**2/23/2012 PNDRP Minutes**

**Note list of attendees appended at the end of the minutes**

Presentations are linked in the meeting agenda at <http://www.nwcouncil.org/energy/dr/meetings/2012_02/Default.htm> .

The meeting began with introductions of attendees. There were 39 in the room and 24 attending by phone

These minutes do not attempt to reproduce in detail the speakers’ presentations, which can be viewed using links in the meeting agenda on the Council web site. The minutes describe in a general way the material in each presentation and focus on the discussion, questions and answers among the audience and the speakers related to the presentation.

**Ron Dizy,** ENBALA Power Networks, Inc. “Management of a Portfolio of DR Resources to Provide Regulation Service”

Ron’s company has developed a strategy to provide regulation (adjustments every 4 seconds) to a balancing authority or independent system operator, using a portfolio of loads. The portfolio is made up of disparate loads, but the loads share an ability to be somewhat flexible in the timing of their electricity use while meeting the service needs of the customer. There are many examples of such loads, such as pumping into reservoirs, aeration in waste water treatment, production of an intermediate product such as wood pulp that can be stored until they are used to produce a final product such as paper, and others. Variable speed drives are especially useful in managing a portfolio of loads form regulation. ENBALA’s approach is to take advantage of whatever flexibility the customer’s process has, while leaving the customer’s requirements for service as first priority.

Ron’s presentation illustrated the cumulative effect of adding flexible loads one at a time to the portfolio, and the ultimate accuracy of the match between the performance of a portfolio and a regulation signal from an ISO, in slides 12-28. Ron emphasized that variety of loads in a portfolio is a good thing, since most loads can’t be managed to meet a regulation signal by themselves but can contribute in combination with other loads.

Ron was asked about monitoring and verification, to assure the system operator that the portfolio is actually delivering the service called for. Ron responded that the ENBALA system is live and operating in the PJM ISO, meeting PJM’s requirements for monitoring and verification. In response to another question, Ron said that ENBALA is concentrating on the regulation market, and has no plans to use this approach to provide traditional demand response. He was asked how many customers and MW ENBALA was controlling for their PJM work, and responded that the numbers were still small but growing.

Ron expanded on that by saying that the comments from their participating customers were very good. Customers didn’t notice any effect on their businesses’ operations from ENBALA’s control, but they did notice the payments they are receiving. ENBALA’s recruitment efforts are focused on early adopters. ENBALA’s experience has been that early adopters can be recruited quite quickly, and customers who aren’t really early adopters need to observe other customers’ experience before they are ready to try this new business arrangement. ENBALA emphasizes that the customer’s requirements for operation are always met – they’re paid for letting ENBALA use their flexibility, not to accept degradation of their business operations. ENBALA’s first contact is usually the company’s energy, who is usually receptive, but when the discussion moves to include the operating manager he’s often more cautious and concerned about possible downside effects. It’s this operating manager who has to be convinced.

Ron was asked how loads get paid. In the organized markets where ENBALA has operated until now, there is a market price for regulation, and ENBALA passes 50% of that benefit to the load.

What about places where an organized market for regulation doesn’t exist, like a vertically-integrated utility that operates its own balancing authority? Ron responded that by using load for regulation, such utilities avoid costs like optimizing the operation of their generation, reducing O&M costs of those generators, and the participating customers are reducing their bills and improving their satisfaction with their utility. EnerNOC is working with vertically-integrated utilities, though it is providing conventional DR and a load-following pilot with BPA, not regulation. ENBALA is interested in finding a vertically-integrated utility to work with to demonstrate the value of this much more sophisticated, real time demand side management. There is a consortium of 3 Eastern Canadian utilities that has issued an RFP for a demand based wind-firming pilot, and there is a pilot that Honeywell is starting with Hawaiian Electric Company on Oahu to provide 10-minute balancing.

Ron made the point that regulation, like many of the more demanding ancillary services, really does require aggregation and management to capture the value from loads. .  The vast majority of loads are unable to respond to 4-second prices signals (as required for regulation), but they do have some amount of flexibility.  What is required is a system that can aggregate whatever flexibility is available and then aggregate it in a way that is reliable and robust for the system operator or utility.

Ron made a distinction that we have discussed in PNDRP a number of times in the past: One unique quality to a load that can provide regulation is that it can accept additional power when necessary, not just reduce load for the system’s needs. That additional power needs to be stored in some form for it to put to a useful purpose later. That storage can take the form of stored electricity, but can also take other forms, such as thermal storage, or oxygenated water in a waste water processing plant, or wood pulp in a paper plant, or others.

In response to another question Ron said that given the use of the hydro system for regulation in BPA’s balancing authority, BPA was probably not a hot prospect for his service currently, but over time that might change. He is working on making the case that there are real costs to using hydro facilities to provide regulation, contrary to conventional wisdom.

Ron said that developing his control approach is evolving with experience. With each customer, it is essential to understand what flexibility means and how to use that flexibility to the greatest benefit to the system.

**Eric Cutter**,Energy and Environmental Economics (E3**)** “Getting More from DR in the Northwest; Non-Wires Solutions and Other Benefits”

Eric presented a summary of E3’s experience and the development of our region’s interest in demand response.  He described the traditional definition of demand response and the limited situations where that kind of demand response was attractive to PNW utilities (e.g. reducing the summer peak loads of Idaho Power and the eastern part of PacifiCorp’s service territory).  He described policies adopted in California for the purpose of establishing appropriate incentives for DR using the CPUC adopted avoided-cost methodology.  The methodology includes six components to reflect the Total Resource Cost test (TRC) value of load reduction or distributed generation to the region (The perspective of the utility and of the customer can also be considered, but are not the primary evaluation metric).  Even in this period of excess capacity, for DR (but not for EE or DG), the CPUC elected to adopt a relatively high capacity value of ~$163/kW-Yr. based on the residual capacity value of a new combustion turbine.

He described work E3 has done evaluating the potential for DR to avoid or defer Bonneville transmission investments, the value of permanent load shifting, approaches to managing the impact of plug-in hybrid electric vehicles (PHEVs), and work E3 has done on the frequency of “overgeneration” episodes.

He also listed a number of new ways in which load could  be controlled to reduce the cost of the integration of renewable generation, targeted applications of load control that avoid or defer investments in transmission and/or distribution.

Finally, E3 suggested a list of top 5 DR topics for the purpose of focusing discussion

1.       Non-wires alternatives

2.       Use large industrial load to provide local capacity and renewable integration

3.       Controlled charging of plug-in electric vehicles

4.       Permanent load shifting for electric end-uses

5.       West-side communicating thermostat standard

**Geoff Carr**, Northwest Requirements Customers (NRU). “BPA's Tiered Rate Methodology (TRM) and Demand Price Signals

Geoff began by explaining that Northwest Requirements Customers represents about 50 “full requirements customers” who represent about 25% of Bonneville’s energy sales. He then summarized the changes in Bonneville’s wholesale rates to those customers, beginning in October, 2011. These rates represent a very significant change in BPA’s rate structure for those customers, converting much of customers’ bill to a fixed monthly charge. This leaves customers’ bills fairly stable, but the rates also raise the marginal cost of both energy and peak load significantly once the level of those services pass utility-specific thresholds. Most Bonneville customers are not exposed to Tier 2 energy rates, but they are quite aware of their exposure and many are making serious efforts to keep their loads from rising to the threshold where they will see Tier 2 rates.

With respect to peak load, Geoff explained that due to fine points of the rate determinants the impact of changes in utilities’ peak loads could have varying impacts on their total bills, but that in general the marginal impact of a change in a utility’s monthly peak load is now about 4 times what it was a year ago. Utilities in Geoff’s organization are responding to this change in varied ways, some actively exploring retail rate or DR program options that would reduce monthly peak demand, others watching what happens to those “early responders”.

The overall response to Bonneville’s new rate structure will develop over time, and is impossible to predict, but it’s clear that the full requirements customers now have a stronger incentive to manage their peak demands than they have in the past, and some level of response over the next few years seems quite likely.

**Bill Dickens**, Tacoma Power – “Peak Capacity Cost and the Implications for Demand Response: Tacoma Power's Experience”

Based on Geoff Carr’s presentation Bonneville’s full requirements customers generally see a stronger incentive to control their peak demand than in the past. In most circumstances, if a full requirements utility’s monthly peak demand increases by one kW, its bill from Bonneville increases by $7 to $11, depending on the month. In contrast, there is another significant group of Bonneville customers, the “slicers” who have signed up for a fraction of the federal power system’s output and pay a fixed monthly charge for that share. They can manage the timing of the output they take, within limits, and they accept the risk that a poor water year may mean that their share may not cover their needs. In exchange they may have power to market in good water years. Many slicers also have some generating asset of their own that they can manage in combination with their slice of the BPA system.

What does BPA’s new rate structure mean to these customers? Bill Dickens’ presentation illustrated Tacoma Power’s situation. Bill’s presentation showed that Tacoma Power’s expected peak loads are well below their peak generating capacity for 20 years, so that they don’t expect to need to find more peak generating capability to cover their loads. He also concludes that while load shifting from heavy load hours to light load hours would allow Tacoma Power to market power energy during heavy load hours at the cost of using more energy in light load hours, the benefit is limited to the market price margin between HLH and LLH market prices. He showed a projection that that margin is unlikely to cover the cost of a load-shifting program.

Bill concludes that for the present, the “stars do not align” for Tacoma Power to pursue demand response. In addition to not being capacity constrained, Tacoma has neither thermal generating assets nor a significant pricing differential between light load and heavy load hours typically needed to bring capacity value for a utility. This conclusion is in part due to the lack of a regional RTO/ISO, which could provide a straightforward means of marketing peak reductions to the RTO/ISO, whose regional perspective would include part of the region that may have inadequate generating capacity to cover their peak loads. There were some questions about the possibility of Tacoma Power, or other utilities in their position, marketing peaking capacity through bilateral arrangements in the absence of an RTO/ISO, but many utilities are reluctant to enter such a business enterprise, which is significantly different than they are accustomed to.

**Aimee McKane and Sasank Goli,** Lawrence Berkeley National Laboratory – “Realizing DR in California: Enhancing Industry’s Relationship with the Electric Grid”

Aimee and Sasank began by describing the Demand Response Research Center and some of the work the DRRC has done in smart grid technologies, including Open ADR, which was described in more detail by Sila Kiliccote of LBNL in our last PNDRP meeting in April 2011. They then went on to describe the results of case studies of refrigerated warehouses in California for their demand response performance. Their conclusion is that refrigerated warehouses have significant potential for demand response, depending on control system capabilities and other technical characteristics of each warehouse. LBNL is working on a quick assessment tool that would make it easier to evaluate individual facilities for their DR potential.

LBNL is also evaluating data centers for their DR potential. They estimate that there are about 500 MW of data center load at the time of system peak load in California. A useful categorization of energy use in data centers is to divide use into “site infrastructure,” lighting, cooling and ventilation, and “IT infrastructure,” the use by servers, storage, and network equipment. The management possibilities for site infrastructure are fairly well understood, since they involve measures similar to those available for other sectors such as office buildings. The possibilities for IT infrastructure are not so well understood, but the largest opportunity for energy efficiency and demand peak load reduction seems to be “virtualization,” a method of combining separate data processes in one server to use each server’s capabilities more fully and reduce the total number of servers operating at a particular time. Reducing energy use by the IT infrastructure also reduces heat that has to be removed from the facility by ventilation and cooling, so reduces site infrastructure use as well. Another measure is “load migration,” which is moving data processing from a center in an area whose power system needs to reduce demand to a center in another area. With the internet, the load could be moved to another time zone or another continent.

Aimee and Sasank said that “non-mission-critical” data centers, those whose response time is not of critical importance, are likely to be early providers of DR. Such facilities include research data centers, and one such center at LBNL is part of LBNL’s research.

Aimee and Sasank also described LBNL’s work modeling demand for irrigation pumping (driven by crop, weather, and irrigation technology). Idaho Power shared its experience with 230 MW deployed for DR. Aimee and Sasank also described work analyzing waste water treatment as a source of DR. They described 2 case studies of waste water treatment plants that resulted in peak reductions ranging from the mid-20s to over 30 percent.[[1]](#footnote-1)

Their presentation cites LBNL reports documenting their analysis in all these areas in detail.

The presenters were asked, if virtualization works to reduce energy use when DR is needed, why not practice virtualization all the time and reduce total energy use all the time? Their response was that data center operators are risk averse, that they’re reluctant to operate the center in a way that might compromise reliability. Virtualization, by operating servers closer to capacity, is perceived to risk shorter operating life of servers or in some other way risk the reliability of service to the data center’s clients. Aimee said the construction and operation of these centers is an “ad hoc” environment, with centers thrown up in a hurry. A comment from the audience agreed with that evaluation, saying that operators are very risk averse. Aimee added that the initial perception of risk has been an obstacle to early adoption in virtually every sector in which DR has been proposed.

The discussion took up the question of how to deal with the perception, accurate or not, that measures like virtualization, and DR in general, will degrade the service reliability of data centers. Aimee and Sasank suggested starting with easy and low-risk measures, like management of site infrastructure in research data centers, to build confidence in the general idea of DR. They also cited work at LBNL led by Bill Tschudi on the design of new data centers, and suggested that companies planning to build new centers be encouraged to consult with him.

**Phil Lusk**, City of Port Angeles – “Nippon Paper as a Source of Ancillary Service**”**

Phil described some of the history of the combined water and electricity utility of the City of Port Angeles. His utility is small (10,600 electricity meters) but has a history of more than 120 years, and it is moving aggressively to adjust to the new Bonneville rate structure and other changes in the utility environment. It expects to finish a complete changeover of its electricity and water meters to Advanced Metering Infrastructure (AMI) by the end of this year. It is planning to adopt mandatory time of use pricing for all rate classes, which will also be seasonally differentiated.

Phil’s utility is also testing the provision of demand response and ancillary services with a combination of a storage battery and several customer-side efforts including controllable water heaters, smart thermostats, and an Open ADR pilot product with commercial and industrial customers.

Finally, the utility is working with its largest customer, Nippon Paper Industries USA, Inc., to explore the use of the paper plant’s mechanical pulping equipment to provide increases and decreases on 10-minute notice to provide “load-following” service. This could provide as much as 36 MW of DEC service (increases in loads) and as much as 41 MW of INC service (decreases in loads).

Phil was asked how it is that a small utility is moving so energetically. He gave credit to BPA support, a forward-looking “visionary” utility management team and good community support. In connection with maintaining good community support, he said the utility has worked very hard to see that as much as possible, the money spent on these initiatives has stayed in the Port Angeles area by using local contractors and suppliers.

**Lee Hall**, BPA – “Smart Grid and Demand Response; Creating a Shared Resource”

Lee began by summarizing BPA’s experience with demand response, starting in 1995. He laid out BPA’s strategy for developing DR in their balancing area and with their customers, with a goal of achieving more than 250 MW in the next 4-5 years. He listed the various benefits that Bonneville could get from achieving the right kind of DR, including reduction of wind integration costs, control of peak demand, better utilization of generating resources, and possible avoidance or deferral of transmission investments. BPA has DR pilots underway in at least a dozen utilities, including an innovative energy storage pilot using loads to provide balancing reserves to BPA’s operators.

BPA is now developing a business strategy to make it jointly worthwhile for BPA and its customer utilities to develop DR resources of various types. BPA held a summit meeting with three organizations with extensive and varied DR experience (New England ISO, PJM, and TVA) to learn from their experience in the design of such an approach. BPA has developed a menu of diverse services that various loads can provide. BPA is planning to introduce its plans in several venues over the next few months, looking for comments and suggestions from all parties.

The meeting agenda has a link to a YouTube video created to describe the BPA/Port Angeles collaborative demand response pilot program, at <http://www.youtube.com/watch?v=vgyIM0_F2w4&feature=share> .

**Lisa Schwartz** (Regulatory Assistance Project) and **Ken Corum** (NW Power and Conservation Council) – “Topics of Interest for Future PNDRP Meetings”

Lisa and Ken introduced a list of potential topics for future PNDRP meetings based on conversations with state PUC staff and BPA. They did not go into the list in detail, but asked everyone to have a look at the list and communicate with them by phone or e-mail with comments or suggestions, including suggested speakers. They said they expect to schedule the next PNDRP meeting in the next 3-4 months.

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| **Attendees** |
| **First Name** | **Last Name** | **Affiliation** |
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|  **In Person:** |   |   |
| Chris | Ashley | EnerNOC |
| Tyler | Bergan |   |
| Tom | Brim | BPA |
| Diane | Broad | Ecofys |
| Geoff | Carr | Northwest Requirements Utilitiies  |
| Phil  | Carver | OPUC |
| Pete | Catching |   |
| Kurt | Christensen | Ecofys |
| George | Compton | OPUC |
| Ken | Corum | NWPCC |
| Isajah | Cox | PGE |
| Brad | Davids | EnerNOC |
| Stacey | Donohue | Idaho PUC |
| Ken | Dragoon | NWPCC |
| Gordon | Feighner |   |
| Jason | Gates | BPA |
| Lee | Hall | BPA |
| Jeff | Hammarlund | PSU |
| Dan | Harris |   |
| Jeff | Havranek | BPL Global |
| Brooke | Jockin | PGE |
| Massoud | Jourabchi | NWPCC |
| Dave | LeVee |   |
| Phil | Lusk | Port Angeles |
| Ken | Nichols |   |
| Sharon | Noell | PGE |
| Graham | Parker | PNNL |
| Pete | Pengilly | Idaho Power |
| Robert | Pratt | PNNL |
| Elaine | Prause | Energy Trust of Oregon |
| Robert | Procter |   |
| Jenny | Roehm | PECI |
| Eugene | Rosolie | Cowlitz County PUD |
| Rob  | Russell |   |
| Kim | Saganski |   |
| Andy | Satchwell | LBNL |
| Vijay | Satyal | ODOE |
| Lisa | Schwartz | RAP |
| Ken | Sieden | Navigant |
|  |  |  |
| **By Phone/GTM:** |   |
| Ben | Boyd | EnerNex LLC |
| Frank | Brown | BPA |
| Eric | Cutter | E3 |
| Ron | Dizy | ENBALA |
| Leona | Doege | Avista |
| Jennifer | Eskil | BPA |
| Syd | France | PSE |
| Sasank | Goli | LBNL |
| Lee | Hamilton | Not listed |
| Bill | Henry | Not listed |
| Mike | Hoffman | PNNL |
| Steve | Johnson | WA Utilities and Trade Commission |
| Toshifumi | Karasawa | Tokyo Electric Power Company |
| Nikki | Karpavich | Idaho PUC |
| Greg | Kelleher | EWEB |
| Jordan | Kwok | FERC |
| Alberto | Martinez | Energy Curtailment Specialists |
| Shannon | McCormick | PSE |
| Aimee | McKane | LBNL |
| Jonathan | Nelson | E Source |
| Tom | Payant | Snohomish PUD |
| Paul | Pietsch | National Action Plan Coalition |
| Snuller | Price | E3 |
| Matt | Renninger | Energy Curtailment Specialists |

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1. (Comment by Ken Corum) It’s worth remembering that Ron Dizy’s illustrative portfolio for the provision of regulation included equipment in a waste water processing plant, with variable speed drive equipment especially useful in bringing the portfolio’s performance into close agreement with the grid operator’s regulation signal. [↑](#footnote-ref-1)