July 11, 2005
Discussion Draft

A White Paper
Demand Side Measures And Their Potential Within Grid West[1]

Tom Foley[2]
Preston Michie[3]

Introduction

Grid West is currently refining its preliminary market design. This work will, in part, enable a decision to be made later this year about whether to seat a Grid West Developmental Board. A number of features in the preliminary design create the potential for demand-side resources to provide significant benefits to Grid West participants.

The purpose of this paper is to raise awareness of the potential benefits to the efficient operation of the grid that can be supplied by demand-side resources, including near-term and long-term load management, behind-the-meter-distributed generation, and energy efficiency measures (such as insulation).

We argue that it is important to build on the strong commitment to employing demand-side resources in the current Grid West design during the next stage of development to assure that demand-side resources fulfill their potential to provide benefits to Grid West

---

[1]This White Paper was sponsored by the Bonneville Power Administration (BPA). The views expressed in this White Paper are solely those of the authors and do not necessarily represent those of BPA, the renewable resources community, the Pacific Northwest National Labs, the US Department of Energy, or any other entity. The authors wish to thank BPA for supporting the preparation of this White Paper.

[2] Tom Foley is a member of the Grid West Regional Representatives Group (RRG) representing the interests of renewable resources. Tom has been involved in Grid West development since the RRG was formed in 1999. He is President of the Board of Directors of the Energy Trust of Oregon and is active in promoting renewable resources and demand management. He is a member of BPA's Round Table, an advisory group supporting BPA's efforts to use non-wires strategies, such as demand response and distributed generation, to complement transmission planning and expansion.

[3] Preston Michie is a consultant to BPA who has worked on Grid West issues since 1999. He also consults to BPA on energy efficiency issues and issues relating to using hydrogen in the Northwest economy for power generation, such as fuel cells. He also provides consulting services to the Pacific Northwest National Labs for their "grid friendly appliances" project as an aspect of the U.S. Department of Energy's Grid Wise program. He is a member of the Board of Directors of the Energy Trust of Oregon.

participants. This will require a focus on issues unique to demand response during the next stage of development to allow demand-side resources to compete on a level playing field with generation as the current design anticipates.

This paper could serve as a stand-alone thought piece to guide Grid West's thinking about demand-side resources when and if a Developmental Board is seated. It could serve as an important placeholder from which to begin more detailed discussion on issues related to demand-side resources during the next stage of Grid West development.

While a number of the White Papers being prepared by the Structure Group on demand response make clear the intent is to allow demand-side resources to supply various services, there is no single, comprehensive paper describing the potential role demand-side resources may play in the Grid West design. This paper serves as a high level discussion draft describing the role demand response resources could play to guide the next stage of Grid West development.

We note the benefit of developing Grid West design principles based on fairly detailed examples involving generation that are discussed at length in meetings and often incorporated into discussion papers. We encourage Grid West to develop similar examples involving demand-side resources to address issues uniquely relating to demand-side resources during the next stage of Grid West development.

The potential for demand side resources to provide transmission-related services is growing as technology advances occur. Demand-side resources have not been widely used in the ways we suggest in this paper. During the 2001 California energy crisis, *ad hoc* demand response was put into place to the benefit of many utilities. Effective participation of demand response resources within the Grid West markets would help demand-side resources become a normal part of regional energy and transmission and distribution planning and operations, instead of waiting until emergencies push us in that direction.[4]

To its credit, the TSLG has recognized the benefits of demand-side resources by making clear that demand response can participate in the various components of the Grid West market design—if it can deliver the promised service. We need to follow up on that work during the next stage of design by focusing on issues unique to demand response to assure that demand-side resources become full participants in the Grid West design where

[4] An unpublished, rough assessment conducted by the Northwest Power and Conservation Council (NWPCC) shows that the region spent about $2.3 billion dollars on energy efficiency between 1991 and 2002. During the two years of the energy crisis (2000 and 2001), that energy efficiency measures saved energy worth over $4 billion. (Personnel communication by one of the authors with Mr. Charlie Grist of the NWPCC). Demand exchange conducted by utilities during that period added greatly to these savings.

they can provide cost-effective service, from transmission planning to ancillary services. As we move forward on the work to establish an operational Grid West, we need to keep reminding ourselves of the potential benefits of these resources.

We note in passing that the Transmission Improvement Group (TIG) has not yet addressed demand-side resources. We suggest to TIG that addressing demand-side resources would strengthen their proposal.

Background

The transmission grid, together with connected generators and loads make up one giant synchronized machine. To get optimum performance from this machine, thought must be given in advance to opportunities to create benefits from strategic actions using all parts of the machine, including loads.

Historically, the innovative benefit that can be supplied by controllable loads and dispersed generators has not been a major part of transmission thinking, although interruptible industrial loads have been an important source of operating reserves for many years.[5] Linc Wolvertonhas noted the "transmission centric" ideology that has plagued planning. Wolverton is concerned that "the transmission-centric nature of Grid West will lead to over building of transmission or gold plating."[6]

This is not an idle concern. The Industrial Customer Coalition (PJMICC) taking service from PJM has written a white paper[7] in which it states:

> "One of the major flaws of the current capacity markets are the structural barriers that prevent demand from acting as a check to market power exercise."

PJMICC gives an example in support of its statement. For most of June 2004, daily capacity markets cleared at about $110/MW-day. In spite of the fact that many of its customers would have been happy to shed a considerable amount of load at or below that price, these customers (loads) were told they have no capacity to sell without being "short" in the market on its load service entity's capacity obligation.

---

[5] For many years the region relied on BPA's large, interruptible direct service industrial loads to provide operating and planning reserves through the ability to interrupt these loads in "quartiles" for various purposes if needed to keep the lights on. To help manage an energy shortage over the past several years, these loads have been bought down to relatively low levels.

[6] Linc Wolverton, Speech to NWPPA RTO Conference, February 2005. In addition, a recent draft white paper produced by the Western Assessment Group (WAG) fails to even mention the demand-side even though it recognizes that the system is one big synchronized machine.

[7] PJM Industrial Customer Coalition ("PJMICC") Whitepaper: What Large Commercial & Industrial Customers Need from the PJM Market Place", September 14, 2004

The Bonneville Power Administration (BPA) has established a Round Table[8] to examine how non-wires measures can assist it in its transmission planning. BPA, in its wisdom, recognized that most expansions are driven by load growth that can be anticipated far ahead, making fixed energy efficiency and demand response resources (including small scale distributed generation) perfect candidates for delaying large expenditures on transmission until truly needed.

The Round Table identified demand-side resources that would be able to defer an expansion of a major transmission line on the Olympic Peninsula under current system security criteria being used by BPA for that line. More importantly, since there are large loads on the Olympic Peninsula that may not exist in five years, the value of deferring an investment decision may be much greater than a simple measure of the time value of deferred capital. That is, the line may never be needed, if those loads go away.

In addition to the value of deferring capital, this strategy creates a call option for BPA. The call option is the ability to relieve transmission congestion into the Olympic Peninsula should that prove necessary. The cost of creating the call option is the cost of paying for demand response resources. The value of the call option is the ability to defer the transmission investment decision until needed. This reduces the risk of a stranded investment. The option is also an environmental call option on the same logic—the environment benefits from deferring transmission construction that may never be needed. A call option, whose value can be estimated using the Black Scholes Option Pricing Model,[9] has value in addition to the value of deferring capital.

Thus, a non-wires project that includes an embedded call option produces two benefits. It defers capital, and preserves flexibility. Both values should be considered in determining whether to invest in the non-wires alternative rather than upgrading transmission capacity.

The Grid West design includes demand response in Grid West's planning functions, but more emphasis is needed. For example, in Grid West's Draft White Paper on Planning and Capacity Expansion, FERC, States and Tribes, and transmission owners are described as active participants in the planning process. [10]

In contrast, owners of non-transmission resources will have "an opportunity to participate" and may "provide detailed project proposals to Grid West." All important stakeholders (Grid West, FERC, tribes and states, transmission owners, non-transmission

[8] Round Table members are shown as an attachment.

[9]The Black Scholes Option Pricing Model is a model developed many years ago to value options. The value of an option is a function of five factors: the strike price at which the option can be called, the current price of the underlying subject of the option, the time to expiration, current risk-free interest rates, and the price volatility of the underlying subject of the option.

[10] TSLG Draft 16Feb2005 Planning and capacity Expansion, Section 3.2, 3.3, and 3.4

owners, and proponents of demand response solution) should be actively working towards the best system solution, not just the best transmission construction solution. [11]

Non-transmission owners should not be the only entities that bring non-wires solutions to the table. The entire planning function should be required to look for the best combination of wires and non-wires alternatives that meet identified need. Proponents of transmission solutions should be required to consider non-wires alternatives and include an assessment of non-wires alternatives in their proposals. It would behoove us if all transmission planners were required to work with loads to identify, recruit, and deploy cost-effective demand-side resources.

Finally, the costs of implementing any demand-side transmission measure to defer or avoid a transmission investment should be allocated in the same way that costs of transmission upgrades are allocated. Transmission owners should be allowed, or perhaps required, to treat these costs as transmission costs and allocate them accordingly.

Several important policy issues relating to demand response need to be discussed fully. For instance, there is a perception by some that proponents of demand response expect demand to become owners of electric power that is saved and resell it to others. This is not necessary for demand response to succeed; we do not support this approach. Similarly, there has been little discussion of the role of the load service entity where the demand response is located. Our view is that it is not feasible to allow demand response to bid directly into Grid West markets without working through the local load service entity.
Little discussion has occurred about whether a transmission owner or load service entity that participates in Grid West has an obligation to assist demand in participating in Grid West markets. Further, there has been little discussion over who gets paid when demand offers services to Grid West—demand, the local utility, or transmission rights holders. Finally, once the demand-related responsibilities and obligations of transmission owners and load serving entities that participate in Grid West are defined, they should be included in Transmission Agreements. These are important policy issues unique to demand response that merit further discussion—early in the next stage of Grid West development.

It may be beneficial for investor-owned utilities to work with their state regulatory commissions on these issues to gain a clear understanding of how the commissions will allow the utilities to recover the costs of demand response resources that provide transmission benefits. Everyone will benefit if the commissions' treatment is clear in advance and consistent over time.

---

[11]For example, a recent White Paper drafted by the Western Assessment Group (WAG), an ad hoc group to address a recent transmission resolution by the Western Governors fails to mention demand-side resources as part of a transmission solution. This omission only points out that demand-side measures are not a part of the collective consciousness of some transmission planners.

Similarly, an important question is whether FERC will allow the costs of non-wires options to be classified as transmission costs. A favorable answer to this question would help provide certainty to demand response, particularly if FERC will grant utilities a higher return on investment if they join regional transmission entities.

The next section of this paper, Part I, will discuss the appropriate use of demand-side resources to provide ancillary services to Grid West.
Part II will discuss the appropriateness of incorporating demand-side resources in the planning and expansion of the grid and as a way to relieve significant chronic congestion. Because effective congestion management may alleviate the need to invest in additional transmission, demand's role in congestion management is discussed in Part II.

Part I: Ancillary Services (Reserves, Regulation, and Imbalance Energy)

Managing Price Excursions

Historically, regional loads have not been responsive in the short term to the price of power and ancillary services in part because of a lack of adequate price signs. Some circumstances, such as unusually high demand, generation shortages, severe transmission constraints, or poorly functioning markets, have driven the price of power, including ancillary services and imbalance energy, to very high levels for prolonged periods. If demand-side resources had been major players in these markets, loads and behind-the-meter generators undoubtedly would have been more responsive to price, with the net result of lower prices for all.

Inelastic demand arguably contributed to the California energy crisis in 2000 and 2001. With limited supply and relatively inelastic demand, generators were able to charge very high prices for their resources. Demand response might have mitigated the market power exercised by generators, but loads did not face the right price signals until late in the process.

Instead, load shedding in the form of rotating black outs became the norm when a properly structured voluntarily demand response program would have found those willing to reduce consumption for a fee. These programs came too late to avoid serious problems in California, but they helped resolve the California energy crisis once they were developed.

Richard Cowart[12] has a written that

> "Cost-effective efficiency and load management investments could significantly improve the reliability of the nation's electric system, and make electricity markets more competitive and more efficient, while lowering the economic and environmental costs of electric service"

Cowart suggests that we should ask for each function and rule adopted in the formulation of a grid operator:

> "Could the function of this market or the purpose of this rule be served at lower cost and/or lower risk through demand-side resources? And if so, how can we organize this market or structure this rule to ensure that high-reliability, low-cost solutions are in fact developed"?

---

[12] EFFICIENT RELIABILITY: THE CRITICAL ROLE OF DEMAND-SIDE RESOURCES
IN POWER SYSTEMS AND MARKETS, Prepared for The National Association of Regulatory Utility Commissioners, Richard Cowart, Regulatory Assistance Project, June, 2001

In *Avista Corporation*, the FERC stated:

> "In the situation where the transmission provider is obligated under Order No. 888 to meet all demand for ancillary services in the market at a cost-based rate, a third-party supplier will have an incentive to compete business away from the transmission provider if discounting from the transmission provider's cost-based rate is profitable. With enough entry, stimulated by the ability of third-party suppliers to charge flexible rates, prices would eventually be bid down to competitive levels."

Based on statements such as these, it appears that FERC would look kindly on demand-side resources playing a price mitigation role.

As we design Grid West, we have to make sure excessive price excursions don't happen in the Northwest. Among other benefits, demand-side resources can help mitigate price excursions for, say, ancillary services or imbalance energy, by reducing the ability of generators to exert market power.

Demand-Side Ancillary Services

FERC has defined ancillary services to be: "Those services that are necessary to support the transmission of energy from resources to loads while maintaining reliable operation of the Transmission System, in accordance with Good Utility Practice."[13] Several of these services can be supplied by controllable loads and distributed generation strategically placed within the grid.

Because the region does not have a long history of demand-side resources offering ancillary services, we need to carefully examine how best to do that. Further, the fundamental value proposition for ancillary services, imbalance energy, and related services is not well understood by demand response proponents. It would be difficult for loads to become effective participants in supplying these services without significant education as to their value to the system and an understanding of the mechanics for making these services available to Grid West.

Similarly, it takes time for demand programs to bear fruit. While they have the advantage of being small and diversified throughout the system, they have the disadvantage of a long ramp up period needed to develop programs to install demand resources. Indeed, one of the biggest challenges facing demand response is uncertain funding as utilities gear up demand programs when a crisis develops, then gear down when the crisis passes. This "boom or bust" cycle may not be the best strategy for long-term success of effective demand response.

[13] [Cite]

A strategy of promoting more or less constant investment in demand response might be an insurance premium worth paying to reduce the risk of California-type problems. This might be considered in the context of establishing a regional adequacy standard for transmission and resources, as well as a strategy to manage risk. Managing demand boom or bust cycles also seems like an appropriate topic for the next stage of Grid West development.

Among the ancillary services that FERC Order No. 888 requires every transmission customer to obtain are the following:

1. Regulation and Frequency Response Service--regulating margin needed to follow the moment-to-moment variations in the load located in a control area in order to maintain scheduled interconnection frequency at sixty cycles per second (60 Hz).

2. Energy Imbalance Service--energy required to compensate for the net mismatch during any hour between the scheduled deliveries of energy and the actual load that the energy serves in a control area.

3. Operating Reserve-Spinning Reserve Service--generating units that are on line but not fully loaded, and are available to serve load immediately in the event of an unexpected contingency such as an unplanned outage of a generating unit.

4. Operating Reserve-Supplemental Reserve Service--generating units that can be made available within a short period of time in the event of an unexpected contingency.

New technology could play an increasingly important role in the provision of ancillary services from the demand side. As an example, the Department of Energy, through Pacific Northwest National Laboratories (PNL), is working with appliance manufacturers to install a chip in appliances that will automatically respond to frequency changes on the grid. The chip could also be easily designed to detect and respond to a drop in voltage locally as well as a change in grid frequency. These are referred to as "Grid Friendly Appliances" (GFAs).

The chip can be used to automatically shut off or turn on appliances with less than a one-second lag.[14] The ability of millions of appliances to automatically respond to system frequencies has substantial value, including potentially providing ancillary services to grid operators. This business model could be commercialized quickly, if appliance manufacturers can capture the extra costs of installing these devices into the appliances they produce.

[14] They are designed not to turn on at the same time. Rather, once conditions return to normal, a timer is triggered. After a lag of, say, 16 seconds, the devices turn on randomly over the next 14 seconds. The devices can be designed to manage cold starts. After a line goes out, GFAs could be programmed to trigger the timer to introduces a lag and random operation. This provides more "give" to the system allowing the grid operator more flexibility in restoring service after an outage.

Similarly, adding two-way communication through low-cost wireless technology to control such devices would add value by allowing demand to be controlled from a central location or by allowing load to bid a price at which it would temporarily drop off. PNL, working with BPA, PacifiCorp, Portland General Electric, and Whirlpool, is conducting a study this winter of the efficacy of using these control devices in appliances to manage load, including active response through two-way communication.

If we can solve the problem of measuring the value of these new technologies and deciding who should pay for them, GFAs could be with us in the near future. If demand-side response resources can establish themselves as effective participants in the ancillary services markets, more innovations like GFAs would likely be developed.

How Would Demand-Side Resources Fit into the Market for Ancillary Services?

The following discussion explains how demand response resources can provide various ancillary services. The examples cited are based on proven technology, although in some instances we assume demand response can reach a certain scale, an assumption some may challenge. Despite the authors' confidence that demand response resources can perform as promised below, proponents of particular demand response resources must make their case that they can indeed meet the criteria required for a particular ancillary service.

1. Energy Imbalance Service

   Controllable demand-side measures, such as GFAs and centrally controlled distributed generation, are quite suitable for supplying this service. They can be turned on or off quickly with a remote control device. Because they are part of load; they may be a better choice for deployment than a generating resource that may be far removed from loads.

   Loads that have been called to decrement can be used as an incremental load by turning them back on. Many loads, particularly loads involving thermal mass such as a hot water heater, can be decremented for up to an hour or more and thus may be a ready source of balancing energy over the delivery hour. Similarly, they can be turned on to increase load for short periods within the recovery cycle of, say, a hot water heater. One of the purposes of the PNL study this fall referred to above is to test the efficacy of GFAs to perform these services.

   We note that the Grid West proposal includes consolidating control areas. This may provide a wide diversity of loads to contribute to imbalance energy, given the broad geographic and weather diversity inherent in a large control area. This may become more important when congestion develops within the control area because controllable loads may be a good way to obtain imbalance energy where it is needed when the system is congested.

2. Operating Reserve-Spinning Reserve Service

The ability to reduce load quickly can provide much the same reserve service as the capacity to generate. The price at which the customer is willing to reduce load, and other conditions of participation that affect whether the resource may qualify as a spinning reserve (e.g. how much notice the customer requires, maximum and/or minimum periods of reduction) will vary from customer to customer. In some circumstances, customer loads can be aggregated to supply as large a resource as a generating plant. A recent demonstration by PacifiCorp showed a rapid 42 MW demand response that was sustainable over several hours on a hot day in July at the push of a button to manage air conditioning load.

The metering and communication equipment requirements, and the need for an agreed-upon base level of use, are essentially the same for demand side reserve participants as for participants in short-term regional buyback programs. Compared to stand-alone buyback programs, demand side reserve programs may have an advantage to the extent that they can be added to an existing ancillary services market.

3. Operating Reserve-Supplemental Reserve Service.

Some demand-side resources can be controlled quickly, say, within ten minutes, to respond to unexpected contingencies and qualify as Supplemental Reserves. In Grid West demand-side resources will be able to bid into the day-ahead reserves market after the day-ahead transmission scheduling process.

4. Regulation and Frequency Response Service.

Some loads, e.g., GFAs, can be shut off or turned on within one second automatically in response to system conditions, such as over-or under-frequency, or with the push of a button. The parameters can be set tightly to cause the GFAs to respond to small fluctuations in frequency. As such, they may an effective, cost-effective source of regulation and frequency response. The PNL study described above will test the efficacy of GFAs to perform this service.

Part II: Demand-Side Resources (Non-Wires Solutions) to Increase Available Flow Capacity (ATC) and To Lower Congestion Costs

Non-wires alternatives have been included in FERC rulings and in the plans of other independent system operators, but the implementation of non-wires alternatives has lagged. Most Independent System Operators (ISOs) continue to treat them differently from the way they treat transmission construction.

Demand-side resources may help to delay (or obviate the need for) investments in transmission and distribution systems. Demand-side resources should be able to provide non-wires solutions to transmission investment to the benefit of Grid West and its participants.

The current design of Grid West allows demand-side resources to be considered as an alternative or complement to wires. At this early stage in the development of Grid West it may be wise to give non-wires solutions a high profile and stress the importance of demand response in planning because too often transmission planners do not seriously consider non-wires opportunities. [15]

Capacity Expansion

The final form of Grid West's expansion authorities will not be determined until later, after Transmission Agreements (TAs) have been negotiated and signed with Grid West. The planning function is expected to be an open process, and is expected to "provide a single-system view for analysis of transmission needs, system reliability and proposed transmission expansion projects." Because the system is currently nearing capacity in many parts of the grid, there will probably be transmission capacity needed soon after Grid West begins operations, or sooner.

Grid-West-Initiated Capacity Expansion—Backstop Authority.

When transmission adequacy and reliability standards are not being met, Grid West has the responsibility and the authority to "cause" system expansion through its backstop authority. Grid West is required to consider non-wires options in developing its regional transmission plan, but it is limited in what it can cause to happen because the backstop authority does not expressly allow Grid West to implement non-wires solutions, should they be the best solution to a transmission problem.

[15]For example, a recent White Paper drafted by the Western Assessment Group (WAG), an ad hoc group to address a recent transmission resolution by the Western Governors fails to mention demand-side resources as part of a transmission solution. This omission suggests that demand-side measures are not yet a part of the collective consciousness of some transmission planners.

This issue has been debated at length several times within the Regional Representatives Group (RRG), a stakeholder advisory group to Grid West. To date the RRG has not seen fit to include demand response within Grid West's planning backstop authority. A change in the scope of the backstop authority to include demand would require a supermajority vote of the members of Grid West.

We encourage the members of Grid West to once again consider the merits of strengthening the backstop to allow Grid West to implement non-wires solutions should they prove to be the most cost-effective solution. A good time to consider doing so would be during the next stage of development.

Similarly, if demand were to enter into long-term agreements, such as a call option to reduce demand on short notice, that have the effect of allowing Grid West to market additional ATC, demand should receive compensation, just as a generator that created a similar effect (e.g., by entering into a call option agreement for the generator to operate behind a constraint if a constraint develops).

Chronic, Significant Commercial Congestion.

If markets fail to do so, Grid West may be able to alleviate chronic significant commercial congestion if the membership votes to expand the backstop authority to allow Grid West to do so. If this occurs, it is important to allow non-wires solutions, such as demand response, to participate in alleviating chronic significant commercial congestion.

A possible approach would be for Grid West to first identify a preferred solution, including non-wires, develop an implementation plan, and lay out a strategy for cost allocation for anyone who brings a solution forward. If no one voluntary does so, Grid West would arrange for the preferred solution to be implemented. We should ascertain how demand-side resources can be a part of a preferred solution, and compensated by transmission owners or others that benefit from implementing that solution.

The Reconfiguration Services Market

Grid West anticipates having a Reconfiguration Service (RCS) that "is intended to facilitate acquisition and trading of [short-term] transmission rights by Grid West participants as well as to help Grid West with the operation of the Grid West Managed Transmission System (GWT) in cooperation with the Grid West affiliated transmission owners." The goal of RCS is to encourage holders of transmission rights or scheduling flexibility to release unused rights or unneeded scheduling flexibility to allow others without transmission rights to effect transactions they would otherwise not be able to do. By releasing rights that would otherwise go unused, Grid West can make them available to others that desire them through the RCS auction.

The RCS will be an auction clearing market over various lengths of time from hourly up to one year. The auction "is designed to match bids with offers and available flow capacity in the most economically efficient manner while complying with all physical

and contractual constraints that govern the operation of Grid West managed system." In today's world, many loads do not consider the value of changing their consumption patterns or releasing generation flexibility because there is no price signal to do so. The RCS market holds the potential to change this by providing an effective price signal.

It appears as if demand response (perhaps through an agent acting for aggregated loads) may be able to play an integral part in the RCS. Most loads tend to fluctuate predictably throughout the days of the year, depending, in part on weather and day of the week. Controllable loads may be able to use this predictability to bid into the RCS on a short-term basis, or perhaps up to a year ahead, through its ability to decrease load quickly when needed to accommodate additional transactions.

This approach entails giving up load flexibility by agreeing to reduce demand when needed to accommodate additional transactions. This approach is similar to the generator flexibility that can be sold to reduce flow uncertainty on the system.

Other loads fluctuate depending on when manufacturing processes run. Some steel mills, for example, may have a low capacity factor. If the value of available transmission capacity (ATC) were great enough, a steel mill could design its process schedule around the value of ATC made available at auction in the RCS.[16] For example, it might agree to run its heavy power consuming processes when ATC is not highly valued, and not when the value of ATC is high.

Redispatch Service

Grid West anticipates creating a real-time redispatch service to manage congestion within the consolidated control area using a merit order algorithm based on "inc" and "dec" bids supplied by participants. Demand response could pay a significant role helping manage congestion through a similar mechanism to those discussed above for imbalance energy. Demand could agree to reduce consumption (an "inc" bid) when requested to manage congestion by altering flows on the system.

If a day-ahead redispatch market were to arise, demand respond may be able to provide value by agreeing to stand ready to take direction from Grid West to increase or decrease load to manage congestion in real time. Demand response could bid in appropriate inc (decrease load) or dec (increase load) bids to provide more flexibility for Grid West to manage congestion at lower cost.

[16] The value of ATC is high when load serving entities prefer to use distant, lower cost generators to serve load obligations, but cannot do so because of system constraints, aka "congestion." In this instance, they must rely on more expensive generators that do not cause system constraints. The value of relieving congestion is the difference in the cost of the two generators. If demand can profitably agree to reduce consumption "behind the constraint" at a price less than this difference, the buyer will have access to the lower cost resource to the benefit of consumers.

Conclusion

Demand response is an evolving part of the electric power industry. New technologies that employ low-cost two-way communication systems, more broadly available market information, “grid friendly appliances” that respond automatically to system conditions, and other similar devices are changing the cost paradigm for demand response. The value proposition for demand response is also changing through the implementation of new technology that will enable demand response to take advantage of new markets for ancillary services and imbalance energy, such as those being proposed for Grid West.

The Grid West proposal would benefit from a carefully focused approach to demand-response. That should occur as part of the next stage of the design effort.

Challenges and Recommendations.

During the next stage of the design development, we recommend that an RRG subgroup be set up to focus on issues unique to demand response to assure that, in the end, demand-side resources become full participants in the Grid West design, from transmission planning to ancillary services, imbalance energy, redispatch, and the Reconfiguration Services markets.

We recommend that selected RRG members be chartered to support this effort, but that attendance at this work group be by self-selection to permit all those with an interest in demand response to participate.

We recommend that the planning approach be reconsidered to require all stakeholders involved in planning and expansion (Grid West, FERC, tribes and states, transmission owners, non-transmission owners, and proponents of demand response solutions) to actively working towards the best system solution, including non-wires alternatives, not just the best transmission construction solution.

We suggest that all transmission planners be required to work with loads to identify, recruit, and deploy cost-effective demand-side resources.

We suggest the demand work group consider whether the costs of implementing any demand-side transmission measure to defer or avoid a transmission investment should be allocated in the same way that costs of transmission upgrades are allocated.

The demand work group should address several important policy issues such as clarifying that the load service entity owns power that is saved by demand response, and not demand. Thus, while demand would receive no power to resell to others, it should be compensated for reducing its take.

Similarly, Grid West's demand policy should preclude owners of demand response to bid directly into Grid West markets without working through the local load service entity. Local load service entities should be required to assist demand in providing these services.

The work group should consider how best to educate demand response proponents as to the fundamental value proposition for ancillary services, imbalance energy, and related services.

The work group should consider whether there are strategies for better managing demand boom or bust cycles.

The work group should consider the upside potential of stimulating innovation and new business models by encouraging demand participation in ancillary services, imbalance, and redispatch markets.

Finally, we encourage the members of Grid West to once again consider the merits of strengthening the backstop to allow Grid West to implement non-wires solutions should they prove to be the most cost-effective solution to a system reliability problem. If the backstop is expanded to allow Grid West to address significant, chronic commercial congestion, demand should be among the permitted solutions.

Each transmission owner, who is ideally situated to benefit from a strong demand response, should consider how it could help promote demand response to help manage transmission-related issues.

In assessing resource and transmission adequacy, transmission owners should carefully consider the potential for demand response to play an important role in meeting future needs.

Utility commissions should convene a regional forum to address regulatory demand response issues to clarify the rules. This group should address questions of cost recovery, including an appropriate a rate of return for investments in demand response resources.

Publicly- and Consumer-Owned utilities should carefully consider the potential of demand response to provide regional benefits, as well as local benefits, by deferring capital and shaving peak loads.

We suggest to TIG that addressing demand-side resources would strengthen their proposal.