CHAPTER 1
PLAN OVERVIEW

The 2015 Electricity Supply Resource Procurement Plan

Portfolio Transformation

NorthWestern's acquisition of the Montana hydroelectric facilities marks a major step in the continuing transformation of the electric supply portfolio towards a more efficient, stably priced, reliable, and lower carbon intensity portfolio. The acquisition of the hydro facilities also includes high priority value-added opportunities at the existing dams. These opportunities would result in increased installed generation capacity at multiple dams on the Montana hydroelectric system by a total of approximately 40 megawatts ("MW").

The establishment of a diversified generation fleet under its ownership and control further solidifies both NorthWestern's and Montana's goal of owning generation, creating more vertically integrated utility operations, and transitioning to capacity-based resource planning to meet critical customer needs while maintaining a low-carbon emission footprint. The resource initiatives and actions developed in this 2015 Electricity Supply Resource Procurement Plan ("2015 Plan" or "Plan") identify the critical future needs of our portfolio including addressing significant capacity shortages. The Plan identifies how to best meet the large capacity needs of the supply portfolio with least-cost, low-risk resources and includes a set of action plans which the utility will implement on a going forward basis. Key focus areas identified and developed in the Plan include:

- *Capacity-based planning and determination of resource adequacy*
- *Co-optimization of hydroelectric and thermal resources*
- *Optimized new resource selection*

- *Resource flexibility, dispatch, and ramping capability*
- *Cost-effective integrated utility operations and planning*

Reducing Resource Deficits Since 2002

NorthWestern has relied on the actions and capabilities of others to meet its load-serving obligations through the use of market products at prevailing levels of price and availability. Although the Supply portfolio has grown through resource acquisitions over the preceding ten years (Table 1-1), a significant capacity resource deficit persists, resulting in long-term supply uncertainty associated with the cost and availability of market products and resulting reliability concerns.

Table 1-1 Utility Owned and Controlled Resources in Montana

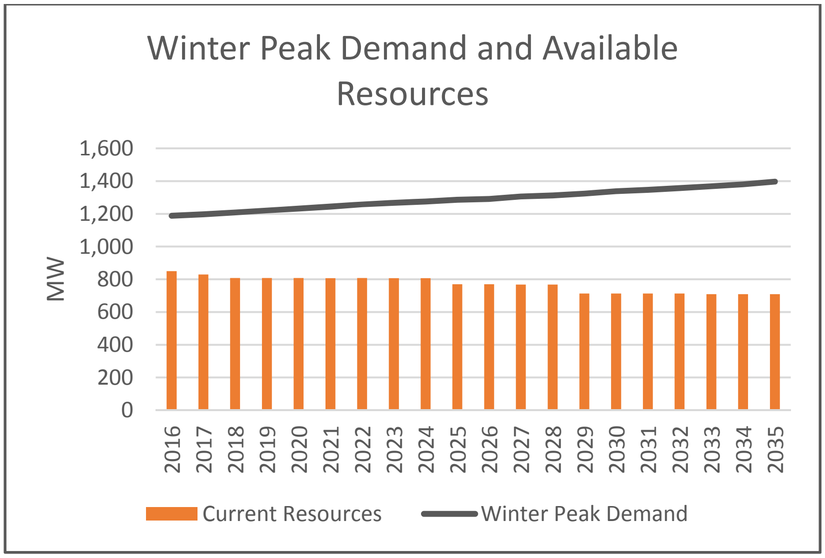
Utility Owned and Controlled Resources			
	Installed Capacity (MW)	Fuel / Resource Type	In-Service Year by NorthWestern
Hydroelectric Facilities	442	Hydro	2014
Spion Kop	40	Wind	2012
Dave Gates Generating Station	150	Natural Gas	2011
Colstrip Unit 4	222	Coal	2008
Basin Creek (under contract)	52	Natural Gas	2006
Total	906		

Capacity Needs and Planning

Regional supply conditions have changed; continued load growth, substantial additions of intermittent wind resources, hydrologic flow restrictions, and planned coal retirements have reduced and restricted electric generation capacity to the point that the region now faces increasing capacity constraints. Based on the findings of the Northwest Power and Conservation Council ("NWPCC") and its Resource Adequacy Advisory Committee ("RAAC"), NorthWestern has adopted a strategy to achieve minimal resource adequacy in ten years – about the same time frame that 2,400 MW of coal-fired generation is scheduled to retire in this region. Additionally, the NWPCC 7th Plan is the first plan to focus on how the region will meet peak capacity requirements, instead of focusing on energy needs. NorthWestern has adopted a "capacity first" planning strategy as well in this planning cycle.

For NorthWestern, the addition of physical resources increased our capability to more reliably meet customer needs, provide stable rates, and reduce risk by lowering market exposure. Concurrent with the growth of NorthWestern's generation fleet, a large amount of intermittent wind generation entered the portfolio to meet Renewable Portfolio Standards ("RPS") and mandatory QF purchases. Today, including NorthWestern's 2014 acquisition of hydroelectric facilities, the portfolio is energy and capacity deficit during Heavy Load ("HL") hours and slightly energy surplus during Light Load ("LL") hours. Significant peak capacity needs remain unfulfilled. The large 20-year peak load deficit is illustrated by the widening gap between capacity delivery capability of the current energy supply portfolio and winter peak demand (Figure 1-1).

Figure 1-1 Winter Peak Demand and Available Resources



Retail loads at winter peak demand are forecast to grow from approximately 1,200 MW in 2016 to roughly 1,400 MW in 2035. The projected peak demand deficit for 2016 is 338 MW and forecast to grow to 688 MW, representing only half of peak demand needs, over the 20-year planning period unless additional capacity sources are secured. The peak load forecast includes reductions to peak demand associated with energy conservation measures from the 2009 Demand Side Management ("DSM") assessment update.

Capacity needs are also increasing for NorthWestern as a result of the adoption and implementation of new operating requirements in the regional utility industry. Reliability Based Control ("RBC"), as required by the North American Electric Reliability Corporation ("NERC"), is altering how NorthWestern and its utility neighbors will be required to meet operational performance criteria beginning July 1, 2016. Compliance with RBC is not optional. Compulsory standards of performance defined under RBC require NorthWestern to respond within 30 minutes to change of generation notifications. In order to comply, NorthWestern must continuously reserve generation capacity and be capable of increasing or decreasing output as directed. RBC represents a capacity need that will be better defined for NorthWestern after the 4-month test period which began in March 2016.

Preferred Resources

The evaluation of resource alternatives using a combination of optimal capacity expansion methods and 20-year Net Present Value ("NPV") of portfolio cost simulations has produced a resource capacity plan to meet minimum levels of adequacy calculated through loss of load probability analysis (Chapter 11). The Economically Optimal Portfolio ("EOP") is comprised of gas-fired capacity resources utilizing multiple technologies that provide economy, flexibility, environmental compatibility, and reliability. Resource selections include flexible reciprocating gas-fired engines, a high thermal efficiency combined cycle combustion turbine with duct firing, and low capital cost simple cycle combustion turbines (Table 1-2). When added to the existing portfolio, the resulting combination of multiple gas-fired technologies, hydroelectric, thermal, wind and limited solar sources creates a cost-effective and diverse portfolio with the capability to deliver sustainable and needed levels of resource reliability and adequacy while further reducing an already low carbon emission footprint (Figure 1-2). Compared to the market alternative, the 20-year NPV of portfolio cost for the EOP is roughly 7% lower:

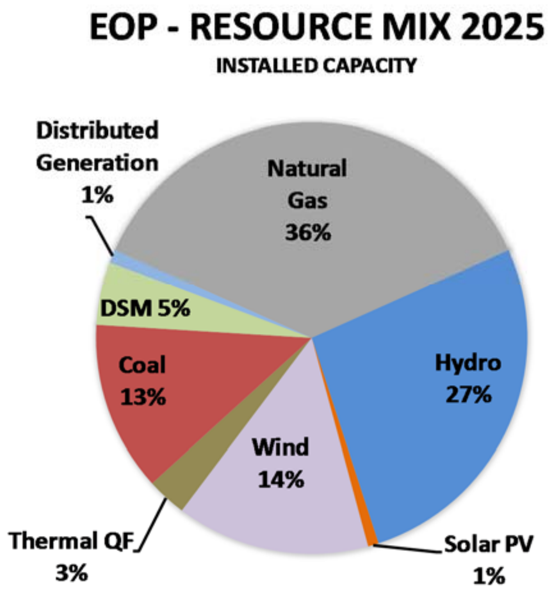
- ❖ EOP $5.5 billion
- ❖ Current Portfolio + Market $5.9 billion

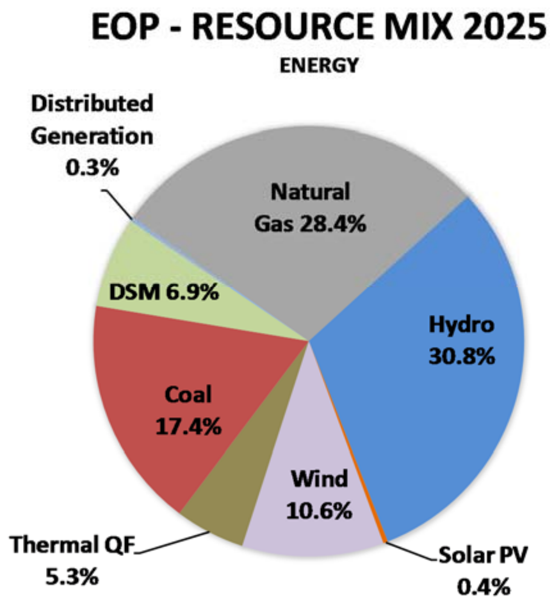
Table 1-2 EOP Resources

PREFERRED PORTFOLIO RESOURCES			
TYPE	NUMBER OF UNITS	CAPACITY (MW)	YEAR ADDED TO PORTFOLIO
Internal Combustion Engine	3	55	2019
Internal Combustion Engine	1	18	2021
Internal Combustion Engine	1	18	2024
Combined Cycle Combustion Turbine	1	348	2025
Internal Combustion Engine	5	92	2028
Frame Combustion Turbine	1	79	2028
Frame Combustion Turbine	1	79	2029

Optimal capacity expansion planning evaluated whether wind and solar photovoltaic ("PV") resource options could contribute to meeting winter peak demand. In the case of both solar PV and wind generation, neither resource was determined to be an economic alternative to gas-fired generation options because of low (including zero) capacity contribution, inability to dispatch, and resource cost. Renewable energy resources such as wind and solar PV are not an economically viable alternative to capacity resources which have the capability to meet time sensitive load-serving needs.

Figure 1-2 EOP– Resource Mix 2025





The 2015 Plan identifies needs over a 20-year planning horizon and evaluates how these needs can be best satisfied using proven and reliable natural gas-fired generation technologies. Siting gas-fired generation on the Montana natural gas transmission system will require a comprehensive evaluation of infrastructure alternatives. The development of natural gas transportation infrastructure is a particularly critical component of the EOP strategy since it will ultimately determine where and when new generation resources can be added. The costs of necessary new natural gas transmission have been evaluated and estimated only at a high level.

Estimated costs for the resources identified in the EOP are included in Table 1–3. These costs, while useful for long-term planning and resource evaluation purposes, should be considered feasibility level estimates that will be further studied and refined as part of pre-development decision analysis.

Table 1-3 Estimated EOP Costs

ESTIMATED OVERNIGHT CAPITAL COSTS ($ Million, nominal dollars)			
	Project Cost	Infrastructure Costs	Total Costs
2019	76.5	22.0	98.4
2021	26.5	7.6	34.1
2024	28.1	8.1	36.2
2025	593.9	59.5	653.4
2028	254.2	83.7	337.9
2029	103.9	40.8	144.7
Total	1,083.2	221.7	1,304.8

Hydro Potential

The hydroelectric generation group operates 37 individual generating units across its ten generation facilities. The Hebgen project does not currently have generation installed at its location. The ten facilities' generation units, turbines, and generators have been refurbished or replaced to varying levels across the system. The potential exists to increase the system's capacity through further upgrades of existing units and the addition of new capacity at the Hebgen and Ryan plants. The replacement of a vintage turbine or generator results in greater long-term reliability and incremental capacity gain from current design and fabrication processes. A baseline life extension evaluation has been performed on all of the projects to evaluate current condition, upgrade requirements, and incremental generation benefit applicable to each facility. The baseline assessments indicate that, in addition to improved reliability, the system has a potential capacity increase of approximately 40 MW through existing unit upgrades. Engineering evaluations have been performed that define the scope of generation potential at Hebgen with a new generating facility and the addition of a seventh unit at the Ryan facility. The potential capacity increase of these two projects is 46 MW. These potential capacity increases have been assessed on a baseload evaluation. Modified system operations could provide additional incremental value.

NorthWestern is currently performing upgrades at its Hauser facility including upgrades to the six turbine generator units which will result in a total generating capacity increase of 2.5 MW. The first unit will be completed in 2016 and the second unit upgrade has started followed by one unit per year until completed. The hydroelectric engineering staff is currently reviewing the baseline evaluations performed at the other facilities where potential capacity increases are possible. This work will update project scopes, associated costs, schedules, and viability to include in our future business plans. The inherent value of the hydroelectric system upgrades to existing and new facilities is that there is no or minimal fixed and variable costs associated with the additional projects. The upgrades would continue to be operated with the existing staff and carbon-free fuel.

Demand Side Management

This Plan includes a description of electric efficiency programs available to residential, commercial, industrial, and irrigation electric supply customers. NorthWestern recently contracted for an updated Electric Efficiency Potential Assessment ("2016 Efficiency Assessment") to determine the amount of remaining achievable, cost effective electric DSM available in its Montana service territory. NorthWestern will maintain the current annual DSM acquisition goal of 6.0 average megawatts ("aMW") established from its 2009 Energy Efficiency Assessment until the 2016 Efficiency Assessment based on new avoided electric costs from this Plan is available, which NorthWestern expects will be completed during the second quarter of 2016. Among other things, the 2016 Efficiency Assessment will evaluate compact fluorescent lamps ("CFLs"), light emitting diodes ("LEDs") and behavioral based energy efficiency programs. NorthWestern will then determine whether revision to the current 6.0 aMW annual DSM acquisition goal is necessary and will adjust program offerings based upon the results.

NorthWestern has completed its 5-year (2010-2014) commitment to the Pacific Northwest Smart Grid Demonstration Project. A summary of NorthWestern's two geographically unique projects and related findings, as well as insights from projects implemented by other utilities in the Pacific Northwest Smart Grid Demonstration Project, are included in Volume 2, Chapter 3.

NorthWestern continues to investigate electric distribution system applications for battery technology and completed the installation of a second project near Deer Lodge during 2015 (Volume 1, Chapter 9). A summary of the status of NorthWestern's first battery storage project in Helena is included in Volume 2, Chapter 3.

NorthWestern continues to explore the potential value of behavior-based DSM. The Pacific Northwest Smart Grid Demonstration Project included some behavior-modification features. To date, NorthWestern's review of a variety of programs offered by vendors that benchmark customers' energy usage and provide education to influence energy reduction behaviors has not shown such programs to be cost effective. Such behavior-based programs will be evaluated in the 2016 Efficiency Assessment.

While NorthWestern initially anticipated that its Smart Grid Demonstration Time-Of-Use study would provide insight into customer price elasticity of demand, the small sample of NorthWestern's retail electric customers and lack of baseline data did not support definitive price elasticity of demand calculations.

Renewable Portfolio Standards

NorthWestern continues to meet its annual obligation to purchase 15% of its energy from eligible renewable resources under the Montana Renewable Power Production and Rural Economic Development Act, § 69-3-2001, MCA, *et. Seq*. (generally known as the

"Renewable Portfolio Standard", or "RPS"). Wind resources, and to a lesser extent small-scale hydro, are yielding sufficient annual volumes of renewable energy credits ("RECs") to enable us to meet the Montana 15% renewable portfolio requirement through 2026, assuming contracted sources are built and achieve the contract commercial operation dates. As detailed in Chapter 8, NorthWestern has integrated a significant amount of intermittent resources – approximately 240 MW of wind and roughly 40 MW of small-scale hydro for a combined total of roughly 280 MW. Unfortunately, not all of these resources qualify as eligible renewable resources and only a few are Community Renewable Energy Project ("CREP") qualified because of size and strict, limiting ownership requirements. Additionally, state statute does not recognize that eligible renewable resources are not all carbon emission free.

Resource Adequacy

Although the addition of thermal and hydroelectric facilities have greatly reduced NorthWestern's dependence on wholesale markets to supply capacity and energy, supply operations must still rely on significant wholesale market transactions to provide necessary capacity during peak load events. In addition, NorthWestern does not currently maintain planning reserves and instead relies on other parties or the market. Figure 1-3 below shows a range of planning reserve margins for selected utilities. The 2015 Plan incorporates Loss of Load Probability analysis to quantitatively assess the ability of the portfolio to meet peak demand (Chapter 11).

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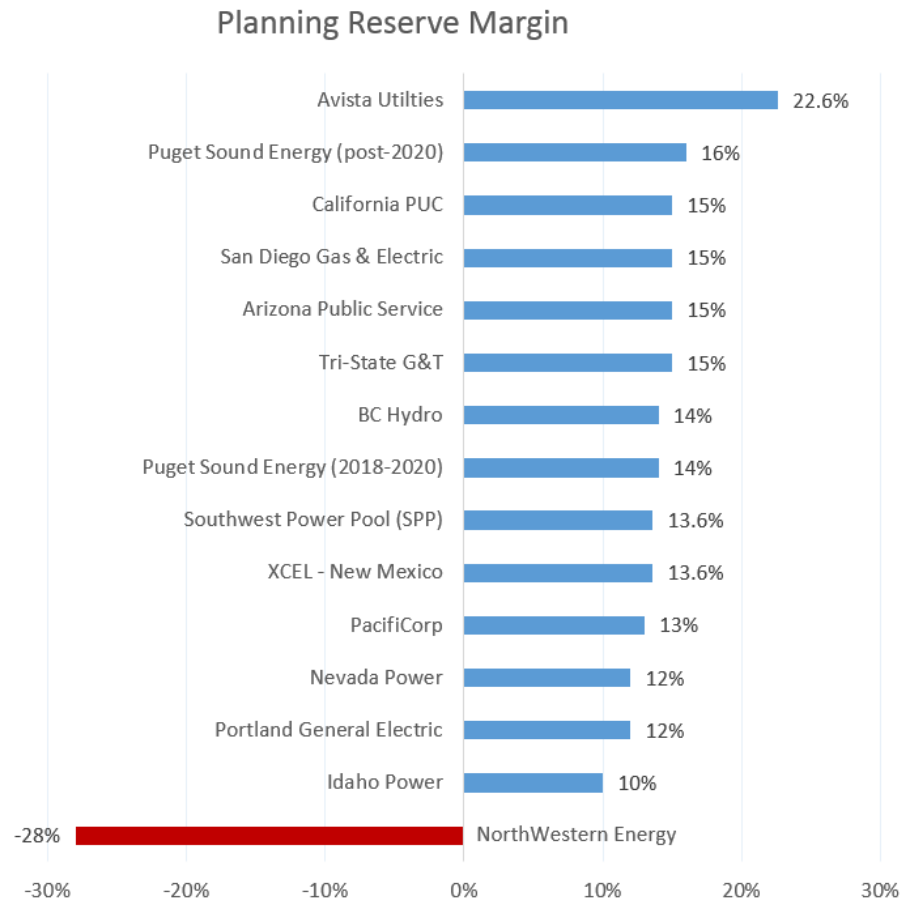
Figure 1-3 Planning Reserve Margins for Selected Power Companies



In 2005, the NWPCC and the Bonneville Power Administration ("BPA") created the Pacific Northwest Adequacy Forum ("Forum") to produce an adequacy standard for the regional power supply. In May of 2015, the NWPCC adopted the Forum's most recent forecast, which shows that the likelihood of a power supply shortage in 2020 is just under the 5% Loss-of-load Probability ("LOLP") standard set by the NWPPC in 2011. By 2021, the LOLP jumps to over 8% due to the planned retirements of Washington and Oregon coal-fired generation plants. The region would need to add 1,150 MW of gas-fired generation by 2021 to reduce the LOLP back to 5% or face a planning reserve margin deficit. Based on this projection of regional resource adequacy NorthWestern cannot assume that the region will be capable of meeting its capacity requirements.

Market Operations

Supply Market Operations conducts hourly, daily, and short-term deployment of portfolio resources to balance load with available energy and load-serving capacity. This function is performed through day-ahead and 24-hour desks where schedulers monitor electric generation production, dispatch resources, react to changes in intermittent wind energy production, and execute market purchases and sales.

In additional to hourly market purchases and sales for balancing, real time operators have the option to use the dispatch capability of certain supply resources including the 52-MW Basin Creek Equity Partners, LLC Plant ("Basin Creek") to meet load-serving needs. Using a defined dispatch protocol that determines the economics of using Basin Creek, real time operators evaluate and determine the use of the resource. The dispatch protocol considers the market price of electricity and the cost of natural gas to fuel the plant to determine economics of running the plant compared to alternatives including market purchases. In addition, a portion of the Basin Creek capacity is dedicated to providing non-spinning contingency reserves, and ancillary service required to schedule and serve load on all transmission systems. The self-provision of non-spinning contingency reserves from Basin Creek eliminates the need to purchase this product from the market.

In Final Order No. 7219h in Docket No. D2012.5.49, the Montana Public Service Commission ("MPSC" or "Commission") ordered NorthWestern to perform analysis of the Basin Creek gas-fired facility to determine if the plant is being utilized effectively. The Commission further required NorthWestern to report the results of this work. NorthWestern engaged the services of Energy and Environmental Economics, Inc. ("E3"), a California-based consultancy, to independently evaluate NorthWestern's use of Basin Creek during 2013. The results of the E3 study are noted in item 20 of NorthWestern's response to Commission comments on the 2013 Plan as well as in Volume 2, Chapter 5 of this Plan.

Since the 2013 Plan was filed, market operations has continued to evaluate and improve upon its capabilities to efficiently use the generation fleet. The integration of the hydroelectric system involved changes to planning and personnel to coordinate business activities necessary to incorporate hydro planning and operations with other supply functions including market operations. The hydro integration process has gone smoothly, including the successful transfer of Kerr Dam to the Confederated Salish and Kootenai Tribes of the Flathead Reservation on September 5, 2015.

Higher levels of integration and coordination between supply, generation, and transmission business units represent an opportunity to operate more efficiently and more cost-effectively. For example, the imbalance service function has returned to utility control. In its role as the imbalance scheduler and resource manager for the Montana system, market operations provides necessary services through the coordinated and cost-effective use of available resources and market purchases and sales.

Regional Electricity Market Development

Energy Imbalance Markets

Efforts to develop Energy Imbalance Markets ("EIMs") in the West have been underway for several years. Like Regional Transmission Organizations ("RTOs") and Independent System Operators ("ISOs"), EIMs accept offers and dispatch resources on a sub-hourly basis to meet load requirements. Unlike RTOs and ISOs, EIMs do not provide ancillary services, manage congestion, or administer an Open Access Same-Time Information System ("OASIS") site, and they do not take on reliability responsibility.

Over the last two years, there has been some progress in the development of these markets. Most notably, PacifiCorp and the California ISO ("CAISO") announced, developed, and on October 1, 2014, implemented an EIM for their Balancing Authority Areas (now called the “Western EIM”). Several other investor-owned utilities (“IOUs”) subsequently began the process to join this market. Separately, the Northwest Power Pool (“NWPP”) worked toward the development of an EIM for a number of years before pulling back from these efforts in late 2015.

Regional Transmission Organizations / Independent System Operators

Development of full regional markets has also begun to progress in the West. Currently, there are two ISOs in the Western Electricity Coordinating Council (“WECC”): the CAISO and the Alberta Electric System Operator (“AESO”). In 2015, CAISO and PacifiCorp announced a memorandum of understanding to explore the possibility of PacifiCorp becoming a full participating transmission owner in the CAISO, raising the possibility that what had previously been a California state market may develop into a regional entity.

Participation in Organized Markets

NorthWestern is assessing the development of these markets and the potential for future participation, and we intend to engage a third-party consultant to aid in our evaluation. There are potential benefits – more efficient dispatch, improved reliability, and intermittent renewable (primarily wind) integration – but there are also challenges for NorthWestern’s participation, including connectivity, implementation costs, and capacity requirements.

NorthWestern will need to assess how its resources would fit with the requirements of these markets. Such participation would potentially place additional requirements on NorthWestern from a resource adequacy and capacity perspective and could change the timing of the addition of resources to the portfolio. Participation in an EIM or ISO would also significantly change both market operations and transmission operations for NorthWestern.

Because a significant number of utilities are moving to organized markets, NorthWestern must also be aware of the potential consequences of not joining. Most notably, NorthWestern is evaluating the potential effects on the real-time bilateral markets as more entities join the Western EIM and potentially other markets. The implications could be significant for NorthWestern. Currently, NorthWestern relies heavily on the real-time market, particularly in times of peak load. A substantial decline in liquidity in the bilateral markets would increase the risk of not becoming an organized market member.

Colstrip Unit 4 Value

The 2015 Plan examines Colstrip Unit 4 ("CU4") from a cost, capacity, environmental, and resource adequacy perspective to assess the value and longevity of the resource for portfolio planning and resource adequacy purposes. Our assessment incorporates carbon costs as well as the potential for different carbon pricing trajectories to determine a range of potential impacts to the portfolio. Based on the results of our analysis we conclude that CU4 provides long-term value to the portfolio, especially when it is considered in the context of the portfolio's capacity requirements.

Introduction to 2015 Plan Document

The Plan is presented in two volumes with Volume 1 separated into primary topical chapters addressing fundamental resource planning components such as load, the current portfolio, resources, model inputs and analysis, and results and conclusions. Volume 2 is a compilation of supporting documentation, references, and technical materials that are too voluminous to be reasonably included in Volume 1. A detailed table of contents for both volumes is provided to help readers quickly and easily locate materials of interest. Discussion of resource topics and analytical methods often leads to the use of technical terminology and acronyms that may not be familiar to all readers. Appendix 1 (Abbreviations) and Appendix 2 (Glossary) to Volume 1 are included as reference aids to support more effective communication of resource planning work and promote a shared understanding of NorthWestern's electric supply business unit.

Volume 1

The first volume is designed to provide a full accounting of the work performed by NorthWestern and its advisors, including Electric Technical Advisory Committee ("ETAC"), to inform electric generation resource procurement. As a planning and information road map, it is a guide that explains the steps taken to craft the EOP and explains how it was determined to be the low-cost, low-risk resource strategy. NorthWestern will show that it has conducted a careful examination of the factors relevant to the retail load-serving obligation and that it has employed methods of evaluation that are appropriate, thorough, and complete.

Volume 2

Seven chapters are included in the second volume which is being supplied in electronic format with printed versions of Volume 1 due the large amount and nature of the information presented. References to the materials found in Volume 2 are found throughout Volume 1 and provide background, source information, and a detailed tabular accounting of modeling results and output. Additional background information is also provided on topics relevant to the Plan in Volume 2 that is not explicitly cited in Volume 1.