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September 3, 2014

MEMORANDUM

TO: Power Committee

FROM: Massoud Jourabchi

SUBJECT: Forecast of Hourly Regional Loads for 2020 Resource Adequacy Assessment

BACKGROUND:

Presenter: Massoud Jourabchi

Summary Key conclusions from the proposed load forecast for the 2020 RAA are:

- Weather normalized annual energy loads (after energy efficiency) are forecast to grow by 0.6%/year for 2014 – 2020
- Proposed range of peak loads in 2020
 - Winter 30,000 - 43,000 MW
 - Summer 26,000 - 29,000 MW

Relevance: The first step in the Council's preparation of its annual Resource Adequacy Assessment (RAA) is to develop a forecast of annual hourly electricity loads for five years in the future. At the September Power Committee meeting staff will present its proposed load forecast to be used in this year's RAA for the year 2020. The metric used to assess resource adequacy in the "loss of load probability" or LOLP. In order to derive the LOLP the Council tests the adequacy of the region's power system to meet a range of future loads under varying weather conditions. Therefore, the proposed forecast includes range of annual energy use and estimates for hourly

summer and winter peaks for the year 2020 based on the past 86 years actual daily temperatures experienced in the region.

Workplan: Not Applicable.

Background: The presentation will provide a review of recent trends in regional load growth under both normal and actual temperature conditions. It will describe the methodology used to forecast weather normalized annual loads and hourly peak loads. Staff will also describe improvements to the short-term load forecasting methodology implemented since the last RAA and plans for future enhancements.

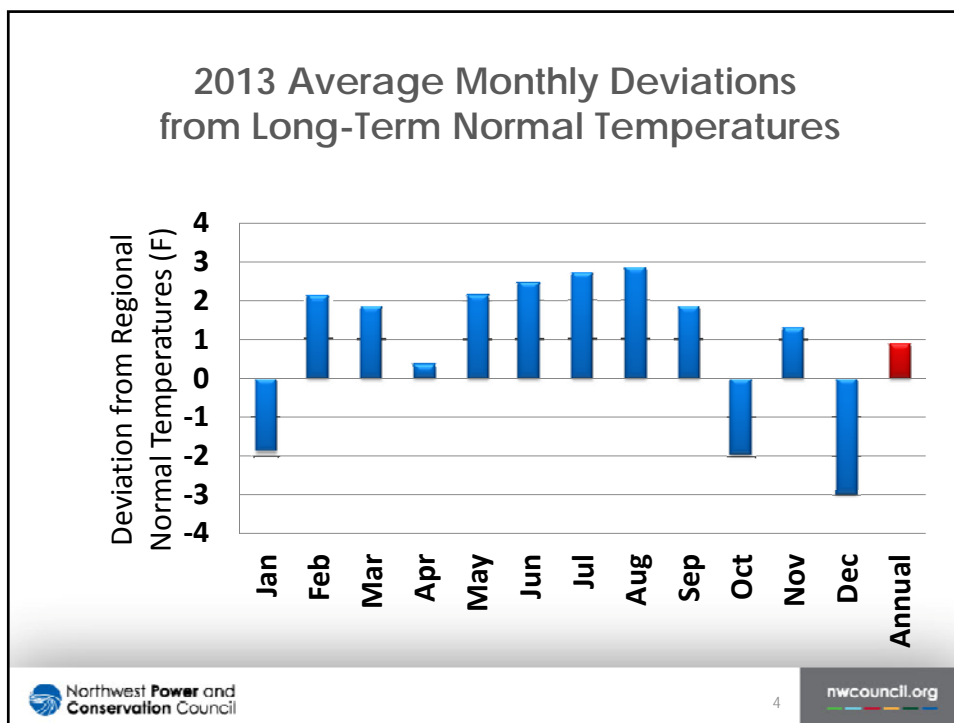
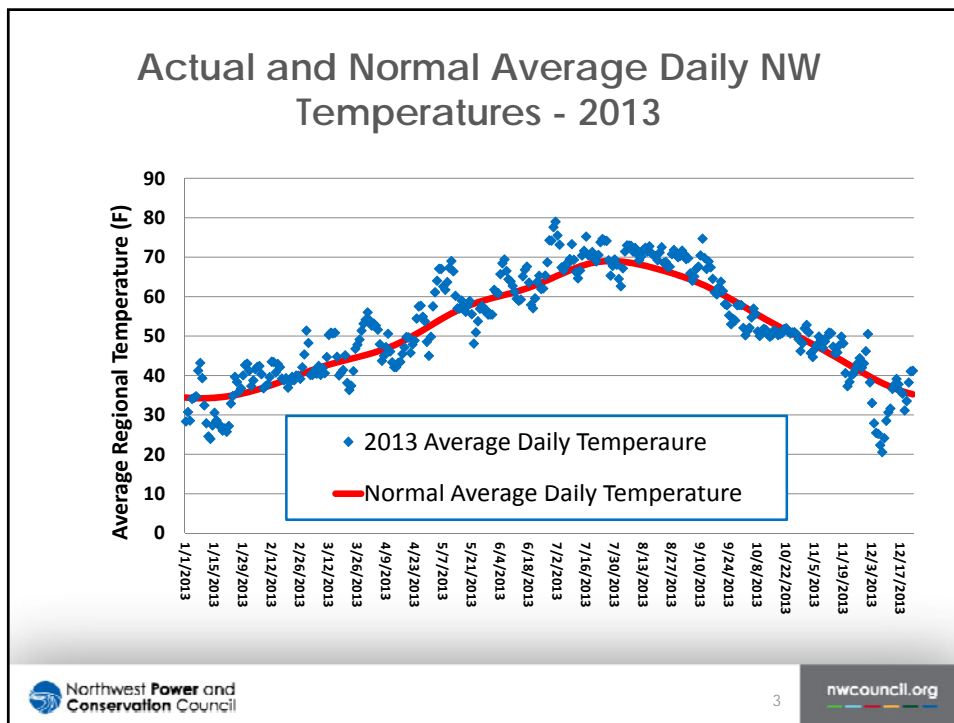
More Info: NA

Forecast of Hourly Regional Loads For 2020 Resource Adequacy Assessment

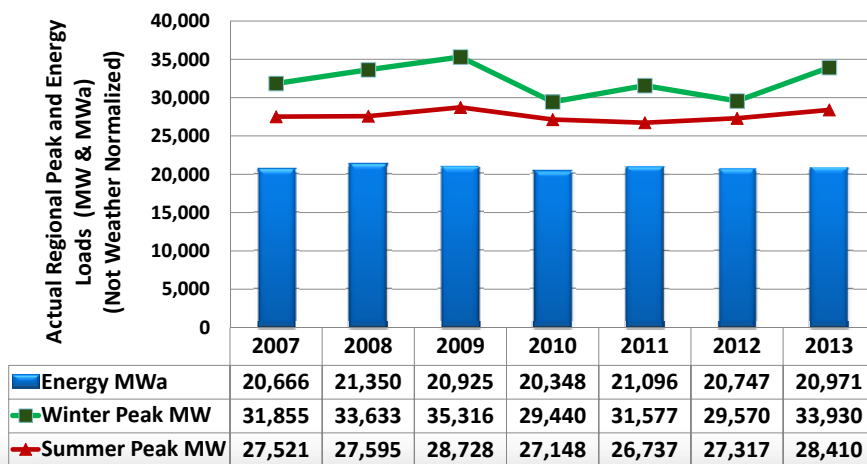
Massoud Jourabchi
September 9, 2014

Today's Topics

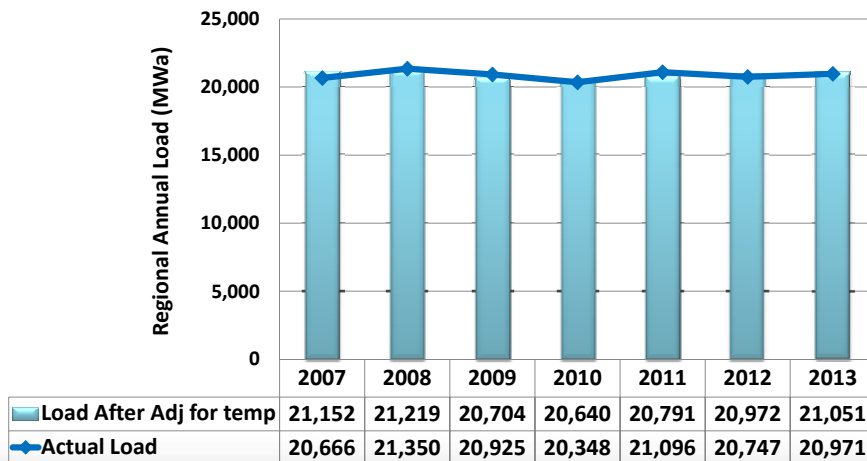
- Review actual annual and peak loads for 2007-2013
- Assess impact of year-to-year variations in temperature on annual and peak loads
- Review load forecast requirements for Resource Adequacy Assessment
- Propose a range of annual and peak load forecasts for the 2020 Resource Adequacy Assessment
- Describe improvements to the short-term load forecasting methodology

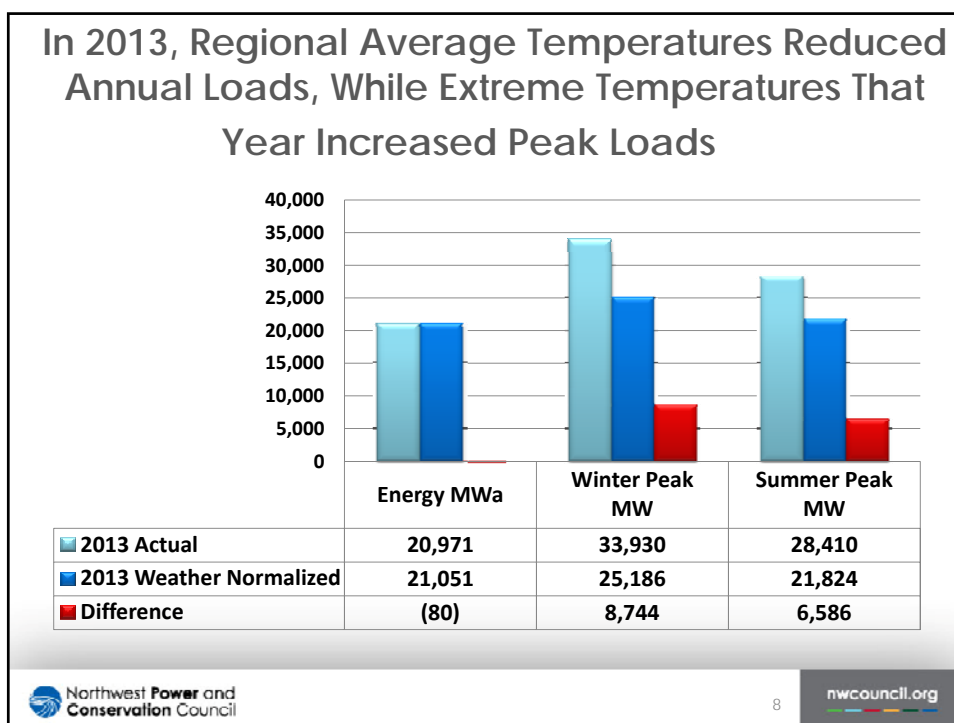
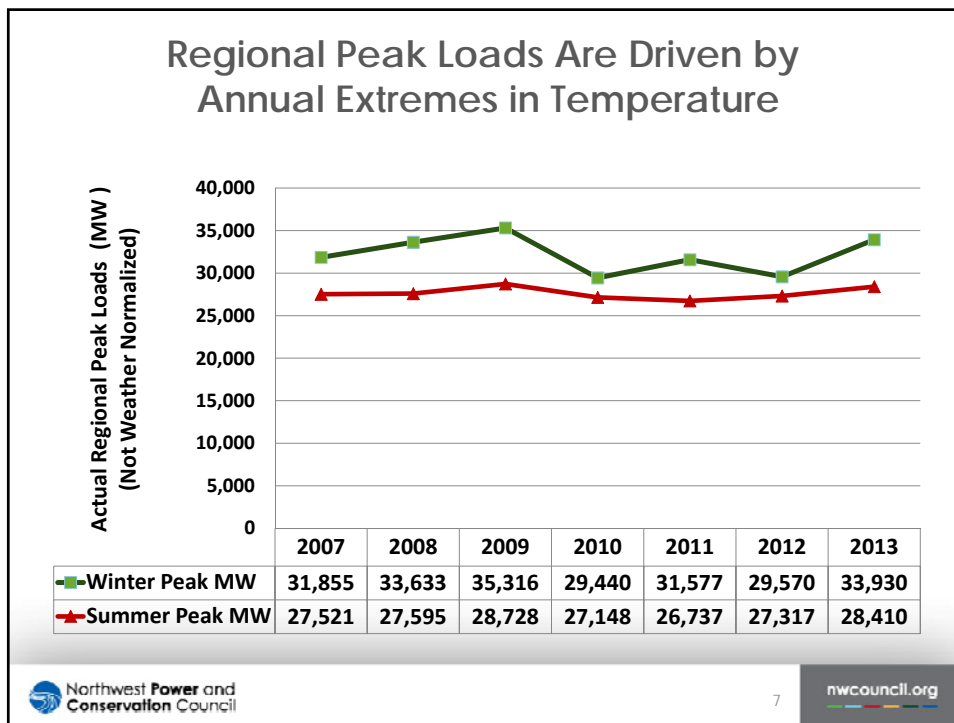


Regional Peak and Annual Loads Show No Statistically Significant Growth Trends Since 2007



Weather Normalized Annual Energy Loads Did Not Show A Statistically Significant Growth Trend from 2007-2013

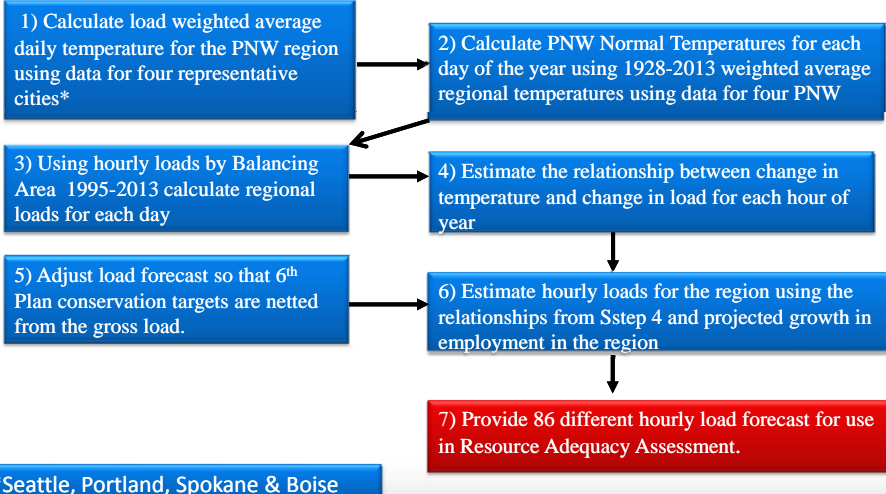


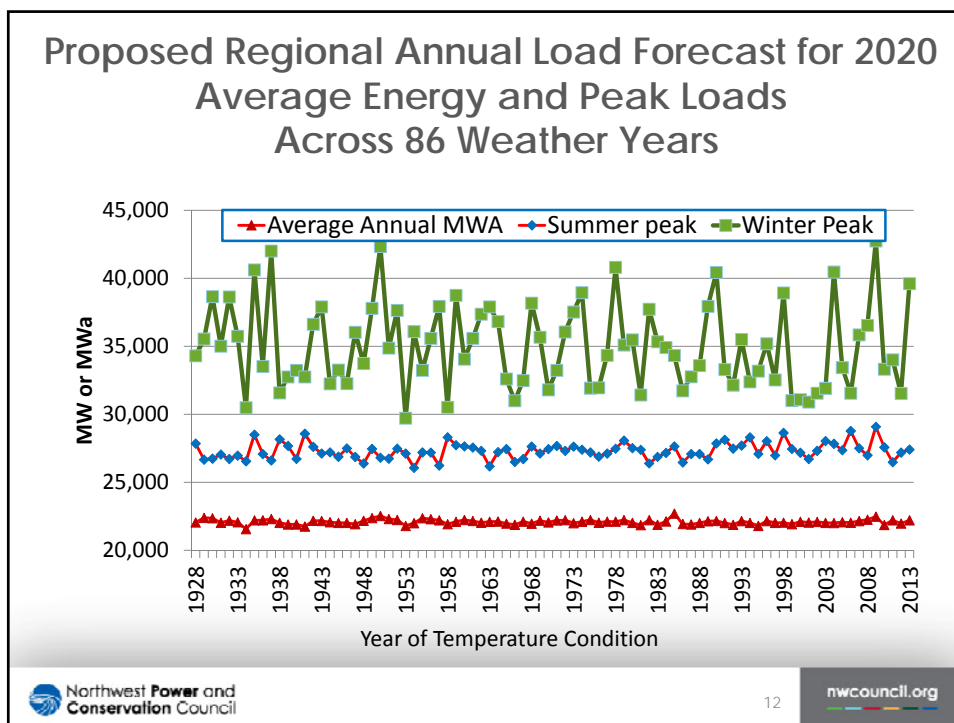
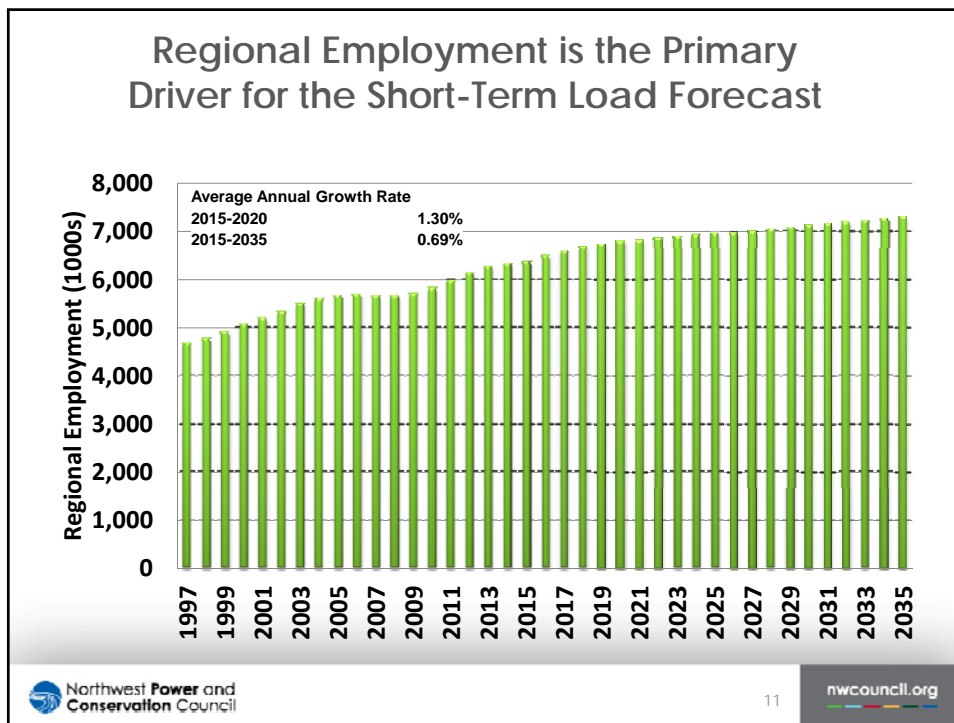


Resource Adequacy Assessment Load Forecast Inputs

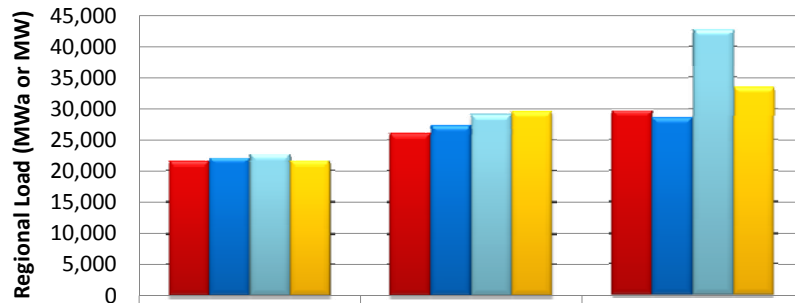
- 86 forecasts of hourly regional loads for 2020
- Each forecast reflects daily average temperatures for each year from 1929-2013
- Forecasts for 2014-2020 are *net* of Sixth Power Plan energy efficiency targets

Information Flow Diagram for Short-Term Load Forecasting Model





Proposed Range of Forecast Energy and Peak Loads Under Average and Extreme Temperatures Compared to NRF



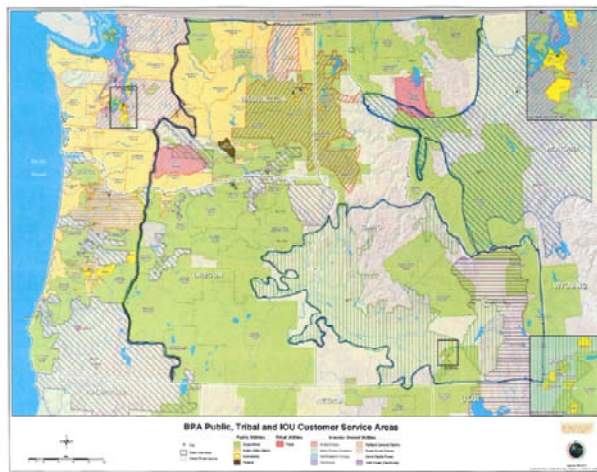
| | Energy | Summer Peak | Winter Peak |
|-------------------|--------|-------------|-------------|
| ■ Ext. Low temp. | 21,567 | 26,063 | 29,720 |
| ■ Average Weather | 22,095 | 27,312 | 28,542 |
| ■ Ext. high temp. | 22,702 | 29,087 | 42,753 |
| ■ NRF 2014 * | 21,642 | 29,551 | 33,500 |

Improvements for the Regional Adequacy Assessment Load Forecast

- **Southern Idaho is modeled specifically**
 - Idaho Power + PacifiCorp East + BPA
- **Washington and Oregon loads will be divided into two zones:**
 - Western Washington and Western Oregon
 - Eastern Washington and Eastern Oregon

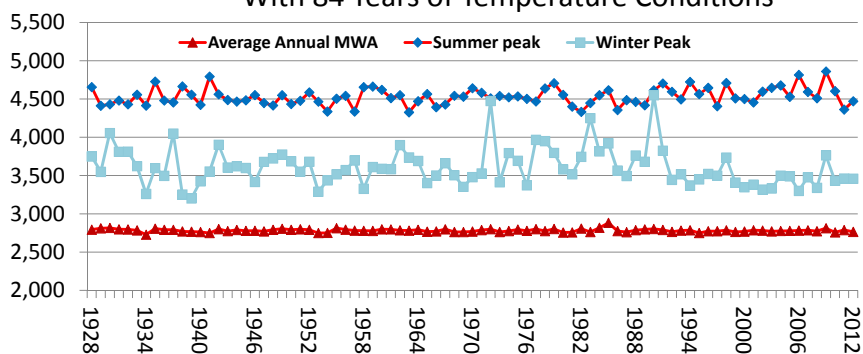
PacifiCorp, BPA, and Idaho Power provided hourly load data

Planned Improvements for the Regional Adequacy Assessment Load Forecast



2020 Southern Idaho Load Forecast

With 84 Years of Temperature Conditions



| Range of Forecast | Low | Average | High |
|-------------------|-------|---------|-------|
| Summer Peak | 4,327 | 4,535 | 4,861 |
| Winter Peak | 3,202 | 3,611 | 4,549 |
| Annual MWA | 2,728 | 2,784 | 2,883 |

Key Points

- **Weather normalized annual energy loads (after energy efficiency) are forecast to grow by 0.6%/year for 2014 – 2020**
- **Proposed range of peak loads in 2020**
 - **Winter 30,000 - 43,000 MW**
 - **Summer 26,000 - 29,000 MW**