Biennial Assessment of the Fifth Power Plan

Interim Report on Demand Response
November 29, 2006

The Council took up demand response for the first time in the 5th Power Plan. The plan traced the increasing importance of demand response and recommended actions "to build on the region's recent experience, to expand the region's understanding of the demand response resource, and to guide future policies affecting demand response." As part of those actions, the Plan recommended that the region acquire 500 MW of demand response by 2009.

Existing Programs

The region's progress on demand response has been uneven. Utilities have implemented some demand response programs, focusing mainly on those programs that offer close control to the utility. Examples of these programs are the irrigation scheduling programs of PacifiCorp and Idaho Power, the air conditioner cycling programs of PacifiCorp and Milton-Freewater, and the Portland General Electric program that maintains the backup generation of some customers in exchange for the right to dispatch that generation into the power system under some circumstances.

Some utilities also have "demand buy-back" programs, which notify customers of prices the utility offers for reductions in electricity use for specified periods; the customers can then reduce their use and be compensated based on the offered price and the amount of reduction. These buy-back programs have not been exercised very often since 2001, and the utilities report that there has been little customer response to offers based on relatively low spot prices for energy.

Meters

Many demand response programs require meters that can measure the customer's energy use hourly (in contrast to the monthly total measured by traditional meters), so that the customer's use (and reductions in use) at specific times can be credited. Many large industrial customers already have such meters, but except for Puget Sound Energy, most utilities' residential and smaller commercial customers do not. The cost of advanced meters continues to decline and their capabilities and usefulness to utilities continue to increase, and we expect advanced meters to be adopted more widely in the next few years. Portland General Electric has proposed to install advanced meters for all customers, and Idaho Power is monitoring the performance of advanced meters installed for about 5 per cent of their customers, in preparation for responding to the Idaho Public Utility Commission's direction to move to advanced meters for all their customers.

Progress toward 500 MW Target

Utilities have acquired demand response capability, but have had limited opportunity to test that capability. We had an unplanned test of that capability on July 24, 2006 when a combination of very hot weather both in the Pacific Northwest and in the rest of the West stressed the entire

Western interconnection, particularly the West Coast. The best evidence is that utilities in the Pacific Northwest obtained somewhere in the range of 150-250 MW of demand response on that occasion. This experience must be interpreted in light of several caveats:

1. It was a summer peak problem, while most of our concerns up to now have been for winter peaks. As a result, the experience is of limited value in helping us estimate how much demand response we can depend on for winter peak problem. However, the July 24th experience also highlights the possibility, which has been suggested by some of our power system simulations, that summer peak problems are more of a risk than we have appreciated.
2. Some of the demand response realized by Pacific Northwest utilities was actually exercised outside the region (in the Utah part of PacifiCorp's service territory). As such, it perhaps should not be counted toward our region's accomplishments, though in the absence of the Utah reductions our region's problem would have been worse.
3. Some of the particular circumstances (e.g. errors in the weather forecast over a weekend, leaving operators with little time to deal with a shortage of resources on Monday morning) were unusual, although unusual circumstances can be expected to recur, and our goal is to have a reliable power system even when they do.

In summary, it's reasonable to interpret the experience of July 24th as evidence that we can get a useful amount of demand response when we need it, but not evidence that we have 500 MW that we can count on. We still need more work and experience.

Development of a Supply Curve

Compared to energy efficiency, the analytical work on demand response is still at an early stage. One of the most important contrasts between the two resources is that we have not yet been able to construct a comprehensive "supply curve" of demand response. This is partly because it has been a relatively short time since we began examination of demand response, partly because the analysis of demand response has unique difficulties[1] and partly because the general perception is that the region is not currently short of peaking capacity. Utilities have identified demand response opportunities, but have not yet done the sort of sector-by-sector, end-use-by-end-use analysis that was necessary to develop the conservation supply curves we now rely on for planning. Puget Sound Energy is considering several pilot programs for demand response that could help fill in some of the gaps.

To an extent, demand response is caught in something like a "Catch 22" situation:

1. Demand response offers the greatest savings if it can prevent or defer investment in new generating (and in some cases transmission and/or distribution) capacity. However, much of demand response is not regarded as a "firm" resource and not regarded as a credible planning alternative to investment in new generating capacity.
2. More experience with demand response would increase confidence in the reliability or "firmness" of demand response, but that experience is difficult to get if incentives are limited to levels based on the current spot market for energy.

[1] The case can be made that while the analysis of energy efficiency is mostly straightforward engineering analysis based on well-understood principles of physics, analysis of demand response is more heavily based on consumer behavior (e.g. under what circumstances will energy users modify their use of energy), which is less well-understood.

3. If the power market were left to itself we could eventually expect enough volatility in spot prices to get more experience with demand response, but we may be embarking on policies (e.g. elevated reserve margins) that will prevent the west coast spot market from showing that kind of volatility.
4. In principle, demand response could help meet such policies' goals (e.g. elevating reserve margins) but it can only be counted toward reserve margins if it is regarded as a firm resource (return to point 1).

The problem is to gain the experience that makes demand response a credible resource, during a period when market conditions often make exercising demand response "non-cost-effective."

Better Estimation of the Value of Demand Response

Demand response is most useful as an alternative to peaking capacity. One obstacle to more rapid development of demand response is the common perception that our power system has more than adequate peaking capacity, due to the characteristics of our large hydroelectric system and recent additions of other generating capacity in our region. Historically, this was an accurate perception; our hydro system did provide plentiful peaking capacity compared to our energy requirements.

However, the situation is changing:

- In the short term, the peaking capacity available from the hydro system has declined because of operating restrictions designed to improve fish survival, and more restrictions could reduce available peaking capacity further. Increasing amounts of peaking capacity are also being used to integrate new wind generation.
- In the long term, the hydro system is now pretty much fully developed. Our options for additional generation to accommodate load growth are much the same as everywhere else in the nation. We are moving from a mostly-hydroelectric power system toward a mostly-non-hydroelectric power system -- from a system where energy capability is the primary planning concern toward a system where peaking capacity is the first concern.

In both the long and short term we are moving toward a situation where peaking capacity is scarcer and more expensive and where demand response is therefore more valuable.

The question is, where are we in that transition process and how valuable is demand response now and in the near future? To answer that question requires better modeling of the use of the hydro system to provide peaking capacity than we have been able to do in the past. Council staff is refining the Genesys model to address this question. In the first half of 2007 we should be able to make better estimates of the costs avoided by demand response (i.e. the value of demand response) during this transition period.

Regional Effort to Stimulate Demand Response

Council staff, with representatives of Bonneville, the 4 states' utility commissions, the Regulatory Assistance Project, and others has been exploring the possibility of a cooperative effort to stimulate the development of demand response in the region. The starting point for these discussions is the experience of two previous efforts in New England and the Mid-Atlantic states, the New England Demand Response Initiative (NEDRI) and Mid-Atlantic Distributed Resources Initiative (MADRI), respectively. The role of utility commissions was central to these initiatives, but the role of utility commissions in a "Pacific Northwest Demand Response

Project" and the identification of other elements of the NEDRI and MADRI processes that should be included are still under discussion.
