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April 2, 2009

MEMORANDUM

TO: Power Committee

FROM: Ken Corum

SUBJECT: Draft of Chapter 5 and Appendix H of the Sixth Power Plan

Chapter 5 and Appendix H deal with demand response as a resource in the Council's Sixth Power Plan. Demand response (DR) is a voluntary and temporary change in consumers' use of electricity when the power system is stressed. Thus, demand response is a possible alternative to building peaking generation. When coupled with further smart grid development, demand response may also provide flexibility for within hour balancing and wind integration.

Chapter 5 includes assumptions of costs and available potential of demand response that were discussed at the February and March Power Committee meetings. Chapter 5 begins with a summary of the key findings. The chapter describes some of the history of the Council's treatment of demand response, developments since the Fifth Power Plan, the basis for the planning assumptions of the chapter, and concludes with recommended actions.

Appendix H covers much of the same material but with more detail about the treatment of demand response in the Fifth Power Plan, the assumptions used in the portfolio modeling in the Sixth Power Plan, and the potential use of demand response to provide peaking and flexibility reserves.

Chapter 5 & Appendix H in the Council's 6th Power Plan

Ken Corum
Power Committee Meeting
April 9, 2009



Topics for Today

- How does Council evaluate DR?
- Treatment of DR in the 6th Plan
- Where did our DR assumptions come from?
- Key findings and action plan



Council's Portfolio Model

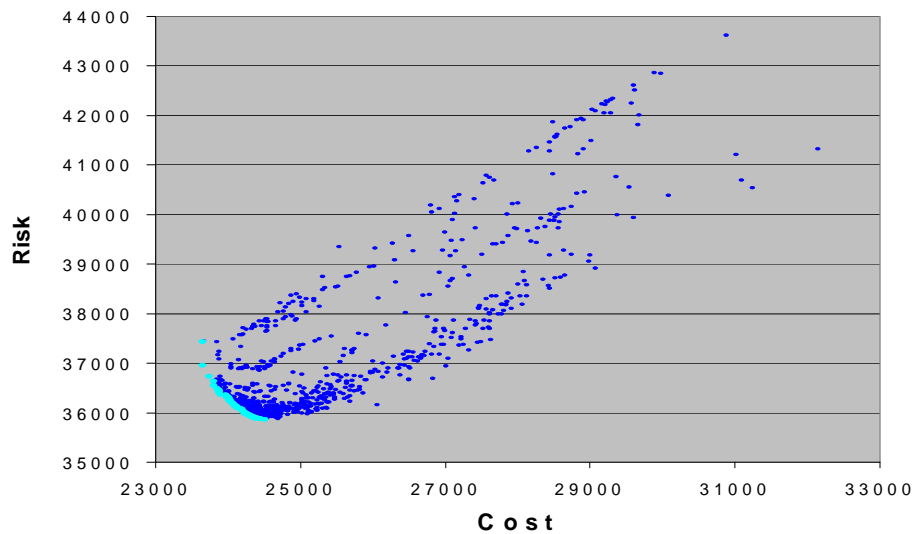
- 3000-4000 portfolios analyzed
- Uncertainties translated into 750 futures (20 years)
- Resources include SCCT, CCCT, conventional and IGCC coal, wind, conservation, DR



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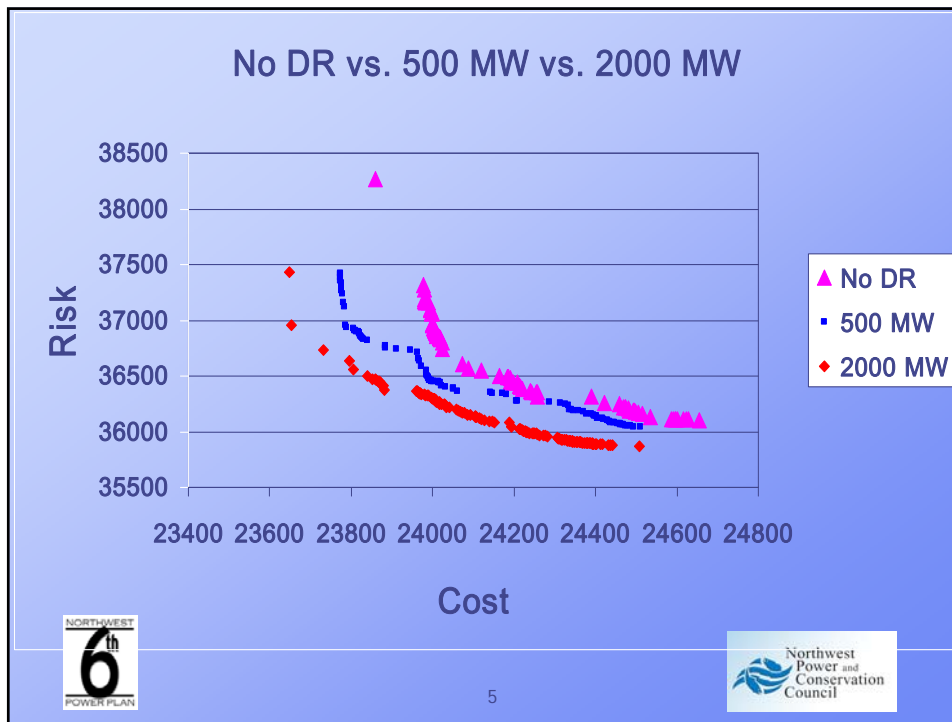


Feasibility Space



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- ## Treatment of DR in 6th Plan
- Review of 5th Plan, progress since
 - Examination of analysis, experience
 - Assumptions for portfolio model
 - Examination of DR as flexibility resource
 - Key findings and action items
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Pacific Northwest Demand Response Project

- Coordinated by Council staff, Regulatory Assistance Project, Lawrence Berkeley National Lab
 - Cost effectiveness of DR
 - Pricing structure to encourage DR
 - DR benefits of transmission & distribution
- Agreed on recommended cost effectiveness guidelines – Appendices H-1, H-2
- Started work on pricing structures



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Analysis

- Studies of potential DR
 - BPA
 - PacifiCorp
 - Portland General Electric
 - Puget Sound Energy



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Experience - 1

Table 5-1 Demand Response Achieved by System

System	Year evaluated	DR (% of peak)
PacifiCorp	2009	5.1
Idaho Power	2013	7.7
Portland General Electric	2012	4.1
New York ISO	2009	5.9 firm, 6.5 expected
New England ISO	2007	8.3
PJM	2008	3.2
California ISO	2006	4.8



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Experience - 2

- 5th Plan assumed DR low fixed cost, high variable cost resource
 - e.g. \$5/kW-yr FC, \$150/MWh VC
- Many DR programs have higher FC, low or zero VC
 - e.g. AC \$60/kW-yr, 100 hr/yr limit



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Table 5-2 Demand Response Assumptions

Program	MW	Fixed cost	Var cost or hr/year	Season available
AC (direct control)	200	\$60/kW-yr	100 hr/year	Summer
Irrigation	200	\$60/kW-yr	100 hr/year	Summer
SH/WH (direct control)	200	\$100/kW/yr	50 hr/year	Winter
Aggregators	450	\$70/kW-yr	\$150/MWh 80 hr/year	Summer + Winter
Interruptible Contract	450	\$80/kW/yr	40 hr/year	Summer + Winter
Demand BB	400	\$10/kW-yr	\$150/MWh	All Year
Disp Stby Gen	1000	\$20-\$40/kW-yr	\$175-\$300/MWh	All Year



DR As Flexibility Resource

- System may be short of flex resources
- Some DR can serve
- Needs testing
- Portfolio model doesn't capture value



Lessons Learned

- Region still needs experience w/ DR
- DR as flexible resource promising, needs testing
- Price structures not well understood
- SO...



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Action Items

- Research pilots to test “risky” ideas
- Development and demonstration pilots to test acquisition plants
- Follow up on prices with PNDRP
- Monitor developments elsewhere in DR
- Monitor developments in smart grid
- Advocate appliance standards incorporating smart grid technologies



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