Non-Wires Opportunities with Grid West and RCS

By Tom Foley

The electricity system is a giant synchronized machine. To date, however, we have treated loads as a constraint to be met, rather than a robust part of the giant machine that can be used to improve efficiency and reliability of the grid. The advent of Grid West and the operation of the RCS auction will allow utilities to change the way that they interact with loads and other parts of the machine that lie near or behind the meter or that can be strategically located within the grid.

Non-wires opportunities include conservation, load management, demand exchanges, remote generation, smart grid measures, etc. Non-wires opportunities in a Grid West will be made available through the RCS for transmission relief and perhaps in ancillary services markets. If non-wires measures are allowed to offer into the RCS auction and increase AFC, they will also defer the need to serve the loads being offered into the RCS. They would also defer the need for distribution system investments at the margin.

Like other estimates being done in the Risk and Reward Group it would be extremely difficult to estimate these benefits comprehensively, because models haven't been designed to do so. But, they are real nonetheless, and in this paper, we make a rough estimate of the magnitude of part of these potential savings by using existing work done recently by the Seam Steering Group for the Western Interconnect (SSG-WI). In that work it was noted that if load growth could be reduced from 2% to 1% over the time period from 2003 to 2013, no transmission other than what would have built by 2005 would be needed. The benefits appeared large, but we did not go beyond the statement that new investments in transmission could be avoided.

Here we will use the 2003 SSG-WI report to add additional quantitative estimates of some of the benefits of non-wires by focusing only on straight energy conservation, ignoring benefits from strategically placed generation and mechanisms to control loads.

Between 2008 and 2013 total WECC load grows by 11,180 aMW in the SSG-WI analysis (See Attachment A). The SSG-WI study was a WECC-wide study of which the northwest represents approximately 28%[1] of the total WECC load, giving a load growth of 3,130 aMW. The costs of serving that load growth on an annual basis is $298,443/aMW/year, including all variable O&M and capital for transmission and generation.

Assume that we can get energy conservation at a cost of from $1.5M to $2.0M per aMW. At an 11% cost of money and assuming a 15-year life, the conservation would cost from $208,560 to $278,130 per aMW/year, or $.024-$.032 per kWh. The Northwest Power and Conservation Council's (NWPPC) plan assumes that conservation will cost $.017/kWh, thus our assumption in this case is conservative to the case being made for non-wires measures.

[1] Communication with PacifiCorp staff.

Compared to the costs incurred in the SSG-WI analysis of $298,443, the conservation in this example would save $89,845 to $20,312 per aMW per year.

If we assume conservation can serve part of the load growth, we can estimate a benefit from doing so. Table 1 displays the potential benefits from serving load growth with conservation.

Table 1. Estimates of Benefits of Conservation.

Conservation attainable as a percentage of load growth	Attainable[2] conservation (aMW)	Attainable conservation adjusted for losses at 10%	High Savings per aMW/year using SSG-WI as a basis. ($million/year)	Low Savings per aMW/year using SSG-WI as a basis. ($million/year)
50	1565	1739	$156	$35
25	782	869	$78	$17
10	313	348	$32	$7

The Grid West operational and market design, including the RCS auction, should provide impetus for some of this conservation. Markets for conservation will be the incentive needed for aggregators to offer up non-wires alternatives in the RCS, including the type of pure conservation being discussed in this paper. If we can assume that the RCS will responsible for 10-20% of this conservation, the range of benefits would be $.7 million at the low (10% of $7 million) and $31 million at the high (20% of $156 million).

In addition to the benefits estimated here, there will be reductions in distribution investments. The SSG-WI study showed about $2.6 billion of investment in main transmission grid between 2008 and 2013, or about $.5 billion per year, or at the Grid West level about $.15 billion/year. The amortized cost of main grid transmission is included in the $298,443/aMW/year number from SSG-WI shown above. But, conservatively, about another $.3 billion per year would be needed for supporting transmission and distribution. Can conservation in the sense used here get credit for saving some of that investment? We think so.

Let's assume that the conservation yields the same reduction at peak[3] as the plants in the SSG-WI gas scenario did. Using the same percentages applied in Table 1, we show in

[2] The Northwest Power plan assumes that the region can get 1535 aMW of conservation

[3] Conservation saves more at peak times than at other times, because much of the savings is weather dependent.

Table 2 the potential savings in transmission and distribution that have not previously been counted.

Table 2. Savings in T&D from Conservation due to the Existence of Grid West

Conservation attainable as a percentage of peak loads.	Expected expenditures on T&D not previously counted per year (Billions of dollars)	Savings in T&D (Billions of dollars/year)	Savings per year if Grid West accounts for 20% of these savings ($millions)	Savings per year if Grid West accounts for 10% of these savings ($millions)
50	$.3	.15	$30	$15
25	$.3	.08	$16	$8
10	$.3	.03	$6	$3

Adding the T&D benefits not accounted for in the SSG-WI study the range of benefits grows from a low of $3.7 million per year to a high of $61 million dollars per year.

Other benefits would accrue from a more complete examination of non-wires measures that can offer into the RCS and, perhaps, ancillary service markets.