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December 1, 2010

MEMORANDUM

TO: Power Committee

FROM: Jeff King

SUBJECT: Forecast of surplus energy events and possible mitigating actions

Action GEN-10 of the Sixth Northwest Conservation and Electric Power Plan calls for the Council to undertake an assessment of the potential extent of the future unbundled renewable energy credit (REC) market, the resulting benefits and costs, and actions needed to remedy possible negative impacts. One effect of an unbundled REC market has been rapid development of Northwest wind resources for supplying RECs to satisfy the renewable portfolio standard (RPS) obligations of California utilities. This development, coupled with wind development to supply energy to meet the RPS obligations of Northwest utilities appears to be leading to an increase in episodes of surplus energy. Episodes occurred in 2008, 2009 and 2010 and were accompanied by unusually low market prices for power. This has raised concern among hydropower operators regarding revenue impacts. The June 2010 episode was particularly severe and highlighted the potential conflict between the production of RPS-qualifying energy and compliance with in-river dissolved gas limits.

Council staff is preparing a forecast of surplus energy events and a paper describing the factors driving these events, the economic effects of these events, and possible actions to remedy negative impacts. Modeling difficulties extended this work longer than anticipated, however, the modeling problems have been resolved and a draft paper is being prepared.

Staff will discuss the findings of this work and review the contents of the paper during the Power Committee webinar. Because the paper could provide a useful contribution to ongoing regional efforts to resolve issues associated with surplus energy events, staff recommends that the paper be released for public review and comment.

Northwest Power & Conservation Council
Power Committee

Surplus Energy Events and Possible Remedial Actions

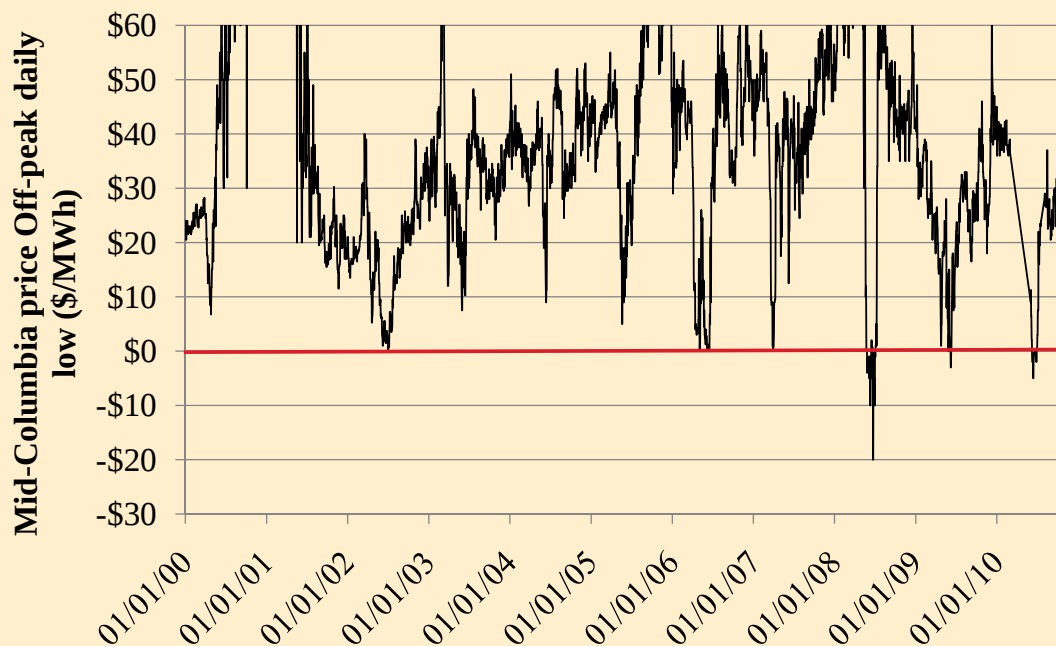
Jeff King
December 9, 2010



12/9/2010

1

Low market prices suggest surplus energy episodes may be increasing



12/9/2010

2

The setup for a surplus energy event

- Low springtime loads
- Thermal down, or at minimum operating levels
- High runoff
- Spill constrained by total dissolved gas limits
- Minimum hydropower generation constrained by spill limits
- Wind curtailment constrained by potential loss of production tax credits and renewable energy credits

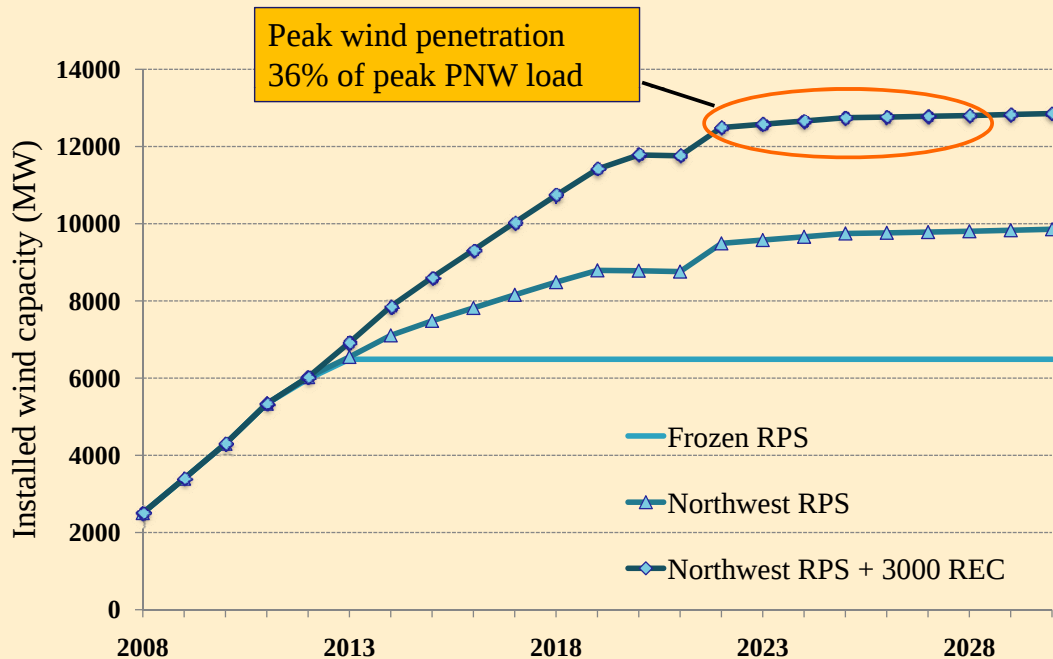
Conclusions - 1

- The Northwest is committed an increase in surplus energy events
- Absent increased export of unbundled RECs, surplus energy events are likely to increase in frequency through the early 2020s, and thereafter slowly decline.
- Increased export of unbundled RECs is likely to increase the frequency of surplus energy events. The frequency would decline once this development ceased.
- High runoff will increase the severity of surplus energy events. Likewise, the severity and duration will decline during years of low runoff.

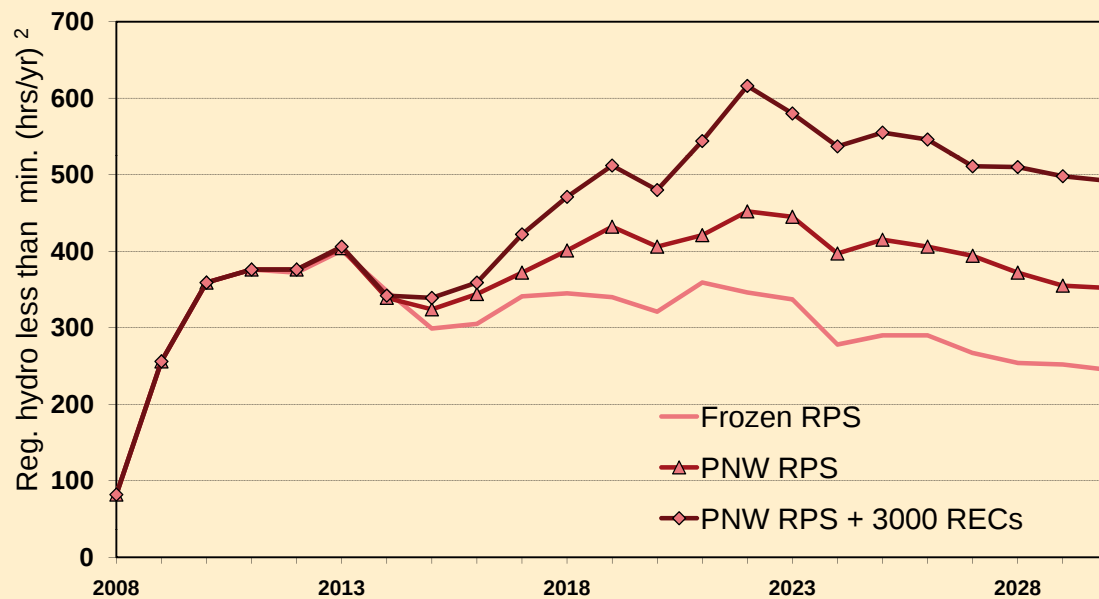
Conclusions - 2

- Unusual runoff patterns can create surplus energy conditions even in average water years.
- RPS resource development will drive down the value of non-RPS electricity until RPS targets are achieved.
- The average impact of lower market prices on the energy value of all generating capacity will be moderate, but the value of hydropower will be disproportionately reduced.
- Measures are available to reduce conflicts between wind and hydro generation, keep RPS resource owners economically whole, reduce price impacts and more productively use available low-cost, low carbon energy. No one measure is a panacea and the cost, lead-time, and feasibility varies widely among measures

Three cases of wind build-out were analyzed



Frequency of surplus energy events increases until addition in advance of load ceases¹

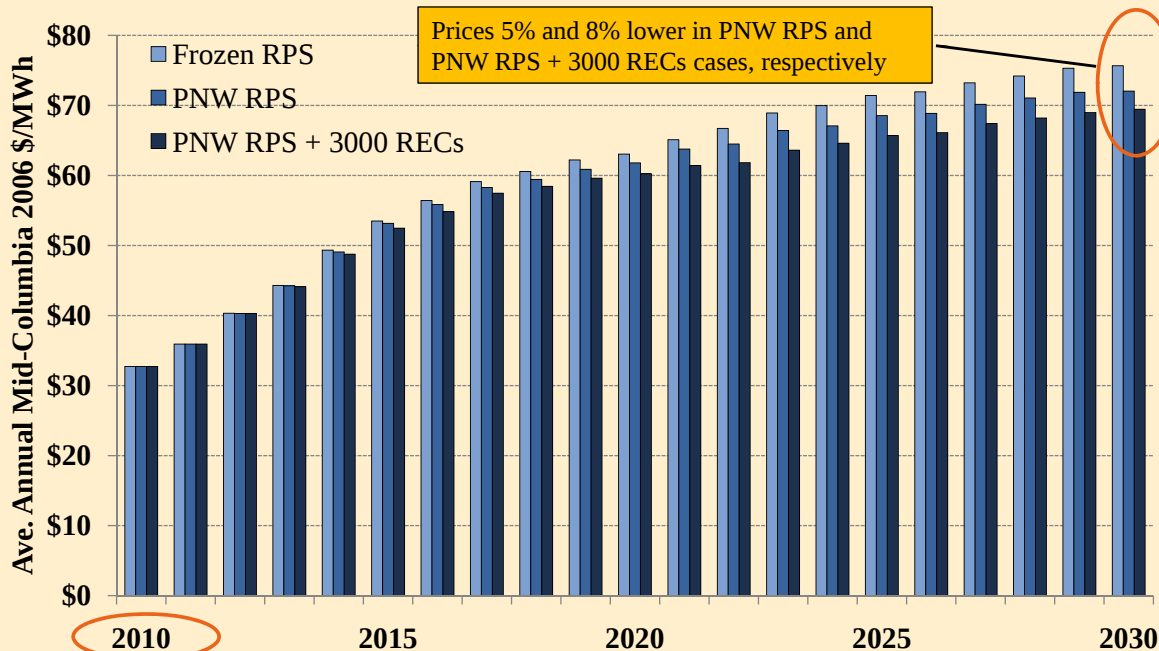


¹ Average hydro conditions

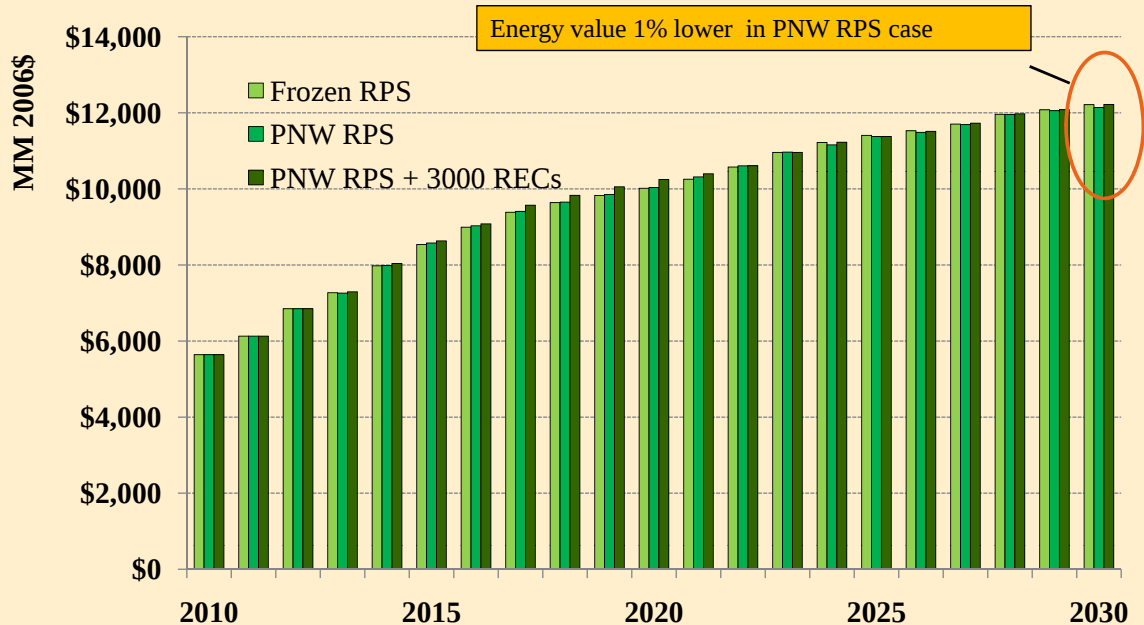
² Minimum hydro is a soft limit in AURORA^{xmp}



Resource additions in excess of need depress the value of non-RPS energy



Total energy value¹ of PNW projects is little affected by the three cases



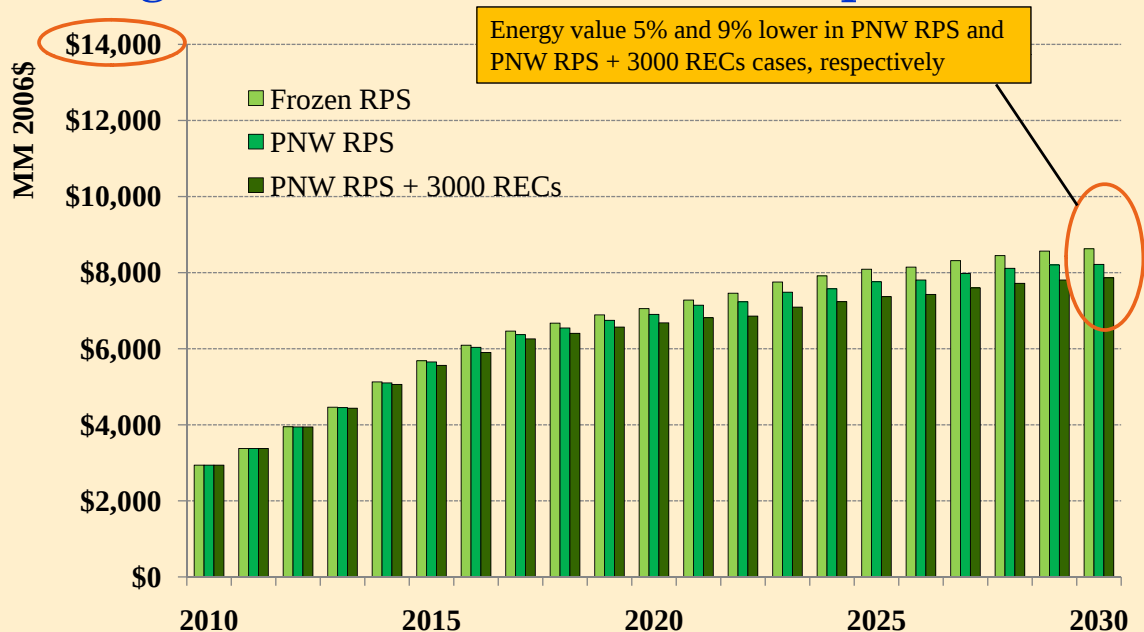
¹ Energy revenue less variable cost

12/9/2010

9



Energy value¹ of hydro projects declines @ higher levels of wind development



¹ Energy revenue less variable cost

12/9/2010

10



Remedies

- Facilitate curtailment of wind during surplus energy events
- Reduce wind output peaks
- Reduce hydro output during high runoff periods
- Increase loads during high runoff periods
- Augment energy dump capability
- Facilitate curtailment of thermal output during high runoff periods