 1.7 alleviates some of staff's concerns but, in the end, the sufficiency of the rebate will be made clear by the participation level.

Throughout this memo, staff has warned against the free rider effect common to EE programs. In this instance, staff overlooks that concern because of the significant impact the program will have on demand and peak load requirements to the benefit of all ratepayers. In addition, including this program will also extend the DSM and EE programs to the large commercial sector otherwise neglected in the residential/commercial A/C cycling program.

Staff has agreed to support this program and notes that according to MDU's model, MDU will lose margins of about \$50,000 a year after 2 years of implementation. If the estimated program costs are amortized over a 10 year life cycle, annual depreciation expense of \$32,000 per year would occur along with about \$50,000 in rate of return requirements plus taxes initially and then declining as the investment is amortized.

#### Commercial Motors

MDU's list of EE programs includes a 15 cent / kWh saved for the replacement of inefficient motors with energy efficient or variable speed motors. Staff has the same kinds of concerns with this program as it does with most EE programs whereby one segment benefits at the cost of the whole. However, like the Commercial Lighting Retrofit program, this program has a significant impact on load requirements.

Still, staff is not inclined to support this program. The program's cost per kWh is twice that of the Commercial Lighting Retrofit program and the cost per kW is nearly four times as much. The program proposed by MDU is also quite small in scope and raises concerns of inequities that might occur between the few who participate and those who don't or won't have the opportunity to participate. Further, like all EE programs, there is a natural encourager of energy efficiency called free market competition. In a free market, those competing to provide a service or product will spend resources where they can gain the greatest advantage possible. Replacing inefficient motors with more efficient motors is just one of many choices to be made in this regard.

### Commercial High Efficiency A/C

Staff does not support this program. See earlier discussion on Residential High Efficiency A/C. Both the Residential and Commercial programs are similar in nature and have similar estimated benefit/cost ratios.

### Residential New Construction Bundle

This program is a combination of the High Efficiency A/C program, the Residential Lighting program and the Energy Star Appliances program. Because staff is not recommending any of these programs, it will not recommend a bundling of these programs either.

### Residential Lighting Program

This program involves offering free compact fluorescent light (CFL) bulbs to residential customers at home shows, trade shows and various other community events. The program would cost \$8,820 to give away \$6,300 worth of CFL's each year.

Staff opposes this on a number of fronts including wide availability in retail stores at competitive prices, high public awareness and a federal energy bill passed last year that will effectively ban the sale of traditional light bulbs by 2014. It appears that the lack of demand for CFL's will be filled with mandates from the federal government. From staff's perspective, there is little reason to embark on this program.

**North Dakota Public Service Commission**  
**INFORMAL HEARING**  
**October 8, 2008**

**Northern States Power Company**  
**Demand Side Management and**  
**Cost Recovery Adder**  
**Tariff**

**Case No. PU-08-171**  
**Filed April 18, 2008**

**Summary of Proposal:** Northern States Power Company (NSP) filed a petition for demand side management (DSM) programs and tariff changes for an associated cost recovery rider that would appear as a line item charge (the "Energy Efficiency Charge") on customer bills. The charge would recover direct and administrative program costs, plus an offset for the resulting electric margin loss from decreased electric sales.

**Procedural History:** The Commission suspended NSP's tariff filing on May 13, 2008.

**Recommendation:** NSP's request in the instant case for funding to implement certain additional DSM programs and its request for a tariff cost recovery rider should be denied.

However, NSP's proposal to expand its existing load management programs (Peak & Energy Control Service and Savers Switch) should be approved with base rate cost recovery implemented, ideally, in NSP's current rate case. (Case No. PU-07-776). Unfortunately, such implementation may require additional rate case procedures as there is no evidence in the existing record.

**Discussion:** Note that on December 14, 2005, in Case No. PU-05-598, the Commission denied by motion a Conservation Tracking Adjustment billing adder requested by MDU for recovering program costs and lost revenue resulting from several proposed natural gas conservation programs. Recalling the discussions at the time, gas costs were peaking and there was reluctance by the Commission to impose increased costs on non-participants.

In 2007, as part of a NSP Gas rate case settlement in Case No. PU-06-525, the Commission approved base rate recovery of \$138,000 of certain residential natural gas conservation programs (home energy audits, furnace and water heater rebates, etc.) for NSP to promote lower natural gas usage and bills among its customers. Consideration of lost revenues was not necessary because of NSP's fixed monthly charge rate design.

NSP states in the current filing that around 1995 it terminated many electric DSM programs in part because there was no mechanism to recover program costs or the adverse impact of reduced electric sales and revenues. NSP further explains

that many programs had lost effectiveness due to higher federal efficiency standards. NSP now cites increased customer focus on conservation, the environment, and desire to manage increasing energy costs as among its reasons for requesting to implement DSM programs it deems cost effective (see Appendix A to the filing) from a Total Resource Cost (TRC) perspective.

NSP further states that Minnesota law has established a goal for energy savings equal to 1.5% of annual energy sales so similar efforts in North Dakota would presumably help prevent additional jurisdictional allocations. NSP has not, however, provided any growth rates comparisons or other supporting data that would indicate the magnitude of or even any basis for such concerns.

TRC is a common cost/benefit test used by DSM advocates to justify energy conservation programs that result in increased rates to customers. The TRC test recognizes total resource costs to the utility and to participating customers who should use less energy and therefore receive lower bills. The problem is that the TRC does not account for reduced system kWh energy consumption, which can leave less system sales volumes over which to spread fixed plant costs and higher kWh rates for customers. Thus reliance on the TRC can result in programs that are subsidized by non-participants. This is why utilities implementing DSM programs based on TRC have problems with rate increases due to lost sales revenues.

Instead, NSP should focus on load management programs aimed at reducing system peak demand to avoid or delay the need for new generation, thus reducing fixed costs and reducing rates from what they would have otherwise been. Ideally, the objective would be to shift load from on peak to off peak - shave the peaks and fill the valleys to make full use of existing resources and minimize lost revenues. Minimum electric rates occur with maximum production from existing base load generation.

The Rate Impact Measure (RIM) is another cost/benefit test commonly used for evaluating DSM programs. The RIM test measures what happens to rates due to changes in utility revenues and operating costs caused by DSM programs. Rates go down if the program's avoided generation, transmission, distribution and energy costs exceed the program costs and any lost revenue. In other words, the RIM test indicates more clearly than the TRC test those DSM programs that will lead to lower rates and eliminate the need for additional customer billings.

In response to staff information requests, NSP provided RIM cost/benefit ratios, which are compared below with the TRC cost/benefit ratios provided for its proposed 2009 programs. A program passes each test if the resulting cost/benefit ratio is greater than 1.0. Cost/benefit ratios at or near 1.0 can be questionable depending on calculation assumptions, free riders, etc.

	Participants	Budget	kW Saved	kWh Saved	TRC Ratio	RIM Ratio
<b>Residential</b>						
Home lighting	6,000	\$100,000	58	515,460	1.33	0.55
Savers Switch	488	\$144,400	586	6,832	5.45	1.63
Home Energy Audits	400	\$167,650			n/a	n/a
Customer Information	71,000	\$48,000			n/a	n/a
<b>Commercial</b>						
Lighting efficiency	32	\$182,337	296	1411537	2.08	1.09
Cooling efficiency	10	\$111,524	120	209,363	1.88	1.27
Motor & Drive Efficiency	16	\$60,732	60	387,957	2.8	1.09
Custom Efficiency	1	\$8,755	25	125,000	5.32	1.19
Energy Design Assistance	1	\$149,668	102	400,000	2.10	0.87
<b>Total Commercial Energy Efficiency</b>	<b>60</b>	<b>\$513,016</b>	<b>603</b>	<b>2533857</b>	<b>2.08</b>	<b>1.06</b>
Peak & Energy Control	10	\$15,000	1,500	167,000	63.11	4.58
Savers Switch	38	\$47,504	103	906	2.82	1.66
Custom Analysis	22	\$52,337			n/a	n/a

As expected, the energy efficiency programs (as opposed to the load management programs) generally do not pass or are questionable under the RIM test. Therefore, additional funding to implement these programs is not recommended. The only programs that provide clear benefit are the load management programs – i.e. Peak & Energy Control service and to a lesser extent the Savers Switch air conditioning cycling programs for residential and commercial customers. These programs provide rate discounts to customers in exchange for having their usage controlled or curtailed *during system peak periods*. These programs are already available under existing NSP tariffs, but have had limited to no promotion.

NSP informs that, in anticipation of its application for, and approval of, a cost recovery tariff rider, costs for these existing programs were excluded from the filed test year in Case No. PU-07-776. NSP further informs that the above cost recovery estimates (\$144,400 + \$15,000 + \$47,504 = \$206,904) include existing

costs plus additional funding for promotion and expansion of these programs plus an allocation of labor costs for an additional full-time employee in North Dakota. If the Commission were to approve only the expansion of the Saver Switch and Peak & Energy Controlled Service in this docket, then some additional labor expenses currently allocated to other commercial efficiency programs proposed in the application may need to be reallocated to the approved programs.

**Prepared by:** Jerry Lein