

White Paper: Integrated Systems Planning

Introduction

In phase I of the e21 Initiative, the e21 participants recommended changes to the resource planning process overseen by the Minnesota Public Utilities Commission (PUC), for those utilities that opt into a performance-based multi-year rate structure. Specifically, the e21 participants recommended that, for those utilities that opt to file for a performance-based multi-year rate plan, the resource planning regime should be transitioned to one that focused attention on the five-year action plan of the current resource planning process, streamlining regulatory review of the later years of a resource plan, outside this action plan period. This planning regime was called an integrated resource analysis by the e21 participants in phase I. The concept was to tie the five-year action plan more closely to the rates that would be charged under the multi-year rate plan, creating what e21 referred to as the utility business plan combining utility rates, costs, and investments.

In addition, the phase I participants recommended including more information about transmission and distribution wire and non-wire alternatives in a resource plan, such as additional demand response capabilities and other distributed resource options. This information could help lead to an overall integrated systems plan that considers a number of ways to serve load that includes utility-sited and customer-driven resources across both the transmission and distribution systems.

Thus, in phase II, the group decided to focus on potential modifications to traditional resource planning that would be useful in transitioning it to produce an overall integrated systems plan. This focus recognizes that expanding resource planning to take a broader set of distributed and transmission system alternatives into account will be essential for maintaining a cost-effective, well-functioning electric system, and that describing what that integrated systems planning process might look like would be helpful to all parties—regulators, stakeholders and Minnesota’s electric utilities—not just those utilities contemplating opting into a multi-year rate planning regime as envisioned in e21’s first phase.

In both phase I and phase II, the e21 participants agreed that Minnesota’s resource planning process has served the public interest exceptionally well over the years, providing regulators, customers, and other interested stakeholders insight into the long-range plans of electric utilities, as well as being an opportunity to shape those plans to ensure system reliability and compliance with federal and state policy goals within a least-cost, best-value planning regime. Our proposals to make changes to the resource planning process is not meant to imply that the current planning process is flawed or is being implemented incorrectly. The intent of e21’s current work is only to ensure that this least-cost planning process continues to promote the public interest as the utility industry evolves.

The evolution of Minnesota’s resource planning process is nothing new. Since first being implemented in the early 1990s, the resource planning process has adapted over time as the utility industry has evolved from a set of relatively closed vertically integrated monopolies that essentially self-supplied to include a more complex and competitive wholesale marketplace. Over that time, resource planning evolved with the industry, to include complex modeling, collaborative processes, and other innovations. The discussion below, like the e21 process itself, is intended to explore the next steps in the evolution of the planning process, so that

regulatory processes align with the business environment facing today's utilities and their customers—an environment that includes

- rapid changes in the capabilities and cost-effectiveness of many non-wire alternatives to building traditional utility infrastructure, such as distributed solar, demand response, and energy storage
- increasing concerns about cybersecurity and the interconnectivity of a growing number of assets on the electric grid
- the growing number of active participants in the system, such as “prosumers” (sometimes acting as *consumers*, using electricity from the grid and sometimes acting as *producers*, making their own and selling the excess back to the grid) and third-party service or technology providers

As the electric utility industry evolves, the key question of the current resource planning process will remain, how best to ensure that customers' electricity needs are met over the planning period, in least-cost ways that comply with relevant state and federal requirements? However, instead of primarily comparing utility-scale generation resources needed to meet forecasted customer demand, integrated systems planning must also begin to ask more granular and difficult questions (though not necessarily provide answers and actionable plans at this point in the process). These questions include:

- a. What is the projection for development of demand-side resources, including both customer-driven generation and customer demand response, that are outside of the utility's control?
- b. What additional potential exists for customer- and utility-sited distributed energy resources to cost-effectively meet system needs? Facilitating that potential may require changes to rate design, procurement programs, or other proactive measures.
- c. What might be the opportunities for third parties in the provision or aggregated operation of those resources?
- d. How might supply-side and demand-side resources interact in real time to optimize past and future investments in order to reduce customer cost impacts over the planning period?

Another important consideration for the PUC will be: How can individual utility's integrated systems plans optimally meet Minnesota's needs and public policies, and coordinate with other utilities' plans and the Midcontinent Independent System Operator (MISO) market?

Charge of the Integrated Systems Plan Subgroup

Involving regulatory staff and others typically engaged in the process, the charge to the subgroup was to:

- evaluate how the integrated resource planning process works now
- identify strengths and specific areas for improvement
- summarize proposed changes and additions to the current utility planning processes
- summarize the costs and benefits of making changes to the traditional integrated resource planning process

The e21 integrated systems planning subgroup assessed options for

- a. transitioning resource planning to a more complete end-to-end look at the utility system that can inform planning and alternatives
- b. reducing overall regulatory burden and cost of resource planning, for utility, regulators, and intervenors
- c. tying resource planning more directly to rates charged to customers by examining decisions establishing the costs (both direct and societal) of providing service to utility customers and achieving the agreed-upon performance outcomes
- d. increasing awareness and consideration of potential for distributed generation and non-traditional resource alternatives in the provision of service to utility customers¹¹

In this white paper, we provide a brief overview of the current resource planning process, summarize benefits that the current process provides, and identify critical features of resource planning that must be retained as the process evolves. In addition, this white paper outlines four possible areas for improvement:

- a. optimize the length of time during which a plan is processed through the regulatory system, and better manage the administrative burden placed on regulators, staff, and other parties
- b. expand the scope of the planning process, to take more of an end-to-end systems approach (from the bulk transmission level to the distribution grid)
- c. include more timely information about utility costs and customer impacts from various approaches to the resource mix, infrastructure investments, and delivery mechanisms
- d. improve the balance in the plan review process between reliance on modeling versus a discussion of policy and strategic considerations

At first glance, there may be trade-offs between these topic areas—how is it possible to reduce the administrative burden of resource planning while expanding its scope? However, the hope is that, if we can find ways to ease the administrative burden of the current resource planning process, we may be able to create some head room to incorporate additional complexities into that process without overwhelming available resources.

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¹¹ While we agree that the opportunities for distributed energy resources should be increasingly considered in resource planning (and, in fact, this is required under Minnesota statute § 216B.2426), e21 participants believe that the pursuit and acquisition of any particular resource to meet customer needs is better left to proceedings and programs outside of resource planning.

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** An asterisk indicates they are no longer at their organization and are no longer participants in e21. Also note that participants that have changed organizations since the start of e21's phase II have their new position and organization in parentheses.*

¹² Matt Schuerger was appointed to the Minnesota Public Utilities Commission beginning February 1, 2016, and undertook no further participation in the e21 process.

¹³ Chris Shaw left the Minnesota Department of Commerce in June 2016 to take a position with Xcel Energy and undertook no further participation in the e21 process.

Section I: Current Resource Planning Process

Brief Overview. Utility resource planning in Minnesota is governed by Minnesota statutes section 216B.2422 and Minnesota rules chapter 7843. Minnesota law defines a resource plan as:

a set of resource options that a utility could use to meet the service needs of its customers over a forecast period, including an explanation of the supply and demand circumstances under which, and the extent to which, each resource option would be used to meet those service needs. These resource options include using, refurbishing, and constructing utility plant and equipment, buying power generated by other entities, controlling customer loads, and implementing customer energy conservation.¹⁴

The forecast period referred to in that definition is 15 years following the year the plan is filed. The resource plan must identify a five-year action plan, which is defined as:

a description of the activities the utility intends to undertake to develop or obtain noncurrent resources identified in its proposed plan. The action plan must cover a five-year period beginning with the filing date. The action plan must include a schedule of key activities, including construction and regulatory filings.¹⁵

Electric utilities are required to file resource plans with the Minnesota PUC on a schedule determined by the commission, generally every two years. Once filed, the proposed plan is analyzed by expert staff at the Minnesota Department of Commerce. In addition, a number of parties often intervene, engage in formal and informal discovery (the process of gathering information from the utility and other parties to the proceeding), and add their recommendations to the record before the PUC. The resource plans of investor-owned utilities, such as Xcel Energy, Minnesota Power, and Otter Tail Power, are mandatory and subject to PUC approval, whereas plans submitted by municipal and cooperative utilities, while also subject to acceptance or rejection by the PUC, are considered advisory.

¹⁴ Minnesota statute § 216B.2422, subd. 1(d)

¹⁵ Minnesota rules section 7843.0400, subp. 3, item (C)

Current Requirements Related to Resource Planning

- Demand and energy forecast (§ 216B.2422, subd. 2a)
- Existing resources (R. 7843.0400 subp. 3A)
- Conservation goals (§ 216B.241 subd. 1a)
- Environmental costs (externalities) (§ 216B.2422, subd. 3)—PUC is updating this
- Carbon cost (§ 216H.06)
- Future resource options (R. 7843.0400, subp.3A)
- Process and analytical techniques (R. 7843.0400, subp. 3B)
- Sensitivity analysis (R. 7843.0400, subp. 2)
- 50% and 75% renewable scenarios (§ 216B.2422, subd. 2)
- Consideration of distributed generation (§ 216B.2426)
- Likely effects on rates and bills (R. 7843.0400 subp. 4)
- Action plan (R. 7843.0400 subp. 3C)
- Findings of whether or not a utility is in compliance with the Renewable Energy Standard (§ 216B.1691, subd. 3), as well as the Solar Energy Standard (§ 216B.1691, subd. 3) if applicable
- Renewable preference (§ 216B.2422, subd. 4)
- Progress in meeting CO₂ reduction goals (§ 216B.2422, subd. 2c)
- Description of efforts to obtain community-based energy development projects (§ 216B.1612, subd. 5b)¹
- Renewable Energy Standard cost impact (§ 216B.1691, subd. 2e)
- Compliance with previous PUC orders—things the PUC has asked be addressed in the next integrated resource plan filing
- Resource plan rate impact
- Socioeconomic studies for existing facilities/retirements
- Cost/benefit analysis for demand-side management

Strengths of the Current Process. e21 participants identified a number of strengths of the current planning process, aspects that should be built on and not lost as planning evolves to address increasing customer and community expectations and other opportunities facing the electric industry. Chief among those strengths is that resource planning helps ensure reliable service over the long term, and it provides regulators, customers, and stakeholders critical insight into the decisions that the utility needs to make to cost-effectively ensure reliability while meeting other public policy goals, both in the short term and with regard to “over the horizon” issues. The current process provides iterative planning opportunities prior to resource commitments, allowing regulators, utilities and other participants to assess, via a resource plan docket, the importance of multiple variables and sensitivities, including cost, size, type, timing of alternatives, and demand forecasts, before committing ratepayer funds to acquire electricity resources. Minnesota’s resource planning process creates relatively unrestricted opportunities for intervenors to explore the utility’s system, proposed plan, and alternatives, to take a broad look at where the system is today, and current goals and future plans to meet customer needs. The process is robust—since utility plans are refreshed every couple of years, this allows course corrections to respond to changes in the utility landscape.

Section II:

Four Areas for Potential Improvement

This section describes the four main areas for potential improvement identified by e21, summarizes participants' discussion of each area, and evaluates potential modifications that could be made to the current resource planning process.

Area 1: Optimize the length of time during which a plan is processed through the regulatory system, and better manage the administrative burden placed on regulators, staff, and other parties

Discussion. Early in the discussion, a number of e21 participants identified the length of time it sometimes takes to process a resource plan to be a challenge—key drivers can change between plan filing and plan approval that create a need to reset the plan, thereby extending the process. As can be seen from the following table, the length of time to process a resource plan can range from 6 to 43 months. Some resource plans can take longer to process, depending on the complexity of the issues raised in the resource plan or the sufficiency of the information provided by the utility. The three longest resource plans—Otter Tail Power's 2005 plan, Great River Energy's 2008 plan, and Xcel Energy's 2010 plan—all had significant issues that required much more time to process than the vast majority of plans.

The average length of time from the date of filing a resource plan to PUC action is 16 months, and only 14 months if the three longest plans are removed from the calculation (see Table 1). Given the complexity of the issues that are considered in a resource plan and the increasing number of filings that state utility regulators and staff need to process, 14 months to process a major filing like a resource plan does not seem unreasonable, especially given the increasing number of utility rate cases and other complex filings that demand the PUC's attention.

Table 1. Length of Time from Filing of Resource Plans to PUC Action

Docket No.	Utility	Date Filed	Date of Minnesota PUC Decision	Length of Proceeding (in Months)
05-184	Dairyland Cooperative	Jan 2005	March 2006	14
05-968	Otter Tail Power	June 2005	Jan 2009	43
05-1100	Great River Energy	June 2005	July 2006	13
05-1102	Missouri River Energy Services	July 2005	Oct 2006	15
05-2029	Interstate Power	Jan 2006	March 2007	14
06-977	Minnkota Electric	June 2006	Oct 2007	16
06-605	Southern Minnesota Municipal Power Agency	July 2006	Dec 2007	17
07-1357	Minnesota Power	Oct 2007	Sept 2008	11

07-1572	Xcel Energy	Dec 2007	July 2009	18
08-784	Great River Energy	June 2008	Nov 2010	29
08-846	Basin Electric	June 2008	Dec 2009	18
09-1088	Minnesota Power	Oct 2009	April 2011	18
10-623	Otter Tail Power	June 2010	Dec 2011	18
10-782	Minnkota Electric	June 2010	May 2011	9
10-735	Minnesota Renewable Energy Society	July 2010	Jan 2012	17
10-825	Xcel Energy	Aug 2010	Feb 2013	30
08-673	Interstate Power	Nov 2010	Jan 2012	14
11-918	Dairyland Cooperative	Sept 2011	Sept 2012	12
12-1114	Great River Energy	Nov 2012	July 2013	8
13-53	Minnesota Power	March 2013	Sept 2013	6
13-1104	Southern Minnesota Municipal Power Agency	Nov 2013	Jan 2015	14
13-961	Otter Tail Power	Dec 2013	Oct 2014	10
13-1165	Minnesota Municipal Power Agency	Dec 2013	Jan 2015	13
14-77	Interstate Power	March 2014	July 2015	16
14-526	Minnkota Electric	June 2014	May 2015	10
14-813	Great River Energy	Nov 2014	Sept 2015	10
			Average	16

Still, reducing the length of time needed for processing a resource plan would seem to be a useful goal if this could be done while building on the strengths of the current planning process described above. Additionally, easing the administrative burden of processing a resource plan will be especially important as the complexities of resource planning evolve to become a more integrated system evaluation that includes more technologies and more information about demand-side, customer-driven opportunities. In addition, from the perspective of intervenors in PUC proceedings, some additional streamlining is seen as necessary, as resource plans, rate cases, and other utility dockets become increasingly more complex and strain available regulatory, utility, and intervenor resources.

Given that the current resource plan provides a platform for identifying resources and/or capabilities that will be needed to serve customer needs over the planning period, the integrated systems plan should build on that to provide—and receive—input and information to and from other important utility proceedings such as transmission plans, distribution system plans, and rate cases. The current planning process does include this kind of information to some extent, and this interactivity between proceedings is not new, but a future planning process may require regulatory processes to be more dynamic and interactive.

e21 participants identified the resource planning process as often too adversarial and believed that the quasi-judicial nature of the process can be cumbersome, adding to the length of time needed to process the plan. Generally speaking, participants shared a view that the process should be more of a conversation than a battle of competing philosophies, to the extent possible and productive. In this way, regulators, utilities, and intervenors can explore alternatives and sensitivities together, clarifying and isolating the important options or decisions that must be decided by the PUC, informed by the technical work by the utility and regulatory staff.

Some e21 participants suggest that one contributing factor to this adversarial dynamic is that well-intentioned parties sometimes try too hard to perfect the utility's resource plan, particularly in the later years of the plan, which gives rise to battles over modeling assumptions, long-term scenarios, and sensitivities. Forecasts and data later in the planning period (beyond the initial five- to seven-year period that constitutes the action plan) are difficult to validate. Reaching for precision with regard to the planning data in these later years can increase tension between and among the utility and intervenors and add to the length and difficulty of a planning proceeding.¹⁶ Moreover, technology is evolving and opening new options so quickly that perfecting the utility's resource plan is even more challenging, particularly for its later years.

Another contributing factor to this sometimes adversarial dynamic is that the resource planning process seems to have competing goals—is it intended to be a high-level overall snapshot, or should we be making detailed analyses on issues such as generation retirements? e21 participants were not able to resolve this question, most likely because too much depends on the context for each particular resource plan—there are plans without significant controversies and these can often be processed more quickly.

Finally, e21 participants discussed the general lack of consistency from plan to plan and from utility to utility. We discussed issues such as a lack of a common vocabulary or standard naming conventions across plans—what's a base case, what's a reference case, what's a preferred plan—as well as changing assumptions and methodologies.

Potential Modifications. The e21 participants discussed a number of potential modifications to the processing of utilities' resource plans. Many of these possible modifications did not receive broad support among the group, such as establishing statutory timelines for resource plan approval, imposing a higher regulatory standard for utility requests for plan extensions, and statutorily restricting intervenor discovery beyond the five-year action plans. However, a number of other potential modifications seemed worthy of further discussions.

One set of concepts that e21 participants thought might be fruitful to explore involves increased collaboration between the utility, regulators, intervenors, customers, and the communities served by the utility. Most of Minnesota's utilities are working to increase stakeholder outreach as part of their resource planning, and one such collaboration seems to have contributed to the success of Minnesota Power's 2013 resource plan. Prior to filing the plan, the utility met with regulatory staff from the Minnesota Department of Commerce to validate the load forecast the utility planned to use in its resource plan, thereby taking this foundational plan input off the table to be fought over during the regulatory process.

¹⁶ However, utilities require long-term planning horizons to ensure they meet reliability requirements and to allow sufficient time to plan for major fleet transitions. Resource plans today must rely on proven technologies and their established value within the North American Electric Reliability Corporation and in the regional market in which the utility operates.

Other important inputs to a resource plan can potentially be worked out between the utility, regulatory staff, and likely intervenors prior to filing, such as key assumptions, modeling inputs and sensitivities, and planning scenarios. This could be done either sequentially with these stakeholders or in a collaborative process, much like a “pre-trial conference” where significant issues would be resolved prior to the utility writing and filing its plan. A similar concept was included in the following e21 phase I recommendation:

To ensure appropriate stakeholder and regulatory evaluation of the [utility resource plan], a utility that opts in to this framework would be required to engage a broad group of stakeholders up front, prior to filing the [plan], so that all interested parties have the opportunity to inform and shape the analysis.¹⁷

This pre-filing process involving the utility, regulatory staff, and other stakeholders could be facilitated either by a lead commissioner (see box below) if the PUC opted to designate one for that particular resource planning docket, by staff from the PUC or Department of Commerce Division of Energy Resources if workload permitted, or by a third party with regulatory expertise.

Minnesota statutes, section 216A.03, subdivision 9, authorizes the Minnesota PUC to designate one of its five members to be the lead commissioner for “a docket, a type of docket, or for a particular subject area.” That subdivision continues:

The commission shall allow interested persons to be heard on a proposed designation prior to making the designation. The lead commissioner is authorized to exercise the commission’s authority to develop an evidentiary record for a proceeding, including holding hearings and requesting written or oral comments. At the request of the commission, the lead commissioner shall provide the commission and the service list for the proceeding with a written summary of the evidentiary record developed by the lead commissioner for the case, including any recommendations of the commissioner. Any findings of fact, conclusions of law, or recommendations of the lead commissioner are advisory only and are not binding on the commission. The commission may delegate its authority to designate lead commissioners to the chair. Nothing in this subdivision affects a person’s opportunity to request a contested case proceeding under chapter 14.

e21 participants raised concerns that the adversarial nature of the current process can sometimes seem to pit stakeholders against one another’s interests, for example, customer interests versus environmental interests versus utility shareholders. As one participant said, “customer advocates are not lobbying for increased carbon, and environmentalists are not lobbying for increased rates.” It is important to be able to find and recognize common ground when possible, ensuring that precious time before the PUC is reserved for making decisions about the most important issues raised in the planning process.

Another participant suggested that resource planning is more complicated than it needs to be. The pre-filing process could help identify and highlight the few variables and scenarios that have significant impact on planning options, then let those impacts inform the decisions the PUC makes about the utility’s resource needs. If the evaluation were to be kept at this higher level, it is possible that resource plans would not be as adversarial or contentious.

¹⁷ *e21 Initiative Phase I Report: Charting a Path to a 21st Century Energy System in Minnesota* (Minneapolis, MN: Great Plains Institute (2014), 14.

Other possible modifications to the resource planning process that might address concerns raised by e21 participants included

- a. the development of standardized naming conventions for what constitutes a “base case,” a “reference case,” or a “preferred plan,” and other terms commonly used in resource plans
- b. the identification of best practices used by utilities in Minnesota from plan to plan, to be shared on a regular basis
- c. the standardization of modeling techniques to be used by Minnesota utilities and intervenors, such as how energy efficiency and distributed generation should be modeled

These concepts could be developed and shared via an annual or biennial resource planning workshop. Minnesota PUC staff convened such a workshop early in 2015 to discuss with utility resource planners how best to address the question of which peak demand Minnesota utilities should be planning to meet for resource adequacy purposes, their own or that of MISO.

In addition to these ideas, e21 participants discussed how a more integrated, synchronized process of resource planning and rate cases would be helpful—with resource planning informing and helping set budgets for the rate case. Coordinating the two could increase efficiency by allowing for reliance on common models, data, and other information to inform both processes. This concept was embedded in e21’s phase I recommendations for a five-year comprehensive utility business plan, including the goal of reducing the frequency of resource planning from its current two-year cycle to five years, which would reduce the overall regulatory burden.

Some participants felt that perhaps an incremental step toward this business plan concept would be to allow the PUC to set the schedule for utility rate cases like it does utility resource plans, or otherwise coordinate the two filings for those utilities that opt to file multi-year rate plans. Doing so would likely require legislative action, but could allow these dockets to be synced and could potentially reduce the overall burden on regulators, staff, and intervenors. On the other hand, synchronizing two massively complex proceedings such as a rate case and a resource plan would need to be done carefully and with significant awareness of possible pitfalls so as to not overwhelm the regulatory capacity to review both cases that the public interest requires. Additionally, utilities that are not contemplating opting into a multi-year rate plan regime would oppose giving up their current ability to decide when their revenue conditions warrant the filing of a new rate case.

Another thought along these lines would be to pick a date—for example, 2020—to develop the full scope of the utility business plan concept and establish the regulatory structure for those utilities that might opt in to such a regime.¹⁸

¹⁸ e21 participants recognize that there are practical issues associated with such a proposal for both utilities and regulators that will require careful thought and planning to prevent unintended consequences.

Area 2: Expand the scope of the planning process to take more of an end-to-end systems approach (from the bulk transmission level to the distribution grid)

Discussion. As we've discussed, the resource plan is already a major proceeding, involving a great deal of time and energy for utilities, intervenors, and regulatory staff. Resource plans generally take more than a year to complete and are occasionally updated by utilities while they are still pending, which lengthens the proceedings. In addition, the resource plan does not actually select new resources for the utility; therefore, once it is approved or modified there are typically additional proceedings to fully implement the action plan. These, too, can prove to be lengthy and they sometimes revisit ground that the resource plan already has covered.

e21 participants recognize that a key consideration in expanding resource planning to become more of a systems approach is that, currently, distributed and demand-side resources (such as distributed generation, demand response, energy efficiency, and customer-driven storage) may not be adequately considered in the process. Demand response is treated in the plan modeling as a reduction to capacity needs based primarily on the number of customers enrolled in utility programs in the recent past and some assessment of the resource potential.

Similarly, energy efficiency is generally treated in the modeling as a reduction to the energy and demand forecast, based primarily on expectations of achievable potential relative to the utility's avoided costs.¹⁹ The possibility of a growth in customer-owned generation is not explicitly considered in the model; instead, it is implicitly included at the historical rate in the demand forecast. As a result, the cost of these distributed resources is generally not compared with other supply options to optimize the combination of supply- and demand-side resources in an apples-to-apples, resource-to-resource kind of way. By omitting this type of analysis, important and cost-saving opportunities to proactively develop non-traditional solutions to meeting expected demand for electricity and other grid services may be overlooked (e.g., altering rates or rate design to encourage demand management or more optimal siting of customer-owned resources).

The increasing cost-effectiveness of distributed energy resource alternatives available to the customer will likely make this evaluation important in the future. Resource planning currently does not incorporate the elasticity of customer demand and will need to. This evaluation should be qualitative to start with, until Minnesota has more experience with distributed energy resources, but the analysis will need to become more quantitative as the magnitude of distributed energy resource adoption increases. The e21 participants note that this is not an evaluation of choices the utility might make in a resource-acquisition proceeding; rather, it is an assessment of choices that customers may make on their own to serve their own electricity needs, which could impact the size, type, and timing of resources evaluated in a utility's planning process.

Strategist, the capacity expansion model used by most utilities in Minnesota and the Minnesota Department of Commerce, has the capability of allowing a demand response resource to be an option in addition to generation options. As a general rule, though, demand-side resources such as energy efficiency and demand response are currently reflected in utility demand forecasts as reductions in demand (measured in megawatts) and electricity (measured in megawatt hours) which are used to define the needs utilities must meet. There are limited modeling runs allowing the model to select demand-side resources along with supply-side resources.

¹⁹ The calculation for utility avoided cost is based primarily on avoidance of the need to add the next generating unit on the utility's system, usually a combustion turbine.

With regard to energy storage, the method or methods for modeling and evaluating these opportunities in a resource plan have not yet been developed in Minnesota, given the state's limited adoption of storage technologies to date. However, utilities, regulators and others in the state have long been evaluating various storage technologies and their potential to address utility system and customer needs. Activity on energy storage in Minnesota has increased significantly in recent years, evidenced by the recent formation of the Minnesota Energy Storage Alliance, deployment of Great River Energy's community energy storage program, and other utility, regulator, and stakeholder efforts.

e21 participants also discussed concerns that extending the resource planning process to include more information about transmission- and distribution-level planning could bog down the planning process, exacerbating concerns about the length and complexity of resource planning dockets. As a general rule, e21 participants agreed that while distribution planning is essential, expanding the resource plan to become a system plan is not the same as incorporating a detailed distribution plan in with the resource plan, and they do not recommend incorporating detailed distribution planning into resource planning.

The system plan could be envisioned more as a look at all of the electricity needs in the utility service area and how those needs will be addressed—whether through utility-owned and contracted supply, demand-side management, or customer-managed generation. Just as the current resource planning process informs a subsequent detailed resource-acquisition process, a system-planning process would be a platform from which information is developed to advise other, more detailed distribution and transmission planning processes. Incorporating consideration of *all* load and *all* forms of serving it would bring a system focus to the plan.

To a large extent, this is consistent with how Minnesota utilities approach resource planning currently. For example, Xcel Energy reports that it does address all known load and power supply options, either by reflecting these in its demand/energy forecast or as a resource option (generation options, demand response, incremental demand-side management, small solar installations, and potential storage technologies). However, it may be useful, as Minnesota's experience with customer adoption of distributed resources grows, for utilities to consider developing comprehensive long-range forecasts of customer adoption of distributed energy resources. A forecast of this type could help identify the net load the utility will need to serve, as well as provide potentially useful information about its customers and how the distribution system could evolve to meet customer needs. The Sacramento Municipal Utilities District is reported to have recently completed such a forecast.²⁰

Potential modifications. In the same way that the resource plan becomes a template for eventual resource acquisition, the integrated systems plan could inform more detailed distribution planning and grid improvement processes (and vice versa), and consideration of a wider range of options (including non-traditional solutions) for meeting any particular system need.

²⁰ See Erika Myers and Obadiah Bartholomy, "Leveraging Customer-side DERs to Benefit All Utility Customers," *Smart Electric Power Alliance* (blog), June 2, 2016, <https://www.solarelectricpower.org/utility-solar-blog/2016/june/leveraging-customer-side-ders-to-benefit-all-utility-customers.aspx>.

Among other things, an integrated systems plan should cover

- a. the utility's demand forecast with and without adjustments for additional load-reducing opportunities
- b. an inventory and forecast of aggregated customer-owned generation and other customer-controlled resources
- c. an inventory and forecast of distributed energy resources, including both utility- and customer-controlled resources. Customer-driven resources are not yet sufficient in scale and magnitude to be of significance in the big picture of utility resource planning
- d. an inventory of utility-owned generation and forecasted retirements
- e. an inventory of contracted supply
- f. a general description of known/planned transmission and distribution-system upgrades and how these are considered within the development of the proposed resource plan
- g. an assessment of potential energy storage applications and the technology performance and economics benchmarks used for this assessment

To accomplish the above, e21 sees value in exploring the use of other models to supplement the existing Strategist model since Strategist may not be well suited for the detailed evaluation of distributed resource options, or of the interactivity of load and supply at a more granular timescale (although it is very useful in other aspects of the planning process). This could be done by an independent third party with experience and expertise in resource modeling, like the Electric Power Research Institute or the Regulatory Assistance Project, which could be asked to provide an evaluation of potential modeling platforms that could be used to supplement Strategist.

The pre-filing process described in the previous section, where the utility, regulators, and stakeholders convene to discuss assumptions prior to filing a resource plan, could be an opportunity to find consensus assumptions for a wide variety of aspects of system planning including the family of assumptions that will be used in the modeling.²¹ The pre-filing process allows parties to focus their comments on the outcomes of the planning work, avoiding discovery of and fights over the assumptions and other inputs that went into the modeling. Explicit responsibilities added to this pre-filing process could include determining how to forecast the potential for customer-driven supply- and demand-side resources in a planning period, and how to evaluate these resources against traditional supply resources available to the utility.

The idea of getting the utility, its regulators, and likely intervenors together to discuss and agree to assumptions, scenarios, and sensitivities that will be used in the utility's resource plan is similar to the process used by the Northwest Power and Conservation Council, as described to the e21 participants by Jim Lazar of the Regulatory Assistance Project. Lazar described how the council forms a number of advisory, collaborative task forces of experts to develop and make recommendations to be used by the council in its resource planning process for the Pacific

²¹ This list of assumptions could include load forecast, resource option costs/performance, natural gas forecast, market capacity and energy price forecast, coal price forecast, wind and solar forecast, sensitivities, demand-side resource cost and performance, and the number and description of scenarios that will be run.

Northwest. Stakeholders in these proceedings collaborate on assumptions, scenarios, and sensitivities regarding

- load forecast
- generating resources
- conservation resources
- demand response
- direct use of natural gas
- quantifiable environmental costs

This process is highly collaborative and successful, and leads to significant consensus on many plan components, isolating key differences that can be resolved only by the council.

e21 also discussed the possibility that certain resource planning requirements that were necessary in the past may now be redundant or unnecessary. Two, in particular, that participants discussed were:

- a. the requirement in Minnesota statute section 216B.2422, subdivision 2 that a utility include a scenario in its resource plan for meeting 50 and 75 percent of all new and refurbished capacity needs through a combination of conservation and renewable energy resources
- b. the requirement in Minnesota statute section 216B.1612 that a utility include in its resource plan a description of its efforts to purchase electricity from community-based energy development projects, including a list of the projects under contract and the amount of community-based energy purchased

Since the 50%/75% scenario requirement was enacted, the state has established many other ways to encourage or require the deployment of renewable energy and energy efficiency, which some e21 participants agreed rendered this requirement arguably unnecessary. Others disagreed, finding that the planning requirement was a useful tool for resource planning. With regard to the community-based energy development requirement, intensive efforts to establish these projects have resulted in only a modest number of operating projects, and over the past few years, efforts have shifted to other methods to promote community involvement in energy development. The Minnesota legislature repealed the requirement for community-based energy development in the 2016 legislative session, while this white paper was being prepared.

While the elimination of either or both of the above requirements will likely not shorten plan preparation or processing significantly, they are an example of possibly superfluous requirements that unnecessarily add to the scope and complexity of a resource-plan proceeding. Identifying and evaluating requirements like these could be made a part of the annual or biennial resource planning conference discussed above.

Addressing how a utility's resource decisions might affect compliance with the newly issued but recently stayed federal Clean Power Plan rule should also be incorporated into the resource planning process (or future regulation depending on what happens with the Clean Power Plan). Doing so would likely require an evaluation of numerous compliance options, including location and timing decisions to maximize the compliance value of a given action. In this period where the Clean Power Plan rule has been stayed by the U.S. Supreme Court, the focus of this evaluation could be placed on identifying "few or no regrets" strategies for sensible resource

options that could ease compliance should the Clean Power Plan or some future greenhouse gas regulation be implemented.

Area 3: Include more timely information about utility costs and customer impacts from various approaches to the resource mix, infrastructure investments, and delivery mechanisms

Discussion. e21 participants discussed the concern that there is insufficient analysis devoted to understanding the relationship between the costs of various resource plan options and their potential customer impacts. Strategist modeling may show only a small difference between the revenue requirements of different scenarios on a system-wide basis (expressed in calculations of their present value). But a heavy reliance on comparing the present value of alternatives can mask or downplay important potential rate impacts of different resource plan options on customers. It is important to e21 participants that these customer rate impacts be more clearly highlighted and evaluated.

Potential modifications. The e21 group discussed the possibility of regulators and stakeholders working with the utility, perhaps in the pre-filing process discussed above, to identify a small number of scenarios and key sensitivities for the utility to evaluate. As part of that evaluation, the utility would conduct a five-year rate impact analysis of up to five alternative plan scenarios, in addition to the overall rate impact of the preferred plan and the comparisons among revenue requirements of various sensitivities that are currently provided (again, expressed in present value terms).

Strategist can provide information that can be used to develop annual revenue requirements of these planning scenarios, such as the magnitude and timing of annual incremental costs of a given scenario over the planning period. Scenario rate impacts would be made a part of the overall evaluation of scenarios presented to the PUC and would help inform its policy decisions on the utility's resource plan. In the group's discussions, e21 participants commented that the Minnesota PUC may not be interested in picking a single plan, but rather on weighing factors among several possible plans and adopting a course of action that takes the best of what has been presented and compiles those as the approved integrated systems plan for the utility.

Further, participants believe that the Commission should consider, in addition to these scenario and plan rate analyses, an evaluation of innovative options that potentially increase system efficiencies or defer investments and therefore potentially reduce overall costs—such as value-of-solar pricing, time-of-use electricity rates, dynamic pricing, system efficiencies that could be captured by grid modernization, and improved utilization of existing generation through demand response.

Area 4: Improve the balance in the plan review process between reliance on modeling versus a discussion of policy and strategic considerations

Discussion. As can be seen from the foregoing discussion, the e21 group spent a good deal of time discussing the impact of a heavy reliance on the Strategist model on resource planning overall. Strategist has provided significant value to utilities, regulators, and intervenors, allowing parties to more easily make the economic case for their positions or decisions. However, while system modeling is highly informative and allows the comparison of alternative resource options with relative ease, over-reliance on modeling can lead to contention and add to the length of a proceeding without informative discussions by parties regarding important considerations, such as comparing potential customer impacts, utility costs, policy outcomes, and MISO market

interactions (sales and purchases) between the proposed plan and various alternative scenarios.

Because modeling can be too often seen as providing “the answer” in a resource plan, parties engaged in the planning docket can spend a lot of time and resources fighting over the proper inputs, leaving less time to focus on significant issues of policy and strategy and recognition of market and regulatory environment considerations that cannot be addressed with modeling. A sampling of comments made by e21 participants can provide a sense of their concerns:

- a. There may be too great a focus on modeling and data and insufficient consideration of judgment and experience—much of resource planning is policy-based and needs to reflect interaction with the MISO market and key aspects of the known and projected planning environment.
- b. Calculations of the present value of revenue requirements associated with different resource plans results in a number that implies precision where it does not exist.
- c. The options available to meet customer needs are increasingly complex, and the changes that are happening are ones that increase the speed of system interactions. As we get to higher penetrations of variable renewable resources, all parties will be participating in a system that changes moment to moment—it will be difficult for long-range models like Strategist to deal with this.
- d. The fact that most stakeholders lack Strategist modeling capability can be a significant disadvantage when participating in a resource-plan process.
- e. In recent years, there has been an increased emphasis on modeling over policy. System modeling is informative but doesn’t always address the broader issues in meeting state and federal policy goals or customer needs and expectations.
- f. Generic resources and options considered in modeling can be very different from the actual resources that are offered in a resource acquisition process.

Potential modifications. e21 participants discussed the potential for increased stakeholder collaboration, perhaps including the pre-filing process identified earlier, to address these concerns with Strategist. As with the discussion of customer impacts, e21 suggests identifying a small number of scenarios and key sensitivities that “matter”—those that impact the evaluation of resource plan options in significant ways—then evaluating each for their rate impacts on customers, system reliability impacts, impacts on the environment, the ability of the utility to comply with evolving state and federal goals and increasing customer expectations, and doing so in collaboration with regulators and stakeholders. This process improvement would help to maximize the benefits of modeling while minimizing the difficulties of over-reliance on modeling.

Section III: Potential Modifications to Resource Planning

While e21 did not attempt to reach consensus on recommendations, participants did agree that there were a number of potential modifications that would achieve the goals the subgroup set for this work:

- a. transitioning resource planning to a more complete end-to-end look at the utility system that can inform planning and alternatives
- b. reducing overall regulatory burden and the cost of resource planning, for utilities, regulators, and intervenors
- c. tying resource planning more directly to rates charged to customers by examining decisions establishing the costs (both direct and societal) of providing service to utility customers and achieving the agreed-upon performance outcomes and
- d. increasing awareness and consideration of the potential for distributed generation and non-traditional resource alternatives in the provision of service to utility customers.

We believe each of these potential modifications deserve further study and consideration by the Minnesota PUC and the greater resource-planning community. These potential modifications are summarized in Table 2.

Table 2: Potential Modifications to Resource Planning

Number	Potential Modification	Description	Notes	Impact	Page
1	Facilitate pre-filing collaboration	Hold a pre-filing collaboration to create understanding and potential agreement among parties around modeling assumptions, resource costs, planning scenarios, and sensitivities	Could be led by a lead commissioner, regulatory staff, or the utility preparing the plan	Reduces post-filing disputes over these issues that can increase time needed for plan evaluation, comments, reply comments, and preparation for PUC hearing on plan	55-56, 60

Number	Potential Modification	Description	Notes	Impact	Page
2	Standardize naming conventions	Develop standardized naming conventions for what constitutes a “base case,” a “reference case,” a “preferred plan,” and other terms commonly used in plans	Should be included as a topic in an annual/biennial systems planning workshop (see potential modification #5)	Is part of continuing process improvement of Minnesota resource planning and improves quality, consistency, clarity, and ease of understanding across utility resource plans	57
3	Identify best practices	Identify best practices used by utilities in Minnesota from plan to plan, to be shared on a regular basis	Should be included as a topic in an annual/biennial systems planning workshop (see potential modification #5)	Is part of continuing process improvement of Minnesota resource planning and improves quality, consistency, clarity, and ease of understanding across utility resource plans	57
4	Standardize modeling techniques	Standardize modeling techniques to be used by Minnesota utilities and intervenors, such as how variable and distributed resources, demand response, and energy efficiency resources should be modeled	Should be included as a topic in an annual/biennial systems planning workshop (see potential modification #5)	Is part of continuing process improvement of Minnesota resource planning and improves quality, consistency, clarity, and ease of understanding across utility resource plans	57

Number	Potential Modification	Description	Notes	Impact	Page
5	Hold annual or biennial systems planning workshops	Hold annual or biennial systems planning workshops to discuss planning, modeling, and forecasting issues and share best practices, as well as to consider new policies and planning requirements and MISO market impacts	Led by regulatory staff with the assistance and participation of resource planners and intervenors, or by the utility resource planners themselves	Is part of continuing process improvement of Minnesota resource planning and improves quality, consistency, clarity, and ease of understanding across utility resource plans	57
6	Minnesota PUC to coordinate rate cases and resource plans	Allow the Minnesota PUC to set the schedule for utility rate cases and resource plans, or otherwise coordinate the two, as a precursor to a utility business plan for those utilities that opt to file a multi-year rate plan	Would likely take legislative action to authorize	Allows for better alignment between multi-year rate plans and resource plans	57
7	Put utility business plans in place by 2020	Develop the full scope of the utility business plan concept and establish the regulatory structure for those utilities that might opt in to such a regime	Would likely be done by another group of e21 participants	Allows for implementation of e21 phase I recommendation	57
8	Evaluate supplemental modeling platforms	Explore alternative planning modeling platforms that could provide better near-term integration of demand-side resources and customer-owned generation with supply-side resources	Could be done by an independent third party with experience and expertise in resource modeling (Regulatory Assistance Project, the Electric Power Research Institute, etc.)	Is part of a continuing process improvement policy for Minnesota resource planning	60

Number	Potential Modification	Description	Notes	Impact	Page
9	Include more information about demand-side resources and capabilities	Include more information about the opportunities around demand-side resources and capabilities on a utility system, including better forecasting of those resources over the planning period and potential interactivity with utility resources	Additional information needed as the distributed resource becomes significant enough to affect planning Distributed energy resource forecasts, however, could provide useful information about customer preferences	Allows for better understanding of the resources customers will acquire on their own, to better understand resources the utility will need to acquire	58-60
10	Evaluate the repeal of outdated planning requirements	Evaluate, for example, the continued usefulness of the requirement for 50/75% renewable capacity scenario	Could be included as a topic in an annual/biennial systems planning workshop (see potential modification #5)	Is part of a continuing process improvement policy for Minnesota's resource planning	61
11	Ensure compliance with Clean Power Plan (or future greenhouse gas regulation)	Address how a utility's resource decisions might affect compliance with the Clean Power Plan (if it is implemented) or future greenhouse gas regulation	To be provided by the utility preparing a resource plan	Ensures that Minnesota is well prepared for any future greenhouse gas regulation	61-62
12	Do five-year rate impact of key scenarios	Include a five-year rate impact analysis of up to five key scenarios identified in pre-filing collaboration, in addition to the preferred plan overall rate impact and present value revenue requirements comparisons currently provided	To be provided by the utility preparing a resource plan	Informs resource planning choices and decisions	62

Number	Potential Modification	Description	Notes	Impact	Page
13	Evaluate innovative options to increase system efficiencies	Provide an evaluation of innovative options that increase system efficiencies, defer investments, smooth rate impacts over time, and therefore reduce overall costs, such as value-of-solar pricing, time-of-use rates, dynamic pricing, and system efficiencies that could be captured by grid modernization	To be provided by the utility preparing a resource plan	Expands the scope of options that could be deployed to serve load, potentially decreasing costs	62

Section IV: Conclusion

The resource planning process has served Minnesota very well since its implementation in 1991. For the most part, the process has ensured the availability of cost-effective, reliable, and environmentally compliant resources for customers; helped avoid the construction of unneeded and higher-cost resources; met state electricity requirements; and either met or is making good progress toward meeting Minnesota’s energy policy goals. Through the years, the process has evolved to address changes in the industry such as the introduction of wholesale competition, the use of environmental costs, the emergence of renewable energy standards, and introduction of the MISO regional electricity market. As the industry continues to evolve, additional adjustments to the process will likely be needed.

The considerations discussed in this white paper are directed toward creating additional collaboration around utility resource plans that could help streamline Minnesota’s resource planning process, while at the same time incorporating emerging resource options and new issues facing utilities as they plan for the future. Recognizing these new trends and transitioning to Integrated Systems Planning will help improve utility plans and continue the tradition of open and forward-thinking planning in Minnesota driven by continuing efforts to ensure a safe, reliable, affordable, and environmentally sound electricity supply to meet all utility customers’ needs.