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Wednesday, March 28, 2012

## MEMORANDUM

**TO:** Power Committee

**FROM:** Michael Schilmoeller

**SUBJECT:** Regional Portfolio Model Futures

The Council's Regional Portfolio Model (RPM) emulates resource acquisition actions over many different sets of 20-year periods. Each 20-year period, referred to as a "future," faces a broad range of possible circumstances under which the power supply must operate. These circumstances and the subsequent resource acquisition choices combine to produce the cost and reliability of the power supply that – for better or worse – regional ratepayers will bear.

There are several considerations that go into evaluating whether the futures used in the RPM help the Council meet its goals of assessing cost and risk of resource strategies. First, are the futures credible and are the behaviors of key elements in the futures realistic? Are there futures in the RPM that look like our present circumstances and current expectations about the future? Some futures may appear extremely unlikely but still plausible. Do such futures help us understand the value of particular strategies? Second, do the futures capture the types of uncertainties that the Council feels will bear on ultimate ratepayer costs? For example, how do we deal with technological innovation that we know is inevitable but is nevertheless unpredictable? Third, do the futures provide insights into the strengths and weaknesses of recommended resource strategies?

At the April Council meeting, Greg Nothstein and I will begin a conversation with Power Committee members about the futures in the RPM. Greg is with the Analysis and Strategy Unit, Washington Energy Office, and he has been helping us since November evaluate the futures that we use in our risk analysis. We thought it would be useful to share a close look at a small number of those futures with Council members and others to see what those futures are composed of, how they differ from each other, and how plausible they are to Council members.

The material that I have prepared for the Council member packet contains a link to a narrated PowerPoint presentation. State staff members have been given instructions on using the presentation. We have successfully tested the link from several locations. This is an experiment for us, however. Using PowerPoint in this way is an attempt to meet the need for a concise presentation that nevertheless "stands on its own." We look forward to hearing whether this is useful to Council, to staff, and to those who rely on the Council's work.

# Regional Portfolio Model (RPM) *Futures*

## **Their Role in Planning Under Uncertainty**

**“Futures are how the Regional Portfolio Model  
*stress-tests* resource strategies”**

Michael Schilmoeller, NWPCC  
Greg Nothstein, Analysis & Strategy Unit, Washington Energy Office  
April 10, 2012



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## Stress-testing means

- § Using extreme and unlikely values to get insight in the vulnerabilities of a portfolio**
- § Looking at unusual relationships in circumstances**
- § Thinking in terms of effect and categories of uncertainty, rather than detailed causes**



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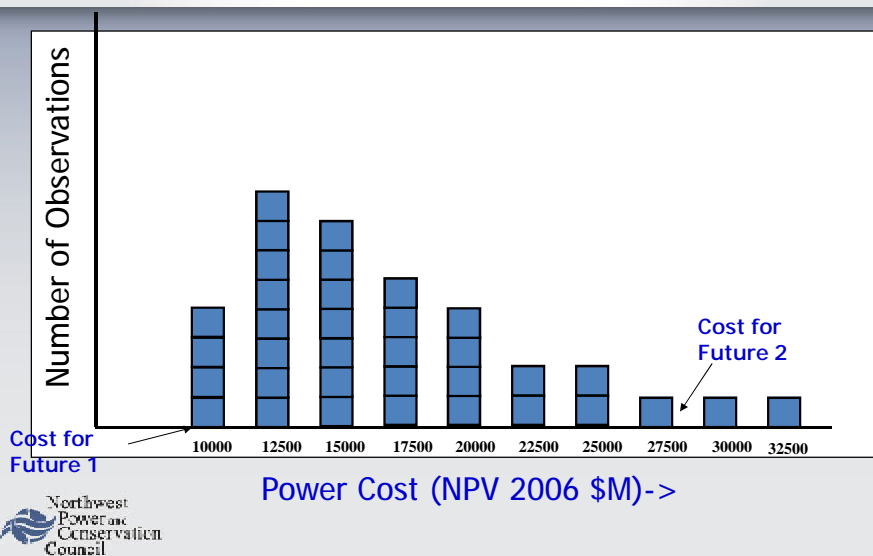
# Overview

- § Background on futures in the RPM
- § A low-cost future
- § A high-cost future
- § Observations and next steps

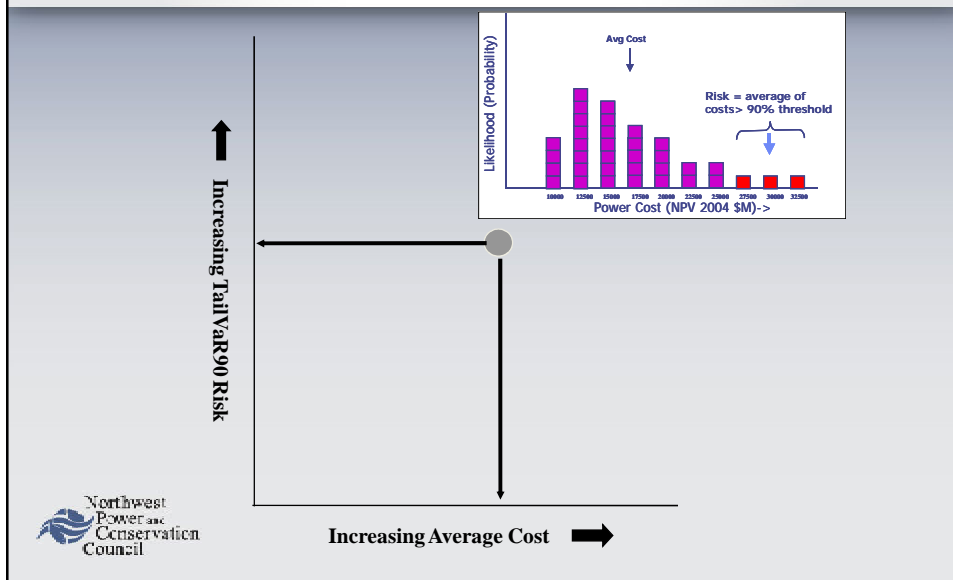


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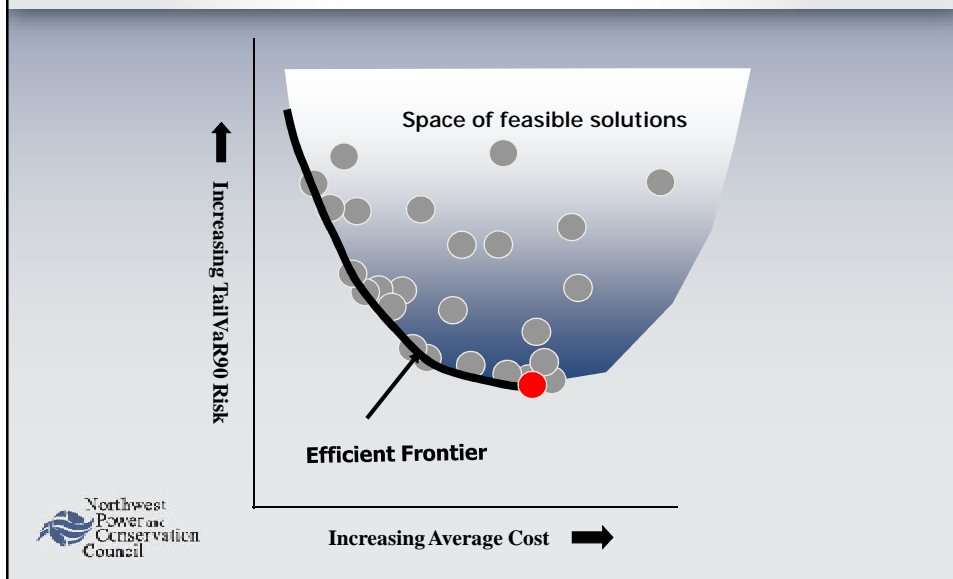
# Distribution of Cost for a Plan

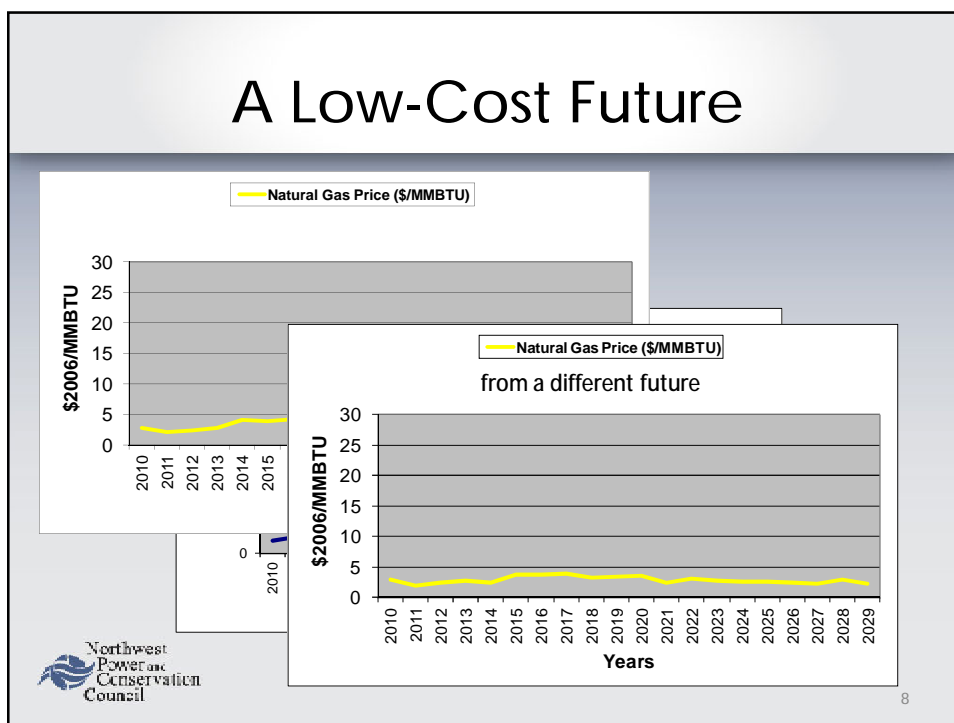
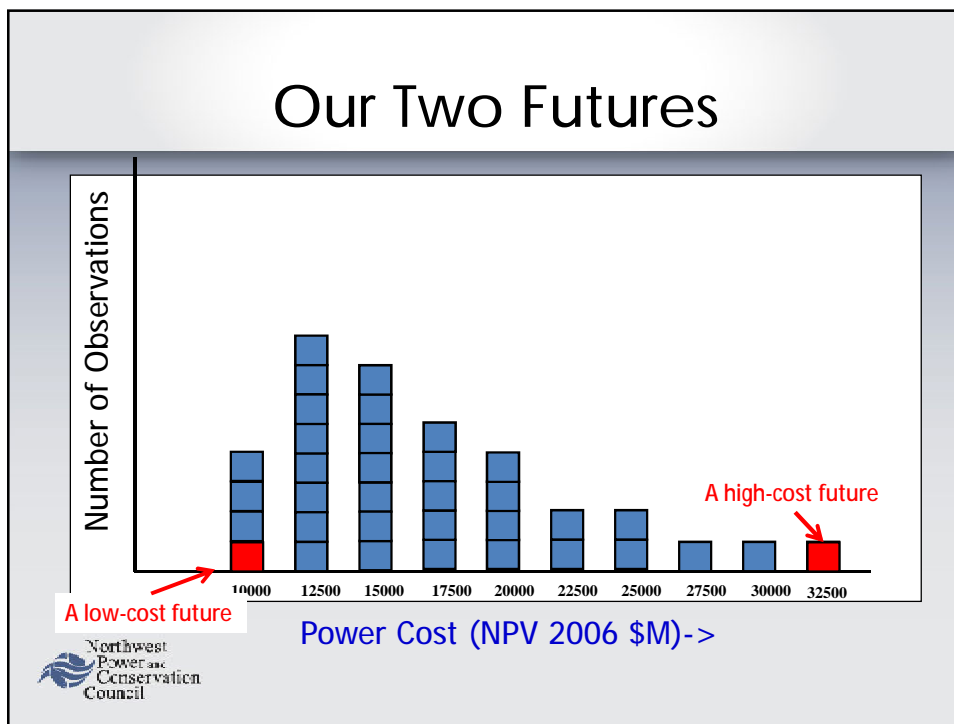


# Feasibility Space

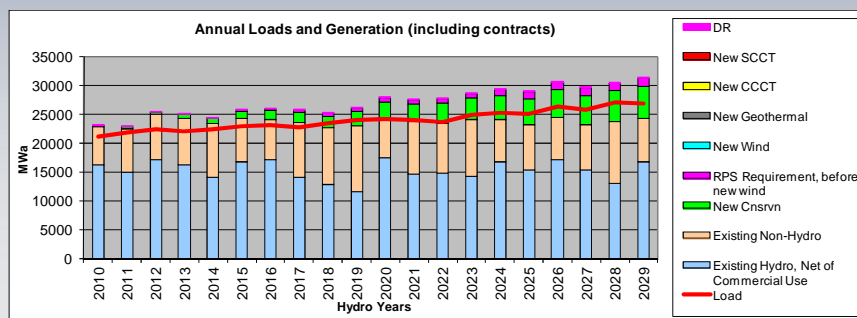


# Finding Robust Plans





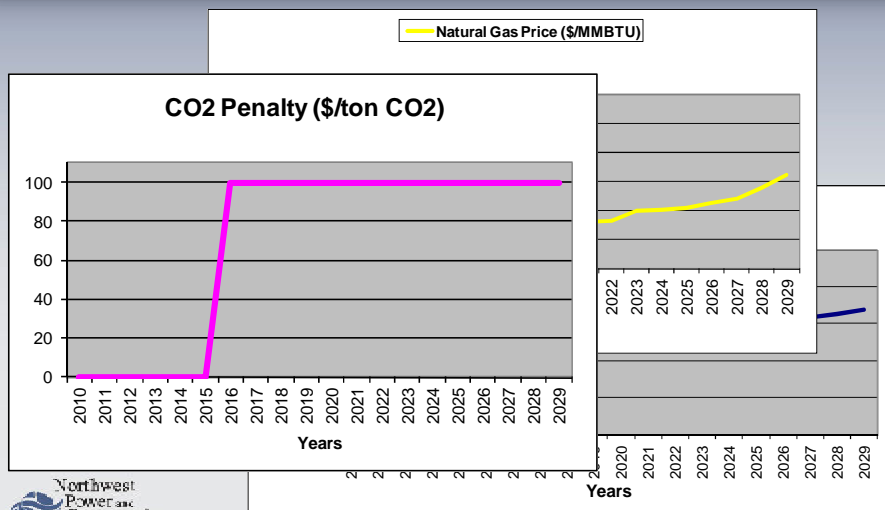
## A Low-Cost Future



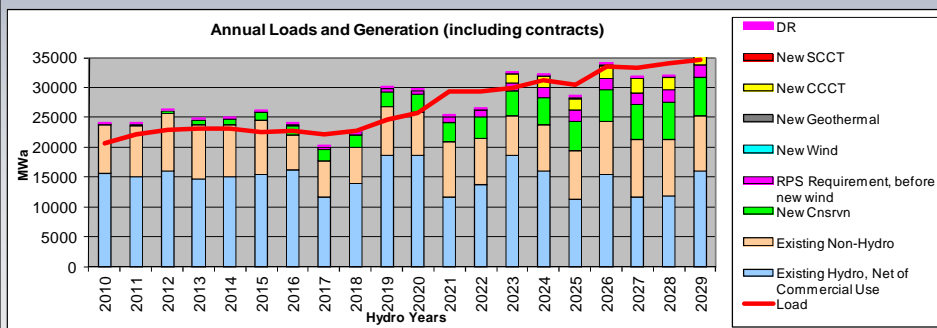
## A Low-Cost Future: Significance

- § This future looks more like our current circumstances
- § Just six years ago, this future was the “least likely” future
- § This is not a high-cost (risky) future, even though it may have “out-of-market” energy efficiency and uncompleted power plants

# A High-Cost Future



# A High-Cost Future



## A High-Cost Future: Significance

While it may appear unlikely,

§ Demand for electricity could rise if carbon penalties elsewhere drive industry to the Pacific Northwest

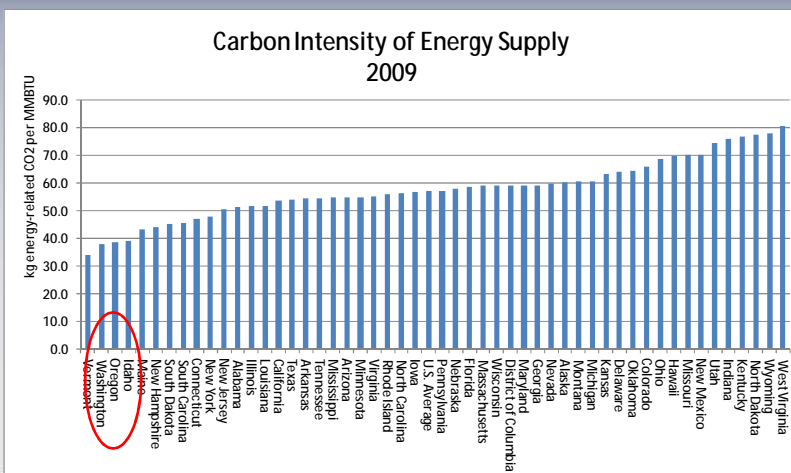
Significance:

§ The strategy needs mid-term CCCT's for the possible replacement of coal-fired generation

§ CO2 emission reduction is guaranteed only if coal plants are closed



## Carbon Intensity of the PNW





# Observations

## § Stress-testing means

- Using extreme and unlikely futures  
(Don't predict! Test!)
- Looking at unusual relationships  
(Remember the Mortgage Crisis!)
- Thinking in terms of effect and categories of uncertainty , rather than detailed causes  
(Remember Boardman and Centralia!)

# Questions?

## Some Takeaways

### § LOAD SCENARIOS

- **High loads:** in-migration **due to the** effects elsewhere of carbon policies **or adverse climate change; economic** expansion; **sensitivity of** new industries **to energy cost**
- **Low loads:** elastic response to prices; **aggressive** energy efficiency **policies;** economy **languishes; adoption of new and existing** distributed generation **technologies**



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## Some Takeaways

### § NATURAL GAS PRICE SCENARIOS

- **High NG price:** costs for frack NG **arise;** demand **for NG – including exports – increases** due to carbon controls; new uses **for methane** emerge
- **Low NG price:** **gas fracking** matures; by-products become more valuable **than methane** – **such as ethylene; new generation and storage technologies** displace NG; **non-electricity NG use** declines



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## Some Takeaways

### § WHOLESALE ELECTRICITY PRICE SCENARIOS

- **High electricity price:** closure of power plants (U.S. or foreign); new regulation or legislation; more carbon mitigation policies; **extended** drought
- **Low electricity price:** new **generation and storage** technologies **emerge**; more energy efficiency