

## Chapter 2 ENERGY EFFICIENCY

### MPSC Comments on 2007 Plan Energy Efficiency

There were two comments received from MPSC that are specific to DSM and Demand Response activities now underway or planned for the future:

*114. Before issuing an RFP for consultant services to study AMI, NWE should provide it to the PSC for its review and approval. NWE should work with PSC staff to schedule a public meeting with the PSC on the topic of AMI and the scope of system-wide evaluation of potential costs and benefits of broad deployment of AMI in the NWE service area.*

*115. NWE should fully integrate its new DSM assessment into its 2009 plan. NWE should provide the PSC a report by November 15, 2009, describing the status of the DSM assessment and progress integrating the results of the assessment into the 2009 plan.*

This chapter addresses these comments where appropriate, the comment text is repeated at the beginning of the relevant section.

### Updated Study of DSM Potential

For this Plan, the DSM planning process began with a comprehensive examination of the remaining electric DSM potential in the Montana electric service territory. The overall research project is referred to as the 2009 DSM Potential Assessment. This DSM Assessment work had been performed in the past, concluding at that time near the end of 2003. That work identified an estimated 100 aMW of cost-effective DSM available from NorthWestern's electric customers in the Montana service territory, and a 20-year DSM acquisition schedule was developed and embarked upon with the introduction of an initial set of DSM programs in early 2005.

Long-run electric avoided costs underpin the cost-effectiveness analysis and ultimate derivation of final results for DSM potential. Because these avoided costs changed substantially during the ensuing period following completion of the 2003 DSM Assessment, the estimates of remaining electric DSM potential were reviewed in advance of publication of the 2007 Electric Resource Procurement Plan. At that time, two primary factors converged to produce the conclusion that the potential DSM remained at 90-100 aMW: (1) then-current electric avoided costs were higher than in 2003, and (2) some of the initially identified DSM had been acquired through NorthWestern's programs. Consequently, NorthWestern continued with its 20-year acquisition plan of 5 average megawatts per year.

The regulatory process covering the consolidated 2006-07 and 2007-08 electric tracker filings concluded with MPSC Order 6836c. This Order directed NorthWestern to complete a new DSM Assessment and incorporate the results of that assessment in its next electricity resource plan.<sup>1</sup> NorthWestern has complied with this provision of the Order by completing a lengthy, detailed and comprehensive consulting engagement with two outside services providers during the 2008-2010 period.

NorthWestern prepared a Request for Proposal (DSM RFP) with a scope of work for services pertaining to assessment of DSM potential (see Volume 2, Chapter 2.1) and retained the services of Lands Energy to issue the DSM RFP and administer a blind competitive bidding process. Finalists in this bidding process were selected and each made presentations to NorthWestern personnel and members of the Electric Technical Advisory Committee in mid-February 2009. The winning bidder was a team proposal from NEXANT, Inc. and Cadmus Group, LLC.

Completion of the scope of work required the remainder of calendar 2009, in large part due to the extensive field data collection required for the first major phase of the study. NorthWestern interacted with the Electric Technical Advisory Committee (ETAC) at all phases of the design of the DSM Assessment, including development of the DSM RFP, the selection of the final bidder, regular progress reports during the course of the work, and review of the results. Presentation of

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<sup>1</sup> D2007.5.46 Final Order 6836c; June 24, 2008; page 63, item 5.

the study results was accomplished through two ETAC meetings, one in December 2009 and the other in January 2010.

The detailed and extensive scope of work for this 2010 DSM Assessment separated into two distinct but complementary parts, the End Use and Load Profile Study and the Assessment of Energy Efficiency Potentials (2010-2029), described in additional detail below.

### **End Use and Load Profile Study**

The first phase of the project involved foundation research and analysis to characterize the energy end uses in the customer sectors. This Energy End Use and Load Profile Study required an extensive, labor-intensive effort to scientifically and accurately catalog, quantify and characterize the ways electricity is used by NorthWestern's customers. While the primary purpose of this study was to provide inputs to the calculation of DSM potential, it is also designed to serve as a stand-alone end use study, supplying information useful for load forecasting, system planning and obtaining a general understanding of the energy using equipment present in Montana. With consideration for these ultimate uses of the study, the following work goals included:

- Report building characteristics including number of buildings, total floor stock, building size, energy usage, and energy utilization index (EUI), schedules, thermal shell characteristics, and other pertinent traits.
- Inventory end use equipment and determine equipment saturations, fuels shares, efficiency shares, and market shares of key energy efficient technologies and practices.
- Evaluate energy end use consumption data and create end use load profiles for the residential, commercial and industrial sectors by calibrating energy usage to historical consumption data.

This work is significantly important and useful for many reasons. The work is based on sound statistical techniques and on-site visits, audits, measurements, and interviews with property owners/operators by qualified engineering/technical personnel. This study approach correctly

addresses the specific characteristics of NorthWestern’s Montana customers and retail electricity markets. For estimation of cost-effective DSM potential, the data produced by this effort allowed the project investigators to avoid sole reliance on national studies and averages that are weighted toward highly populated states and regions. With this current baseline market data, the results of the overall DSM Assessment are much more representative of NorthWestern’s market and customers, and a more accurate and reliable estimate of DSM potential than would be the case simply extrapolating work done either regionally or nationally to NorthWestern’s market area. It provides an update to, and extension of, a residential end use study that was completed in 1995 but had not since been updated. Finally, the work provides end use analysis for non-residential customers that had never before been done at NorthWestern.

This study produced extensive detail in that it is compiled and included in tabular and graphic format in the final report included in Volume 2, Chapter 2.2. Selected tables and figures of interest are presented below to provide an overview of the scope of the work and summary findings.

Table 4: Overall Electricity Breakdown

<b>Overall Electricity Breakdown</b>			
<b>Sector</b>	<b>Electricity</b>		
	<b>Premises</b>	<b>Sales (GWh)</b>	<b>Share (%)</b>
Residential	264,185	2,267.3	43.4%
Commercial	19,188	2,421.0	46.3%
Industrial	9,826	535.4	10.3%
<b>Total</b>	<b>293,199</b>	<b>5,223.7</b>	<b>100.0%</b>

Note: Sales figures exclude GS-2, GS-1 Primary, Lighting, and YNP loads.

Appropriate sub-sector divisions for the residential, commercial, and industrial sectors were defined as detailed in Table 5.

Table 5: Residential and Commercial Sub-Sectors

<b>Residential and Commercial Sub-Sectors</b>		
<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>
Single Family	Education	Agriculture
Multi-Family	Grocery	Chemical Mfg
Manufactured	Large Health	Electrical Equipment Mfg
Low Income Single Family	Small Health	Fabricated Metal Products
Low Income Multi-Family	Lodging	Food Mfg
Low Income Manufactured	Miscellaneous	Industrial Machinery
	Large Office	Mining
	Small Office	Misc Manufacturing
	Restaurant	Nonmetallic Mineral Products
	Retail	Petroleum Coal Products
	Warehouse	Primary Metal Mfg
		Printing Related Support
		Transportation Equipment Mfg
		Waste Water
		Water
		Wood Product Mfg

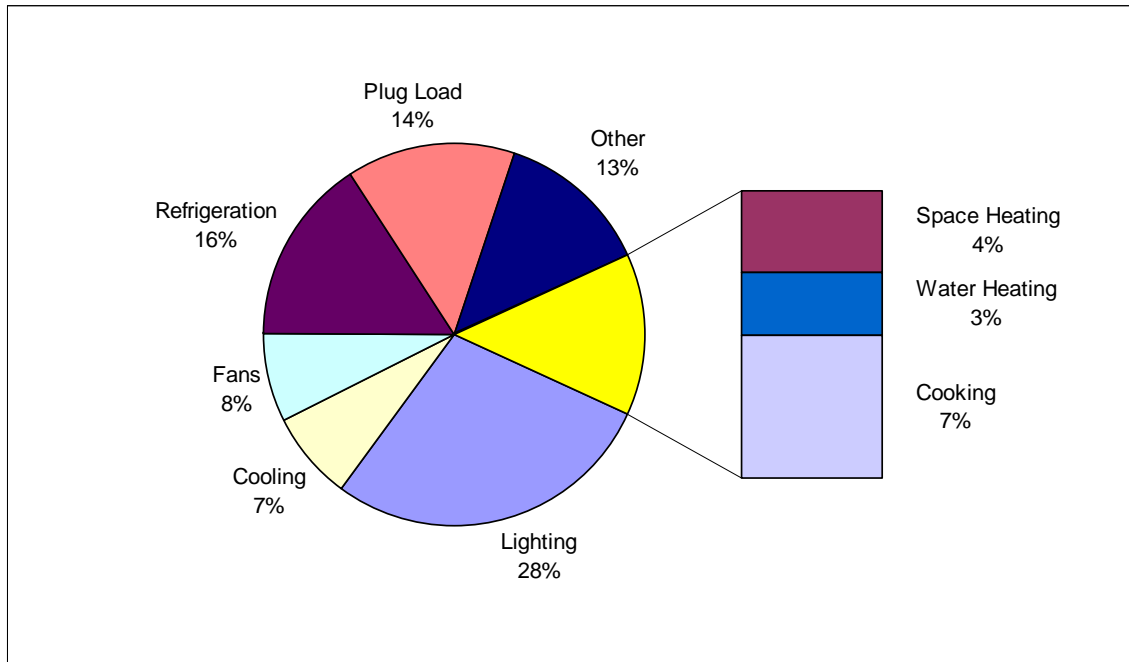
The types of end uses that were examined are consistent with those typically studied in national or regional surveys as little variation is expected in the types of end uses present. Table 6 identifies the end uses included in the study.

Table 6: Residential and Commercial End Uses

<b>Residential and Commercial End Uses</b>	
<b>Residential</b>	<b>Commercial</b>
Central AC	Heating
Central Heat	Cooling
Cooking Oven	Ventilation
Cooking Range	Water Heating
Dryer	Lighting
Freezer	Plug Load
HVAC Aux	Cooking
Heat Pump	Refrigeration
Lighting	Process Loads
Other	Other
Plug Load	
Refrigerator	
Room Heat	
Room AC	
Water Heat	

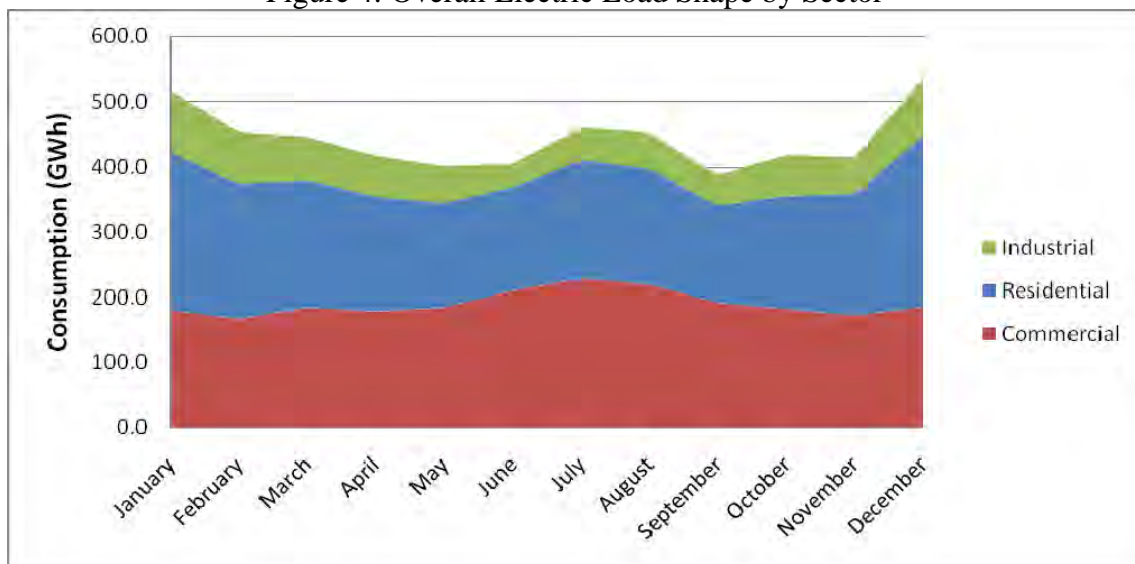
Analysis of on-site survey results and audit data produced the following breakdown of electricity usage by end use category. Lighting, refrigeration, and plug loads provide the largest portions of electricity usage with a combined share of 58%.

Figure 3: Overall Residential and Commercial Electricity Consumption by End Use



Total load was segregated by breaking each end use into load shapes for each sector. These load shapes are applied across the total load.

Figure 4: Overall Electric Load Shape by Sector



Complete information on the study results is presented in the final report of Energy End Use and Load Profile Study included as Volume 2, Chapter 2.2. This report details the goals, methodology and results of the work and documents and presents extensive detail on the characteristics of the energy using equipment and building stock present in NorthWestern's Montana electric service territory and its patterns of energy usage throughout the year. The results of this research are specific to NorthWestern's customer base and allowed well-informed estimates of cost-effective DSM Potential.

### **Assessment of Energy Efficiency Potentials (2010-2029)**

The ultimate primary objective of the DSM Assessment was to identify the remaining achievable, cost-effective electric energy efficiency potential. The study built upon a previous assessment completed in 2003, using a similar approach and methodology. This work also incorporates the findings of the Energy Use and Load Profile Study described above. This study updates data and assumptions through primary data collection and extends the planning horizon to 2029. It also incorporates improvements to the previous assessment with respect to the scope of the analysis and methodology, particularly in terms of the number of energy efficient technologies and measures that were analyzed.

Updated baseline forecast and primary and secondary data collection, as well as the efforts of other Northwest entities such as the Northwest Power and Conservation Council (the Council), were used in the DSM Assessment. The methods used to evaluate the technical potentials for and cost-effectiveness of resources drew upon the best practices in the utility industry and are consistent with the methodology used by the Council in its assessment of the Northwest's 6th Power Plan.

### **Technical, Economic and Achievable DSM Potential**

The methodology used in the DSM Assessment distinguishes four distinct, yet related definitions of DSM potential that are widely used in utility DSM potential assessment and resource planning:

- Naturally occurring conservation
- Technical potential
- Economic potential
- Achievable (program) potential

Naturally occurring conservation refers to gains in energy efficiency that occur as a result of normal market forces such as technological change, energy prices, market transformation efforts, and improved energy codes and standards. In this analysis, the market effects components of naturally occurring conservation are not analyzed separately, since they are captured in NorthWestern's load forecast. Effects of energy codes and equipment standards are taken into account by explicitly incorporating changes to codes and standards and marginal efficiency shares in the development of the base-case forecasts.

Technical potential assumes that all resource opportunities may be captured, regardless of their costs or market barriers. Technical Potential represents the savings due to energy efficiency and demand response programs that would result if all homes and businesses adopted the most efficient, commercially available technologies and measures, regardless of cost. Technical Potential provides the broadest and largest definition of savings since it quantifies the savings that would result if all current equipment, processes, and practices in all sectors of the market were replaced at the end of their useful lives by the most efficient available options. Technical Potential does not take into account the cost-effectiveness of the measures.

Economic potential represents a subset of technical potential consisting of only measures that are deemed cost-effective based on a cost-effectiveness criterion. The criterion used in this DSM Assessment is the total resource cost (TRC) test. For each measure, the test is structured as the ratio of the net present values of the measure's benefits and costs. Only measures with a benefit-to-cost ratio equal to or greater than 0.9 were considered cost-effective and included in the

calculation of economic potential.<sup>2</sup>

Achievable or “program” potential is defined as the portion of economic potential that might be achievable in the course of the planning horizon, taking into account market barriers that may impede customer participation in utility-sponsored programs. The assumed levels of achievable potential are meant to serve principally as planning guidelines. Ultimately, the actual levels of achievable opportunities will depend on the customers’ willingness and ability to participate in the demand-side programs, administrative and budgetary constraints, and availability of an effective delivery infrastructure. The customer’s willingness to participate in demand-side programs also depends on the amount of the incentive that is offered. Achievable potential refines Economic Potential by taking into account various barriers to customer adoption.

Estimates of technical, economic, and achievable potential are applied to the baseline forecast to generate three alternative forecasts based on the type of potential. The process of developing these alternative forecasts begins with estimating measure-level impacts, which are combined to estimate technical potential. Cost-benefit analysis at the measure level is then used to screen measures for cost-effectiveness and developing economic potential. Finally, a set of assumed market constraints are applied to calculate achievable potential.

Figure 5 illustrates the approach, showing a hypothetical baseline forecast along with the three alternative forecasts associated with technical, economic, and achievable potential.<sup>3</sup> These alternative forecasts represent consumption under different assumptions and the difference between the baseline and each alternative forecast represents their respective potential savings.

This approach has two advantages. First, saving estimates are driven by a baseline end-use forecast that is calibrated to NorthWestern’s sales forecasts. The sales forecast serves as a benchmark and helps reveal possible errors in calculation of end-use consumption estimates. Second, the approach maintains consistency among all the assumptions underlying the baseline and alternative (technical, economic, and achievable) forecasts. The approach also provides a

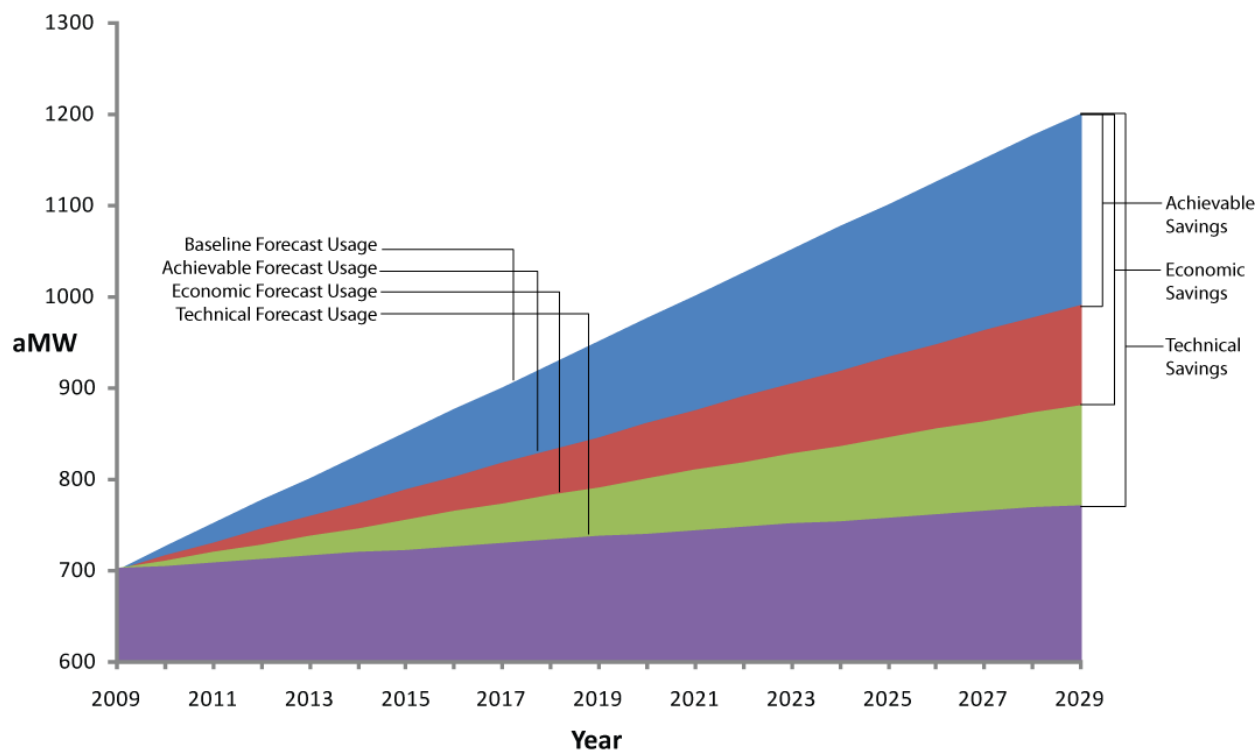
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<sup>2</sup> The 0.9 TRC screen accounts for a 10% “externality factor” consistent with the Council’s methodology.

<sup>3</sup> The baseline and alternative forecasts shown in Figure 5 are purely for illustrative purposes and do not represent the actual data underlying this assessment.

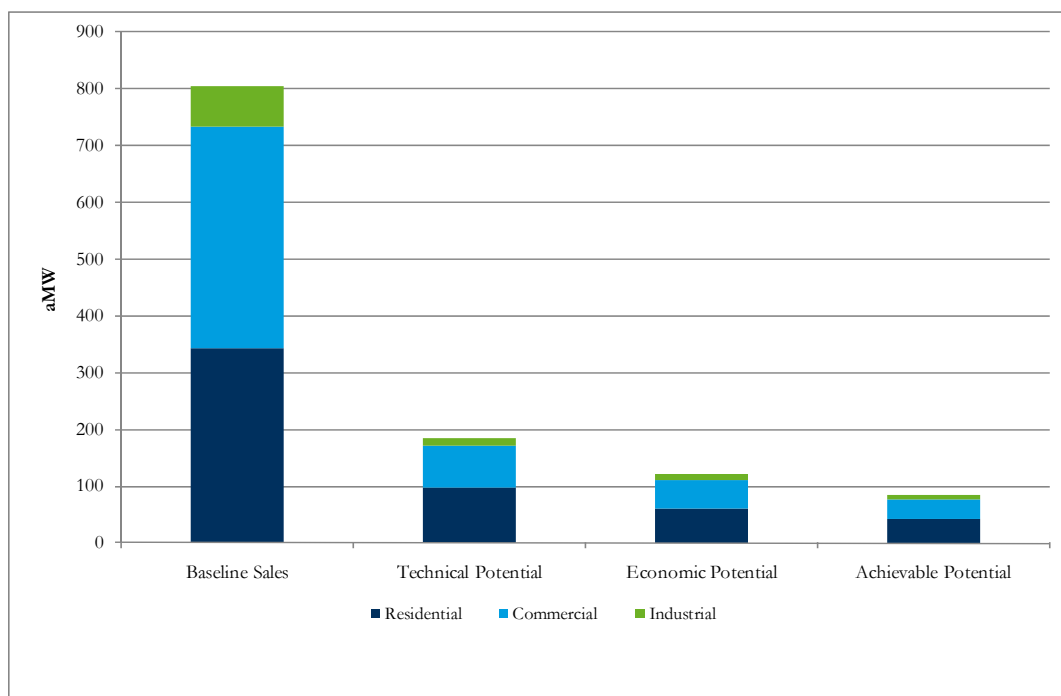
transparent framework. Because the estimated savings represent the difference between the baseline and alternative forecasts, the savings can be directly traced to specific assumptions regarding the impacts of energy efficiency measures.

**Figure 5: Example of Alternative Forecast Approach to Estimation of Energy-Efficiency Potential**



The energy efficiency potentials identified in this study are shown in Figure 6. As shown, nearly 184 aMW of cumulative technical energy efficiency potential is estimated to exist, representing 23% of the base load forecast in 2029. Nearly 66% or 122 aMW of the identified technical potential is expected to be cost-effective, based on the current forecast of avoided power supply costs.

**Figure 6: Projected 2029 Sector Sales and DSM Potential by Sector**



Approximately 69% or 84 aMW of the economic potential is projected to be reasonably achievable once normal market barriers to widespread adoption of energy efficiency measures are factored in. Nearly 90% of the achievable potential lies in the residential and commercial sectors. If fully deployed, the identified achievable potential is projected to help offset 43% of NorthWestern’s 20-year load growth.

**Table 7: Projected Sales and Cost per kWh Saved in 2029 Under Potential Scenarios**

Projected Sales and Cost per kWh Saved in 2029 Under Potential Scenarios								
End Use	Baseline Sales (aMW)	Technical Potential (aMW)	(% of Baseline Sales)	Economic Potential (aMW)	(% of Baseline Sales)	Achievable Potential (aMW)	(% of Baseline Sales)	Levelized \$/kWh Saved
Residential	342	97	28%	61	18%	42	12%	\$0.02
Commercial	391	74	19%	48	12%	33	8%	\$0.04
Industrial	71	13	18%	13	18%	9	12%	\$0.02
<b>All Sectors</b>	<b>804</b>	<b>184</b>	<b>23%</b>	<b>122</b>	<b>15%</b>	<b>84</b>	<b>10%</b>	<b>\$0.03</b>

### Energy Efficiency Potential under Alternative Scenarios

To provide additional perspective on future availability of energy efficiency resources and to take into account uncertainties in future energy costs, economic potential was analyzed under three scenarios:

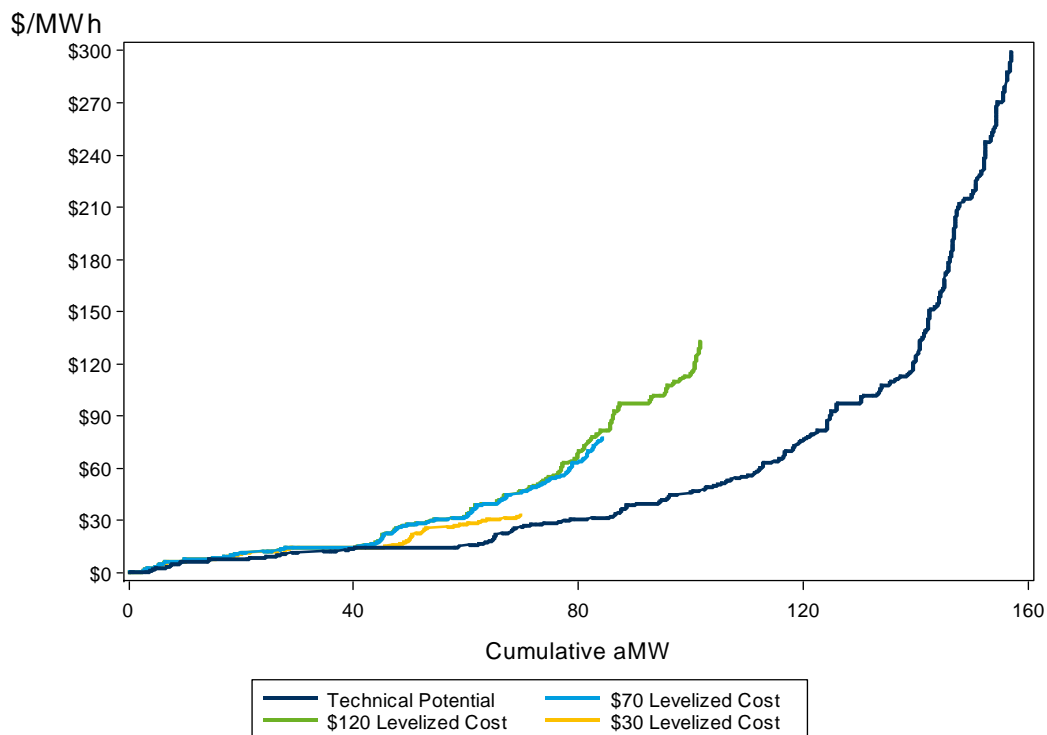
- Base-case: \$70/MWh 20-year levelized cost
- Low cost: \$30/MWh 20-year levelized cost
- High cost: \$120/MWh 20-year levelized cost

The impacts of the lower and higher avoided cost assumptions on economic potential are shown in Table 8. The results show economic potential will decrease by only about 21 aMW (17%) under the low-cost scenario, indicating the prevalence of many low-cost measures in the estimated potential. A nearly symmetrical increase of 25 aMW (20%) occurs should energy costs rise to \$120/MWh.

Table 8: Achievable Potential Under Alternate Scenarios (aMW)

<b>Achievable Potential Under Alternate Scenarios (aMW)</b>									
				<b>Achievable Potential Scenarios</b>					
	<b>Baseline Sales</b>	<b>Technical Potential</b>		<b>Base Case (\$70/MWh)</b>		<b>Low Cost (\$30/MWh)</b>		<b>High Cost (\$120/MWh)</b>	
<b>Sector</b>	<b>aMW</b>	<b>aMW</b>	<b>%</b>	<b>aMW</b>	<b>%</b>	<b>aMW</b>	<b>%</b>	<b>aMW</b>	<b>%</b>
Residential	342.2	97.3	28%	42.5	12%	36.4	11%	54.4	16%
Commercial	390.8	73.5	19%	33.1	8%	25.9	7%	38.4	10%
Industrial	71.1	12.9	18%	8.7	12%	7.3	10%	8.8	12%
<b>All Sectors</b>	<b>804.1</b>	<b>183.7</b>	<b>23%</b>	<b>84.3</b>	<b>10%</b>	<b>69.7</b>	<b>10%</b>	<b>101.7</b>	<b>13%</b>

The supply curve shown in Figure 7 illustrates the relationship between identified achievable DSM potential and the cost of conserved energy.

**Figure 7: Supply Curves for Achievable Potential in Alternative Avoided Cost Scenarios**

This supply curve will be useful in the future when, during the interim between full DSM Assessment studies such as this are performed, revisions to the estimated DSM Achievable Potential are appropriate as forecast long-run electric avoided costs change.

The final report detailing the goals, methodology and results of the Assessment of Energy Efficiency Potentials (2010-2029) is included as Volume 2, Chapter 2.3.

## DSM Acquisition Plan

From the results of the extensive work on DSM potential described and summarized above, NorthWestern's primary DSM planning assumption is that the amount of DSM Achievable Potential is 84.3 aMW. This figure represents NorthWestern's best determination at this specific

point in time of the total amount of cost-effective electric DSM resource that can be acquired from its Montana customers. It is likely that, as time passes, this amount will change as avoided costs vary with market prices, new energy conserving technologies are introduced into the marketplace, different appliance and building codes take effect, amounts of DSM either occur naturally or are captured through NorthWestern's DSM Program activities, or other factors at work in the marketplace affect DSM potential.

Following NorthWestern's meetings with ETAC, specific alternative DSM Acquisition Plans were constructed using an overall Achievable Potential of 84 aMW. A spreadsheet tool was developed by NEXANT/Cadmus to assist with calculations and presentation of DSM annual targets and estimated budgets by year. An example copy of this spreadsheet tool is included as Volume 2, Chapter 2.4.

Numerous factors were considered during the process of constructing alternative DSM Acquisition Plans to achieve this 84.3 aMW of DSM Potential over different time periods. Past DSM Program experience provides guidance to what is reasonably achievable and sustainable. NorthWestern has built up DSM acquisition infrastructure and capability to sustain annual amounts of DSM at 5.0 aMW.<sup>4</sup> It has achieved this amount, or greater, for the previous three years. It has taken some time to get expanded capability in place, and the two entities in Montana (NCAT and KEMA, Inc.) that provide DSM program services as a principle line of business and offer meaningful levels of skills, staff and other resources are now under contract to NorthWestern. Their capabilities have been developed and cultivated by NorthWestern over time through use of incentives and multi-year contracts that help them offer needed employment stability to their respective staffs, and NCAT has built up staffing levels and improved its performance and success over time. Each entity has repeatedly indicated the difficulty in finding and attracting additional qualified persons to help with expanded DSM acquisition. This situation presents a clear impediment to rapid expansion of DSM programs and related annual goals. NorthWestern will need to search outside Montana for additional service providers. In

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<sup>4</sup> NorthWestern exceeded this level during the 2008-09 period, reaching 6.7 aMW.

pursuit of this option, NorthWestern can expect substantially higher costs to attract firms to locate and establish a presence in Montana for the purpose of DSM Program service work.

Shifting business, economic and political environments can influence the level of interest and participation in DSM programs. NorthWestern's experience with its customers in the past few years, especially the 2008-09 period, includes DSM project cancellations that customers directly attribute result from economic downturns and continuing difficulties related to limited availability of capital in the context of competing investment options. Government funding that helps both public and private entities pay for their portions of DSM costs not covered by NorthWestern's program incentives is not always stable and ongoing. It can be highly variable in timing and amounts, and eligible or qualifying uses.<sup>5</sup> Public policies that support DSM are important to sustaining interest in utility programs; as administrations change composition and priorities, policy emphasis on energy efficiency waxes and wanes. NorthWestern has observed that some utility DSM programs are driven by budget availability, and it is not uncommon for such utilities to halt various DSM programs when the budget allocation for DSM has been exhausted, effectively suspending further DSM acquisition until the following budget cycle when more money again becomes available.

There are limitations to what NorthWestern, or any utility, can do to overcome DSM barriers that stem from variable public policy. Because of the difficulty of developing and maintaining a core of quality DSM service providers who, themselves, are interested in regular ongoing employment for their respective staff, and acknowledgment that DSM is potentially a cost-effective resource alternative, NorthWestern has worked toward a steady, stable, and sustainable level of DSM acquisition that can be reached year over year and contributed to the resource portfolio. In this larger context, NorthWestern sets and pursues level annual DSM goals and maintains DSM program continuity year-to-year without intermittent suspensions, budget-driven stops and starts, or major interruptions.

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<sup>5</sup> LIEAP and American Recovery and Reinvestment Act funds are recent and relevant examples of this.

## Annual DSM Goals

Determination of the time period to acquire the total 84 aMW of Achievable Potential is controlled by the actual amount each year that NorthWestern believes it can realistically acquire on a steady and sustained basis. In setting this annual target, NorthWestern took many factors under consideration. Important among these factors is NorthWestern's historical DSM program performance and results. During the time period 2006-2009, the portfolio of DSM programs and activities yielded an average of 5.2 aMW per year against an annual goal of 5.0 aMW. In the preceding two tracking periods (2007-2009) the results have exceeded 5.0 aMW.<sup>6</sup>

NorthWestern reviewed its efforts and success compared to the results achieved by other utility DSM efforts, to gain a sense of how its DSM efforts measure up against the rest of the U.S. electric utility industry. Some data sources were found that provided insight; to place the comparisons on equal footing, rankings of utility DSM efforts were published as follows using the ratio of incremental energy efficiency (MWh saved) to total annual MWh sales:

- NorthWestern ranked in the top quartile among investor owned utilities for the 2006 reporting period, and only 5 utilities in the U.S. (out of the more than 200 utilities identified in the report) reached or exceeded 1% of retail sales;<sup>7</sup>
- NorthWestern's best results to date reached a level of incremental DSM energy savings equal to 1% of its retail sales in the 2008-2009 tracking period.

By these measures, NorthWestern's DSM Programs, efforts, and results compare favorably with the best utility DSM efforts in the nation. Reinforcing this conclusion is the multiple Best Practices awarded NorthWestern by a comprehensive, independent DSM Evaluation performed in 2007.

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<sup>6</sup> It is noted here that NorthWestern does not stop its programs mid-year when either goals are reached or budgets are exhausted.

<sup>7</sup> Cichetti, Charles J., *Going Green and Getting Regulation Right – A Primer for Energy Efficiency*, 2009, Table 27-1, page 290.

Looking to the future, NorthWestern is willing to work for even better DSM results, and intends to try to increase the amount of cost-effective DSM acquired through its programs. Its DSM Acquisition Plan reflects a 20% increase in the overall company DSM effort, with attendant increases in internal and external staffing, budgets, and annual DSM goals. A recent Electric Power Research Institute (EPRI) study<sup>8</sup> forecasts that over the period 2008-2020 the achievable DSM potential of utility energy efficiency programs identified in its study equates to an annual incremental reduction in electricity consumption of 0.40% to 0.85% per year. For NorthWestern, this would equate to a range of approximately 3.0–6.2 aMW of DSM per year.

NorthWestern's final DSM Acquisition Plan is a 15-year schedule at a level of 6.0 aMW/year (includes a first year ramp-up amount of 5.5 aMW). This DSM Acquisition Plan falls very near the high end of the range identified by EPRI for the U.S. utility industry, and it represents annual DSM targets of 0.8% of NorthWestern's retail sales.

### **Alternative DSM Acquisition Plans – Three Cases**

Comments from MPSC on the 2007 Electric Resource Procurement Plan included this item specific to the DSM Assessment completed by NorthWestern:

*115. NWE should fully integrate its new DSM assessment into its 2009 plan. NWE should provide the PSC a report by November 15, 2009, describing the status of the DSM assessment and progress integrating the results of the assessment into the 2009 plan.*

For energy supply portfolio modeling, three cases were provided to NorthWestern's Energy Supply group:

- A Base Case with an acquisition level of 5.0 aMW per year for a 17-year period was provided to begin the process of screening multiple energy supply portfolios.

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<sup>8</sup> Omar Siddiqui et. al., *Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the U.S. 2010-2030*, January 2009, Electric Power Research Institute

- A High Case with a first year ramp up amount (0.5 aMW) over the current annual goal of 5.0 aMW, then leveling to 6.0 aMW for the balance of a 15-year period.
- A Hypothetical Case that increases 1.0 aMW/year over the current annual goal of 5.0 aMW for the first five years, then leveling at 10 aMW for the balance of the 10-year period. This Hypothetical Case was included at the strong recommendation of one of the members of ETAC. It is not considered reasonable or achievable by NorthWestern.

Table 9: Summary of DSM Acquisition Plan Cases Used in Portfolio Analysis

<b>Summary of DSM Acquisition Plan Cases Used in Portfolio Analysis</b>			
<b>Year</b>	<b>Base Case (aMW)</b>	<b>High Case (aMW)</b>	<b>Hypothetical Case (aMW)</b>
2010	5.0	5.5	6.0
2011	5.0	6.0	7.0
2012	5.0	6.0	8.0
2013	5.0	6.0	9.0
2014	5.0	6.0	10.0
2015	5.0	6.0	10.0
2016	5.0	6.0	10.0
2017	5.0	6.0	10.0
2018	5.0	6.0	10.0
2019	5.0	6.0	4.3
2020	5.0	6.0	-
2021	5.0	6.0	-
2022	5.0	6.0	-
2023	5.0	6.0	-
2024	5.0	0.8	-
2025	5.0	-	-
2026	4.3	-	-
2027	-	-	-
2028	-	-	-
2029	-	-	-
<b>Total</b>	<b>84.3</b>	<b>84.3</b>	<b>84.3</b>

**NorthWestern’s DSM Acquisition Plan – High Case 6.0 aMW/year**

The High Case is the DSM Acquisition Plan that NorthWestern will implement beginning with the 2010-2011 tracking period. This Plan represents a 20% expansion of NorthWestern’s current annual DSM goals, and will require expansion of resources and budget allocated to DSM

activities. This Plan shortens the time period to acquire remaining cost-effective DSM from the previous 20-year schedule in previous Electric Resource Procurement Plans to a 15-year schedule.

The first year of this Plan includes a ramping up of the annual goal in a half-step increment from the current 5.0 aMW to 5.5 aMW. In the second year and beyond, the annual goal increases to 6.0 aMW/year throughout the remainder of the time period required to capture the 84 aMW of Achievable DSM Potential identified in the DSM Assessment. The first year ramp up is needed to accommodate the process of hiring, training and deploying additional staff, contractors, and other resources during the first year of this new Plan, and it is expected that some time will be needed for the incremental workforce and resources to reach full effectiveness. The Plan and associated budget is presented in Table 10 below.

Table 10: NorthWestern DSM Acquisition Plan and Budget 2010-2029

<b>NorthWestern DSM Acquisition Plan and Budget 2010-2029</b>		
<b>Year</b>	<b>High Case (aMW)</b>	<b>Budget</b>
2010	5.5	\$11,040,955
2011	6.0	\$13,181,496
2012	6.0	\$14,318,314
2013	6.0	\$15,455,132
2014	6.0	\$16,440,140
2015	6.0	\$17,979,217
2016	6.0	\$19,518,294
2017	6.0	\$21,057,371
2018	6.0	\$22,596,448
2019	6.0	\$24,135,525
2020	6.0	\$25,884,476
2021	6.0	\$27,633,427
2022	6.0	\$29,382,378
2023	6.0	\$31,131,329
2024	0.8	\$4,334,800
2025	-	-
2026	-	-
2027	-	-
2028	-	-
2029	-	-
<b>Total</b>	<b>84.3</b>	<b>\$294,089,303</b>

With this aggressive DSM Plan, NorthWestern is embarking on an experiment to determine whether significantly increased DSM goals can be reached on a sustained basis. In the immediate future, NorthWestern is working to increase its DSM capability with the following actions:

- Staff were added to the Company's internal DSM Work Group in the first half of 2010.
- Existing contractors have been asked to increase their goals and add staffing necessary to increase their respective contributions to the overall DSM effort.
- A Request for Proposal for DSM Services will be issued in second quarter 2010 to solicit proposals from new contractors (both inside and outside Montana) to provide additional support to NorthWestern in the commercial customer sector. If available, interested and capable, NorthWestern will hire more than one additional outside contractor in response to this RFP process.
- Continued expansion and increased spending on DSM marketing and outreach activities is planned.

Following these initial steps, NorthWestern will work to expanding DSM activity each year as new opportunities, programs, technologies and techniques emerge.

## **DSM Programs**

NorthWestern Energy offers a variety of programs, services and resources to help our Montana customers to better manage energy costs. The DSM Programs funded through energy supply rates that NorthWestern will offer in 2010 and beyond include the following:

- **E+ Home Lighting Rebate** - Customers receive a REBATE of up to \$2 or instant savings on ENERGY STAR® compact fluorescent light bulbs (CFLs). Rebates available for ENERGY STAR hard-wired lighting fixtures.
- **E+ Residential Electric Savings Program** - REBATES are available to electric space or water heat customers for qualifying electric measures.
- **E+ New Home Program** - Customers building a new home may receive REBATES for qualifying ENERGY STAR lighting and qualifying natural gas measures. Northwest ENERGY STAR manufactured homes also qualify for rebates.
- **E+ Commercial Lighting Rebate Program** Offers prescriptive REBATES for the replacing of less efficient lighting products and with high efficiency technologies.
- **E+ Business Partners Program** - Provides customized incentives to commercial and industrial customers for electric and natural gas conservation. Examples of projects include measures to improve lighting, heating and cooling (HVAC) systems, refrigeration, air handling, and pumping systems. New and retrofit facilities are eligible.
- **E+ Motor and Motor Rewind Rebate Programs** REBATES offered to offset purchase costs of new NEMA Premium® motors purchased as replacements for burn-outs or for new construction—1 horsepower (Hp) to 200 Hp. REBATES also offered for motor rewinds that meet Green Motor Practices through certified member motor service centers.
- **Northwest Energy Efficiency Alliance** –NorthWestern committed to a new 5-year funding cycle with the Northwest Energy Efficiency Alliance. NEEA is a regional non-profit organization supported by electric utilities, public benefits administrators, state governments, public interest groups, and energy efficiency industry representatives. Through regional leveraging, NEEA encourages “market transformation” or the development and adoption of energy efficient products and services in Montana, Washington, Idaho, and Oregon. NEEA’s regional market transformation activities target the residential, commercial, industrial and agricultural sectors.

Additional energy savings are produced from USB funded programs that will continue into the foreseeable future. The electric energy savings produced from these programs are counted

toward annual DSM goals. The costs to operate these programs are not included in the energy supply resource planning process:

- **E+ Free Weatherization Program** - Provides insulation and other efficiency improvements at no cost to the Low Income Energy Assistance Program (LIEAP) qualified space-heating customer of NorthWestern Energy.
- **E+ Energy Audit for the Home** - Free onsite energy audits and mail-in survey audits.
- **E+ Energy Appraisal for Businesses** - Free audit that focuses on identifying electric conservation opportunities for small commercial customers on NorthWestern Energy's electric distribution system. A report with recommendations customized to the facility is provided. Some energy saving measures may be installed as appropriate.
- **E+ Irrigator Program** - Provides financial incentives for the installation of energy efficient electric conservation in irrigation systems.

NorthWestern is taking steps to expand the size of smaller pilot DSM programs:

- **Bozeman Building Blocks Program** was introduced in late 2009 and will be continued into 2010. This program provides energy audits at no direct cost to owners/occupants of commercial and residential spaces in a defined multi-block area in downtown Bozeman.
- **Green Blocks Program** – energy audits and installation of cost-effective measures at no direct cost to property owners.
  - City of Missoula - following a successful 2008 pilot project, this program is being repeated and increased to 300 residential homes; co-funding with federal ARRA money enables greater program scope.
  - “Missoula Green Biz” – this is a new variation of the residential Green Blocks Program that will target 3-5 commercial buildings located in close proximity (same block if possible) in downtown Missoula.
  - City of Helena – the original Missoula pilot program will be replicated for an initial target of 100 residential dwellings in Helena in 2010.

NorthWestern has other DSM activities in the research and evaluation phase at this time and, if merited, will include them in the DSM Program portfolio going forward:

- **A Residential Home Energy Rating System** - that provides an energy rating to homes of participating customers, and presents participants with home energy ratings of statistical or geographic neighbors for the purpose of comparison and motivation to save energy.
- **NorthWestern Buildings and Facilities** – all buildings owned by NorthWestern have received energy audits by qualified technical staff. A multi-year plan to install cost-effective DSM measures on a systematic basis being prepared for management review.
- **DSM Financing** – lending agencies that provide and process loans at favorable interest rates for qualified and eligible DSM measures.
- **Battery Storage for Demand Limiting** – a proposal for a 10 KW battery storage system for peak shaving is under review.

## Demand Response and Smart Grid

Comments from MPSC on the 2007 Electric Resource Procurement Plan included this item related to advanced metering and Demand Response:

*Before issuing an RFP for consultant services to study AMI, NWE should provide it to the PSC for its review and approval. NWE should work with PSC staff to schedule a public meeting with the PSC on the topic of AMI and the scope of system-wide evaluation of potential costs and benefits of broad deployment of AMI in the NWE service area.*

In early 2009, NorthWestern developed a RFP for use in seeking expert consultant assistance to evaluate the costs and benefits of advanced metering infrastructure (AMI) and the many and various Demand Response programs and activities that are enabled and supported by AMI. As NorthWestern prepared to issue this RFP, federal and regional actions occurred that caused a

change of direction and course with respect to AMI and Demand Response. Enactment of the American Recovery and Reinvestment Act of 2009 (ARRA) presented unique opportunities and set into motion a series of events that will enable NorthWestern to investigate, test and demonstrate Demand Response, AMI, and other Smart Grid technologies in its service territory as part of a much larger regional Smart Grid Demonstration Project. Thus, the RFP for AMI and Demand Response was set aside in favor of the chance to participate in the Pacific Northwest Regional Smart Grid Demonstration Project (Project).

### **The Pacific Northwest Smart Grid Demonstration Project**

Following passage of ARRA, the Bonneville Power Administration (BPA) announced its intentions to seek ARRA funds to conduct a large regional Smart Grid Demonstration. BPA requested proposals for participation and co-funding from regional utilities and other entities located in the Pacific Northwest. The regional goals and objectives of the Smart Grid Demonstration Project, if accepted and funded by the U.S. Department of Energy (DOE), were as follows:

#### Goals:

- Validate new smart grid technologies and inform business cases
- Provide two-way communication between distributed generation, storage, and demand assets and the existing grid infrastructure
- Quantify smart grid costs and benefits
- Advance interoperability standards and cyber security approaches

#### Objectives:

- Manage peak demand
- Facilitate integration of wind and other renewables
- Address constrained resources
- Select economical resources
- Improve system efficiency
- Improve system reliability
  - Load Management

- Conservation Voltage Reduction
- Distributed generation

NorthWestern recognized this as an excellent opportunity to learn about specific things of interest to NorthWestern in its service territory that are related to AMI and Demand Response. It presented a means to leverage a larger pool of funding. Through the information sharing provisions that would apply to all selected regional participants, the Smart Grid Demonstration Project would allow significant learning across a very broad spectrum of AMI, Demand Response, and Smart Grid projects and specific technologies and activities.

The Project presented a chance to “do more with less” in the Demand Response/Smart Grid space of its business, NorthWestern prepared and submitted a proposal (see Volume 2, Chapter 2.5). In mid-2009 NorthWestern was notified that its proposal had been selected as part of a group of 12 regional participants. BPA retained Battelle Memorial Institute, Pacific Northwest Division to lead and administer the project and submit a proposal to DOE. Later in 2009, Battelle announced that DOE had accepted the proposal for the Regional Project. More information is available at web sites dedicated to the regional Project.<sup>9</sup>

### **NorthWestern’s Smart Grid Project**

Over the next 5 years (2010-2014), NorthWestern will conduct its own project as part of the larger region wide effort. NorthWestern Energy will deploy, test, and evaluate various equipment, systems and customer services associated with emerging Smart Grid technology. The scope of this effort includes Smart Grid technologies at the electric utility substation, distribution circuit and customer levels of two unique NorthWestern locations in Western Montana, including “urban” circuits in the center of the City of Helena and a “rural” circuit located in the Georgetown Lake area. The estimated budget for the Project is approximately \$4.2 million (50% cost-shared with ARRA funds).

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<sup>9</sup> The BPA site can be found at [http://www.bpa.gov/Energy/N/smart\\_grid/index.cfm](http://www.bpa.gov/Energy/N/smart_grid/index.cfm) the U.S. government web site can be found at <http://www.smartgrid.gov/>

The Project generally concentrates on the various aspects of advanced volt/VAR control, distribution automation, automated outage restoration, substation capacity, smart metering, and customer demand response, control and energy management.

NorthWestern is working with several firms to specify equipment, software, hardware, and professional services needed to conduct this demonstration project. NorthWestern will require adherence to existing open standards for interoperability, and insist that all vendors equipment will, at the vendor's expense, be modified as necessary to communicate with and operate seamlessly with all other vendors' systems and components. Final selection of vendors will depend in substantial part on their willingness to contribute both direct financial and in-kind services support to the Project.

NorthWestern has already implemented mobile Automated Metering Reading (AMR) metering. Therefore, NorthWestern will evaluate emerging two-way communications technologies that use either the capabilities of NorthWestern's existing mobile AMR or newly installed Advanced Meter Infrastructure (AMI) to enable and mediate the functioning of Smart Grid devices, achieve interval metering, and provide two way utility and customer communications. If proven technologically and economically feasible, enhancement of NorthWestern's existing mobile AMR system to AMI capabilities is preferable as it would extend the remaining useful life of the mobile AMR system, avoid potential stranded investments, and provide significant cost savings over the longer term – particularly in the case of significant future expansion of Smart Grid in the NorthWestern electric service territory.

### **NorthWestern's Project Objectives**

NorthWestern's Smart Grid Demonstration Projects aims at testing the ability to deploy enhanced Distribution System Reliability, Asset Management and Operating Efficiencies in a cost effective manner, and implementing utility imposed customer demand controls and/or providing customers with new and innovative ways to control their own usage

NorthWestern will monitor and measure customer acceptance and energy use behavioral changes resulting from Smart Grid enabled consumer programs, services and pricing structures. The Project will produce additional information about the cost and performance of various Smart Grid components and subsystems through actual deployment and testing on a demonstration scale. This demonstration Project will allow NorthWestern to better validate NorthWestern's many assumptions used to perform economic analysis of Smart Grid deployment. Thus, an important objective of this Project is to develop the knowledge required to better inform NorthWestern's decision-making about potential future expansion of Smart Grid in its electric service territory.

### **Project Scope and Schedule**

The Smart Grid Project is a 5-year effort, spanning 2010-2014, that will constitute NorthWestern's principal Demand Response activity for the immediate future. Demand Response is a central feature of this significant effort to test and demonstrate Demand Response and AMI. In addition, this project will investigate electric distribution system technology and various supporting and enabling I/T and communications technologies. There are provisions in the Statement of Work for expanding the Demand Response activities in Year 3 of the Project to obtain a richer interaction and response from the assets deployed, indications are right to do so at that time. The Statement of Work prepared by NorthWestern and approved by Battelle provides extensive additional detail on the specific scope of work and planned activities; Appendices A and B provide detail on the time schedule and milestones to be achieved during the course of the Project.

NorthWestern will evaluate costs and benefits of its project and draw upon all learning, both from its own project and the collective knowledge produced by the entire Regional Project, to inform future decisions about possible extension of Smart Grid to more of its electric system and service territory. The next update of this Resource Plan will review progress made and implications for the future.

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## Lost Transmission and Distribution Revenue

The current structure of tariffs in place at NorthWestern to recover costs associated with supply and delivery of electric energy relies in large measure on volumetric rates. The potential for lost transmission and distribution revenues, and fixed costs associated with owned interest in Colstrip Unit #4, (Lost Revenues) resulting from reduced volume sales caused by customer participation in DSM Programs remains a financial disincentive to continued operation and expansion of DSM efforts. For the past several years, this disincentive has been avoided through use of a Lost Revenue Recovery Mechanism (LRAM) that adjusts energy supply rates annually for estimated Lost Revenues. This mechanism also incorporates a self-correcting true-up feature with each successive annual electric tracker filing to adjust the prior year forward-looking Lost Revenues with observed results from DSM Programs. The true-up is again performed following a comprehensive a DSM Program Evaluation performed every few years.

In the interim following publication of the 2007 Electric Resource Procurement Plan, NorthWestern filed a general revenue requirements case and received Final Order 7057b which, among many other things, made effective new transmission and distribution rates beginning January 1, 2008. With respect to DSM Lost Revenues, the effect of this order is to “reset” Lost Revenues to a zero starting point, beginning on the effective date of January 1, 2008. NorthWestern made this adjustment in its subsequent electric tracker filing. NorthWestern believes that the Lost Revenue Recovery mechanism that is currently in use, together with recovery of DSM Program costs, is satisfactory and effective in eliminating financial disincentives to DSM Programs under current ratemaking practices.

NorthWestern has engaged numerous parties in a Public Policy Stakeholders Group process. There are several issues under consideration and review in this process, among them alternative ratemaking practices including revenue decoupling. Such alternative practices, in particular revenue decoupling, may obviate the need for the LRAM that is now in place. Until such time as the results of this process are complete and regulatory changes are made that affect the need for LRAM, NorthWestern will continue to seek recovery of Lost Revenues through the LRAM.