Northwest **Power** and **Conservation** Council

December 2, 2014

MEMORANDUM

TO: **Power Committee**

FROM: **Massoud Jourabchi**

SUBJECT: **Preliminary 20-year Load Forecast for use in draft 7th Plan**

BACKGROUND:

Presenter: Massoud Jourabchi

Summary: Using latest economic forecast, and after review by the relevant advisory committees, staff has produced the range load forecast (energy and peaks) for 2015-2035 that will serve as the basis for the draft 7th Plan. The proposed draft plan forecast range is for moderate growth (0.5%- 1.0%) in energy and 0.4% to 0.9% growth in winter peak demands. Regional loads are projected to increase by between 2000-5000 MWa during the plan period prior to accounting for future energy efficiency programs.

Relevance: Producing a 20 year load forecast for the region is a requirement of Power Act. A range forecast of projected future loads is used by Regional Portfolio Model as an input to its analysis resource options for the region. In addition, multiple components of load forecast (economic drivers, baseline efficiency of appliances, number of homes, commercial floorspace) are used in the development of the conservation resource potential.

Workplan: 1D. Prepare for Seventh Power Plan and maintain analytical capability, Update of long-term demand forecast

Background: This presentation builds upon the July 2014 presentation to the Power Committee, in which the key economic drivers of the load forecast were discussed. This presentation will describe the range of load forecasts for key economic sectors (e.g., residential, commercial) and end-uses (e.g., lighting, space heating). Staff will discuss proposals to modify the Council's historical frozen efficiency forecast to account for rapidly evolving technologies and a potential scenario that reflects the impact of future legislatively required updates to federal efficiency standards every 6 years. This scenario could lead to flat growth through 2035.

More Info: NA

Load Forecast for use in draft 7th Plan

Massoud Jourabchi
Charlie Grist
December 9, 2014

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In today's presentation

- Where we are in the planning process
- Review of Economic Drivers- from July 8 2014 P4
- Proposed Draft Seventh Plan Load forecast
- Comparison Draft Plan Forecast to other forecasts
- Discussion on frozen efficiency

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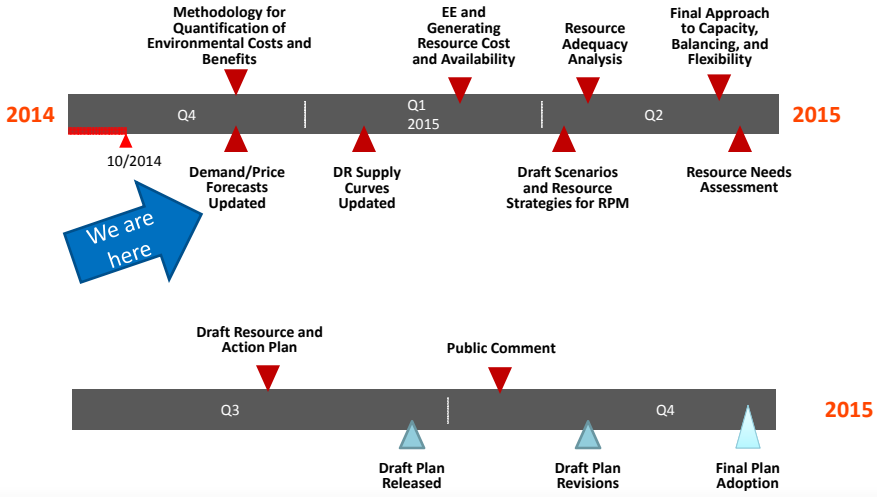
Major Seventh Plan Development Milestones



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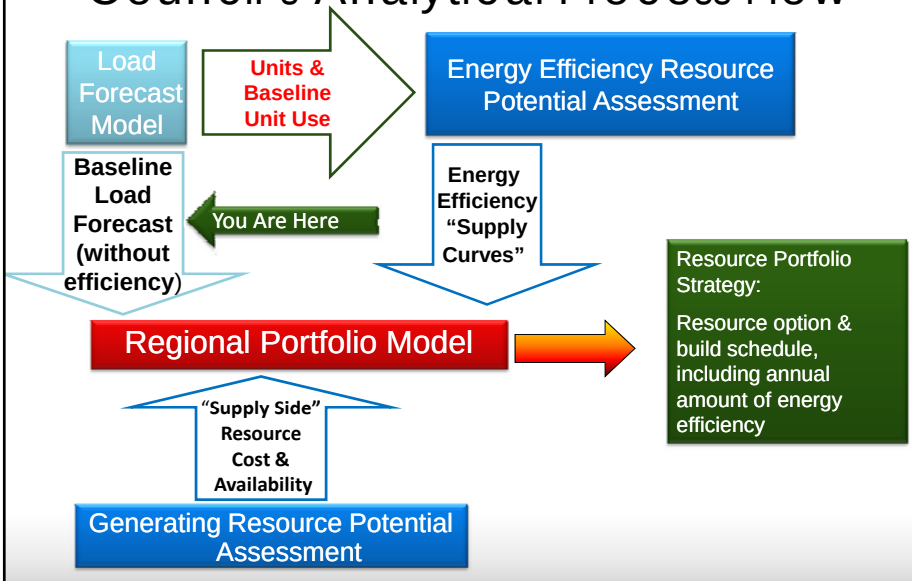
Council's Analytical Process Flow



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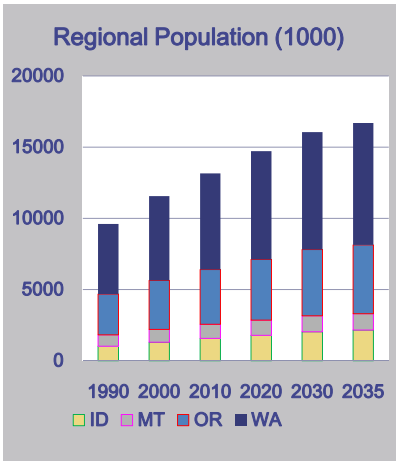
Regional Population



Overall regional population growth is projected to slow.

	1985-2014	2015-2035
ID	1.73%	1.30%
MT	0.77%	0.50%
WA	1.64%	0.90%
OR	1.37%	0.80%
4 States	1.50%	0.90%
USA	1.03%	0.90%

Average Annual Addition to Population (1000)	1985-2015	2015-2035
ID	21	24
MT	7	6
WA	90	66
OR	43	34
4 States	162	130

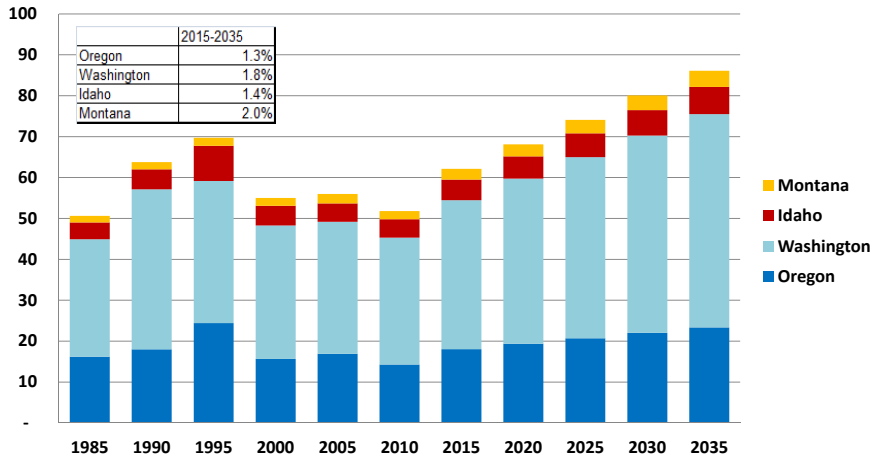
Northwest population remains about 4% of national population.

Commercial Sector Growth*

Millions of square Feet	Cumulative	Annual Average
1985-2014 Additions*	1,406	71
2015-2035 Additions*	951	52

* Subject to change as Commercial Building Stock Assessment becomes available

Industrial Output (billions of 2012 dollars)



•Source: GI August 2014 state level forecast, modified by state economists inputs and smoothed.

•Subject to change from finding from Industrial Facilities Site Assessment (IFSA)

Natural Gas Prices 2012$

Proposed Henry Hub Price Forecasts as of July 2014			$2012/MMBTU
	Council Low	Council Medium	Council High
2013	3.7	3.7	3.7
2014	3.9	4.7	4.9
2015	4.0	4.6	5.1
2020	3.9	5.0	6.0
2025	3.8	5.7	7.3
2030	3.5	6.6	8.9
2035	3.2	7.4	10.8
Average 2015-2035	3.8	5.8	7.5

Assumed Aggregate Average Annual Growth Rate Across Scenarios

	Low	Med	High
Residential	0.7%	1.1%	1.6%
Commercial	1.0%	1.2%	1.4%
Industrial	1.5%	1.6%	1.7%
Agriculture	0.5%	0.9%	1.3%

Adjustments Made Based on Feedback from DFAC
- Industrial sector economic growth too high > Lowered
- Commercial sector economic growth OK > No change
- Growth of solar rooftop too high > Lowered.

Some of the Factors Affecting Load Growth by 2035 (besides economic drivers)

Factors lowering load growth

- Appliance and transformer standards ~700 MWA
- Improvement in efficiencies Misc. End-uses ~ 200 MWa
- Roof-top solar ~225 MWa
- More efficient data centers ~150 MWa
- Total ~1300 MWa

Factors increasing load growth

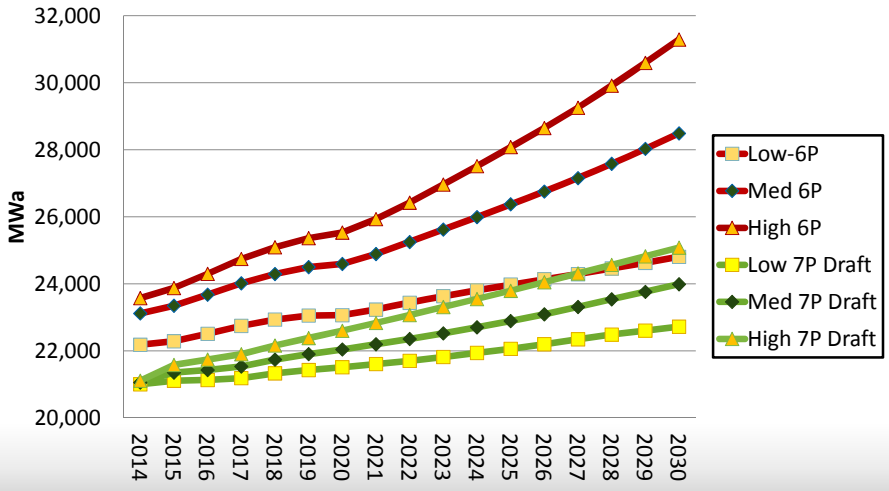
- Washington & Oregon cannabis production ~200 MWa
- Addition of Loads from PHEVs ~450 MWa
- Total Increase ~650 MWa

Overall Net Reduction of ~ 650 MWa

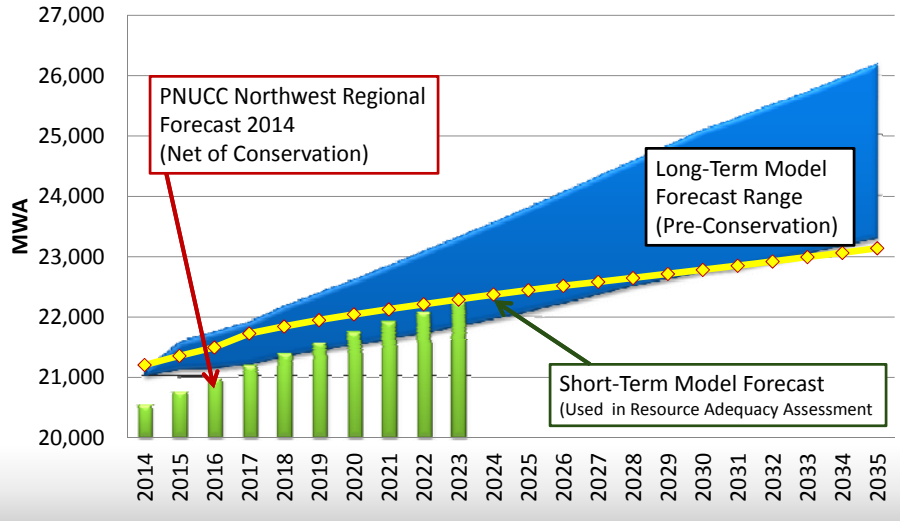
Historic and Forecast Sector Level Loads (medium case)

Sector Level Loads* (MWA)	1986	2010	2015	2035	2015-2035
Residential	6,431	8,118	8,280	8,944	0.4%
Commercial	4,493	6,155	7,237	8,393	0.7%
Industrial	7,006	5,729	5,561	7,029	1.2%
Transportation	3	8	26	459	15.3%
Public service (stl,water)	322	342	350	360	0.1%
Total	18,256	20,352	21,454	25,185	0.8%
*- prior to rooftop solar					

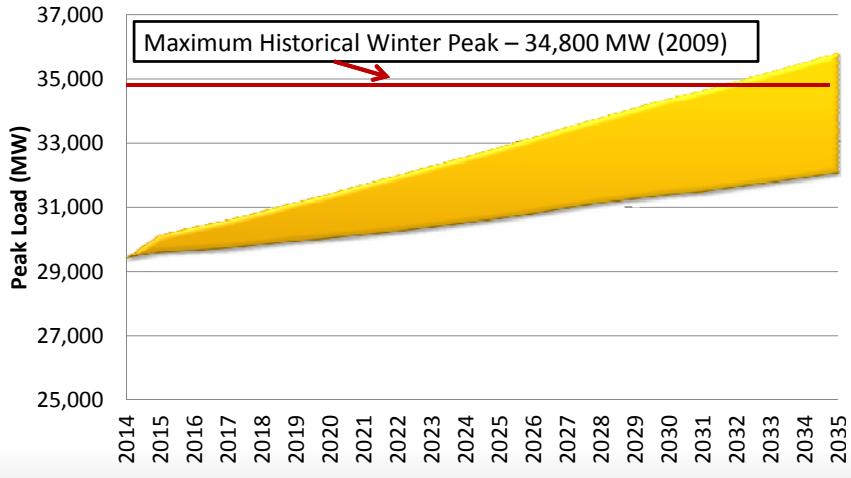
Comparison of 6th and Draft 7th Plan Load Forecast (Prior to Conservation)



Comparison of Draft 7th Plan Load forecast with Other forecasts



Draft – Winter Peak Load Forecast 2015-2035



Projected Average Annual Growth Rates*

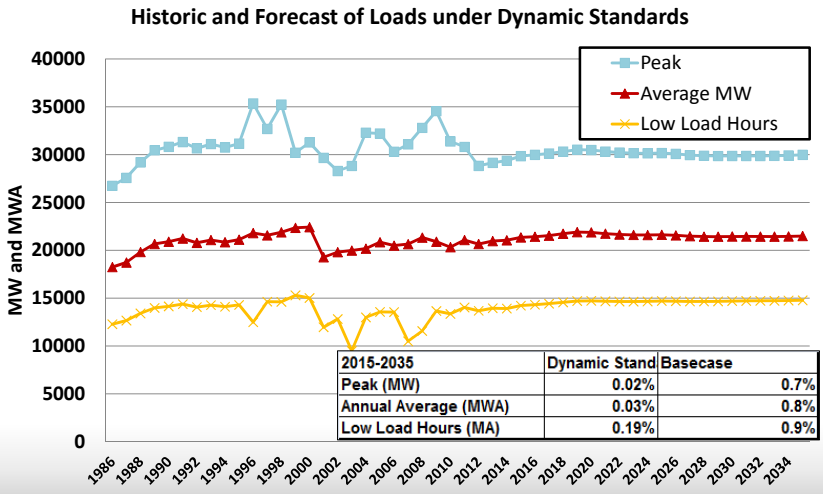
2015-2035	Average	Peak Load	Low Load Hours
Medium	0.8%	0.7%	0.9%
Low	0.5%	0.4%	0.6%
High	1.0%	0.9%	1.2%

- * Summer peak loads growing 0.9% per year.
- * Winter peak load growing at 0.7% per year.
- * By 2035, Summer peaks will be 98% of winter peak.

Dynamic Standards Scenario

- We have developed a "What If "analysis, assuming the federal appliance and equipment standards that were adopted since the 6th Plan would be updated per legislative requirements (i.e., on a 6 year cycle).
- Should we include the this scenario in our demand forecast range?

Under Dynamic Standards Scenario Regional Load Growth Is Essentially Flat



2015-2035	Dynamic Stand	Basecase
Peak (MW)	0.02%	0.7%
Annual Average (MWA)	0.03%	0.8%
Low Load Hours (MA)	0.19%	0.9%

NW Summary Load

- Growth across the full range of load forecasts (prior to conservation) is lower in the 7th Plan than in the 6th Plan

2015-2035 Period	Total Load Growth (MWa)	Average Annual Load Growth (MWa/yr)
Medium Case	3,725	185
Low Case	2,310	115
High Case	4,760	240
Dynamic Standards	265	15

When standards are updated as required by law, load growth may be almost zero.

Load Growth Outside NW

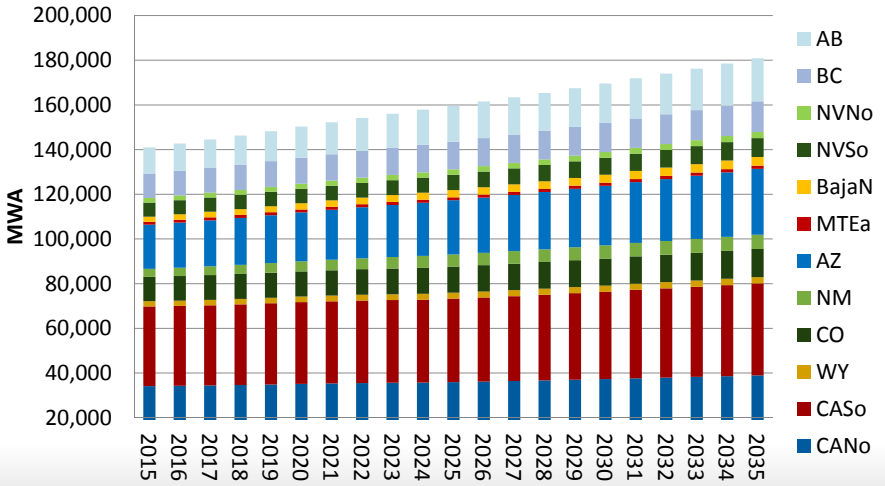
- As part of development of wholesale electricity prices, Council staff creates forecast of loads outside NW.
- For each forecast we use latest available forecast from the regional/state organizations.
- For California, we used load forecast by CEC 2014-2024. CEC net load forecast netted expected generation from roof-top solar.

Average Annual Growth Rate for areas outside NW
2015-2035

	Energy	Peak
Northern California*	0.7%	0.6%
Southern California*	0.7%	0.7%
Wyoming	1.5%	0.9%
Colorado	0.6%	0.7%
New Mexico	1.2%	2.9%
Arizona	1.9%	2.0%
Utah	0.9%	0.9%
Eastern Montana	0.7%	0.6%
Baja Mexico	2.0%	2.6%
Souther Novada	1.6%	1.5%
Nothern Novada	1.7%	1.3%
British Columbia	0.9%	1.1%
Albreta	2.5%	2.5%

California values includes impact of rooftop solar generation

Forecast of Peak Loads Outside NW



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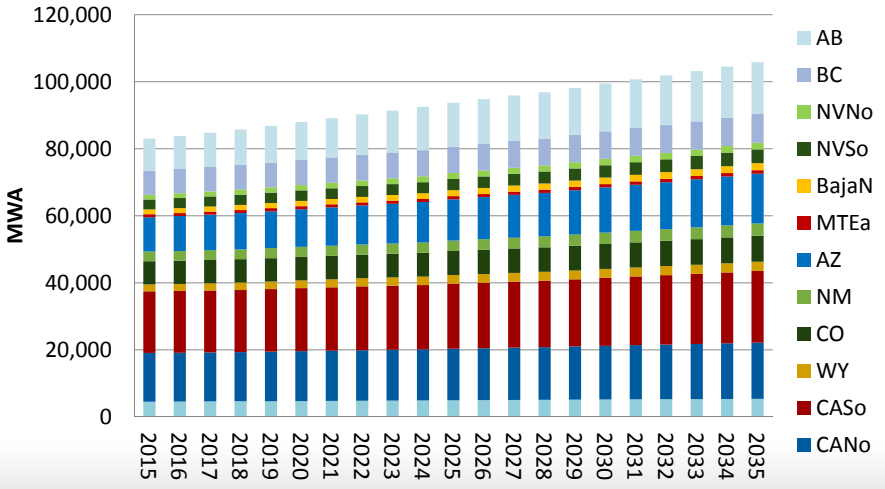
Forecast of Average Loads Outside NW



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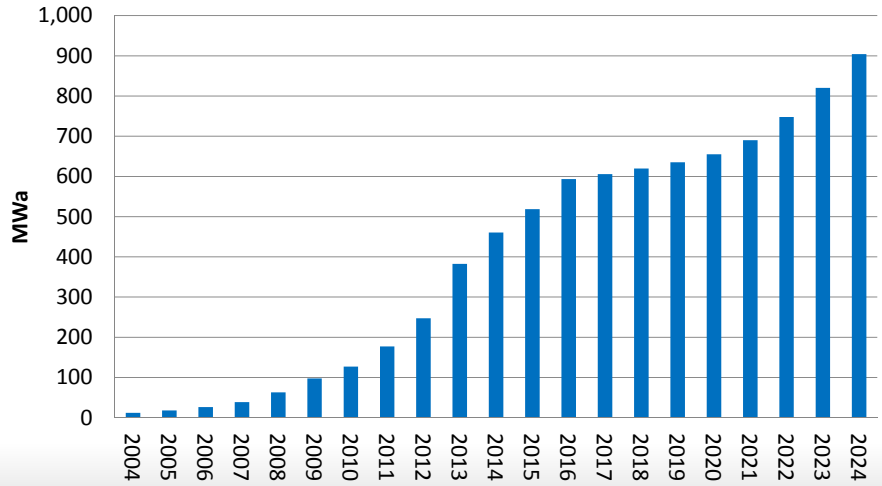
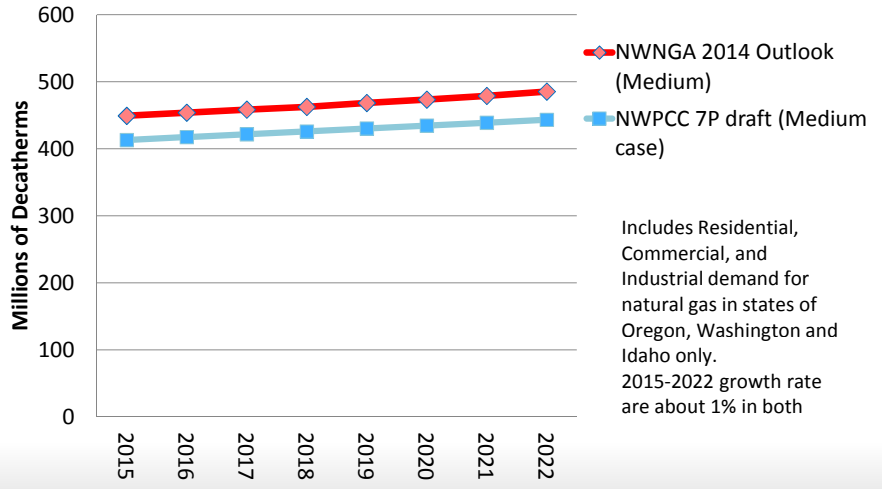
Forecast of California Consumer Site PV Generation (CEC 2013 Forecast)



Comparison of Forecasts of Demand For Natural Gas (preliminary)

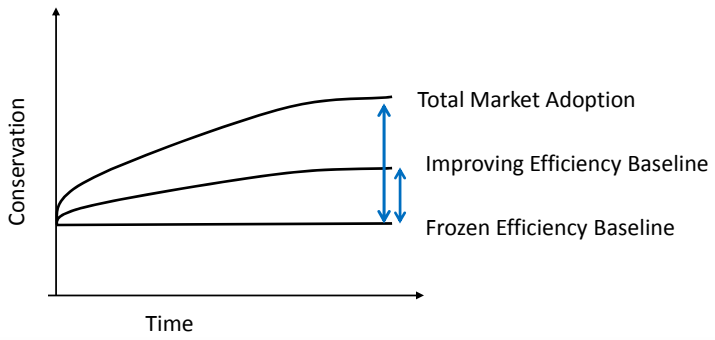


Includes Residential, Commercial, and Industrial demand for natural gas in states of Oregon, Washington and Idaho only.
2015-2022 growth rate are about 1% in both

To Freeze or Not to Freeze or When to Freeze

- Frozen Efficiency
  - What is it?
  - Why we have used this concept in the past in estimating conservation potential.
- New fast moving technologies and costs
  - Solid state lighting
  - Rooftop solar
- If we "freeze" efficiency at today's level and cost, we could overstate the need for program intervention as well as the cost of acquiring these savings

Savings Potential & Baseline



Potential Impact of Solid State lighting…

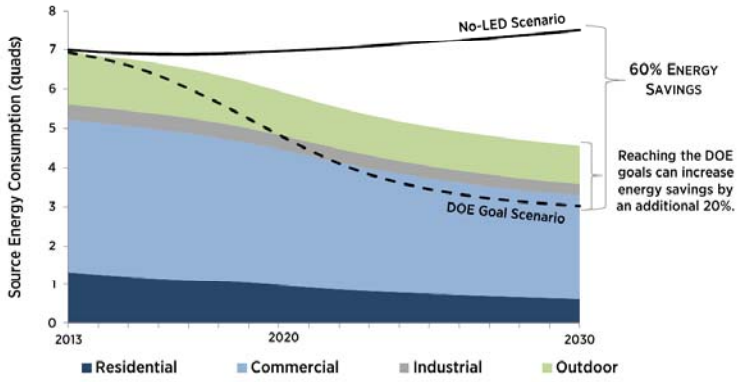


Figure 4.1 Forecasted LED Energy Savings if DOE SSL Program Goals are Realized

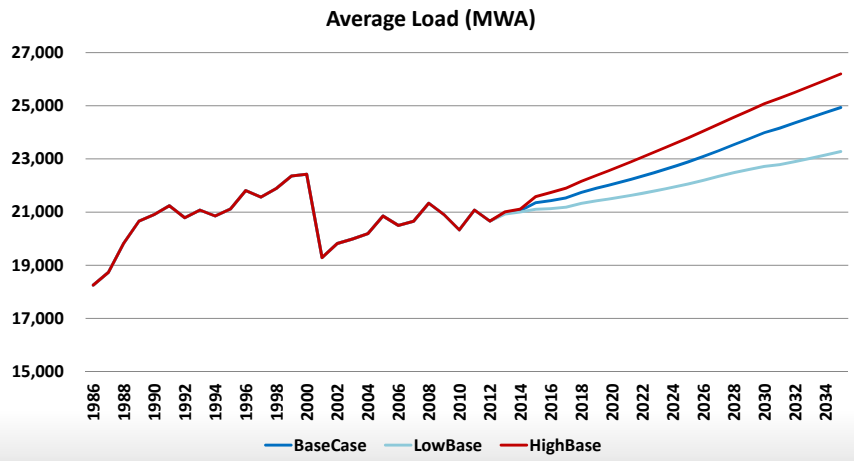
Next steps

- Prepare load forecast for use in RPM
- Conduct the analysis and report on Direct Use of Natural Gas (Feb presentation)
- Between Draft and Final Plan, update forecast to reflect:
  - Commercial Building Stock Assessment
  - Industrial Facilities Assessment
  - Incorporate new appliance load shapes
  - 2013 data on sales

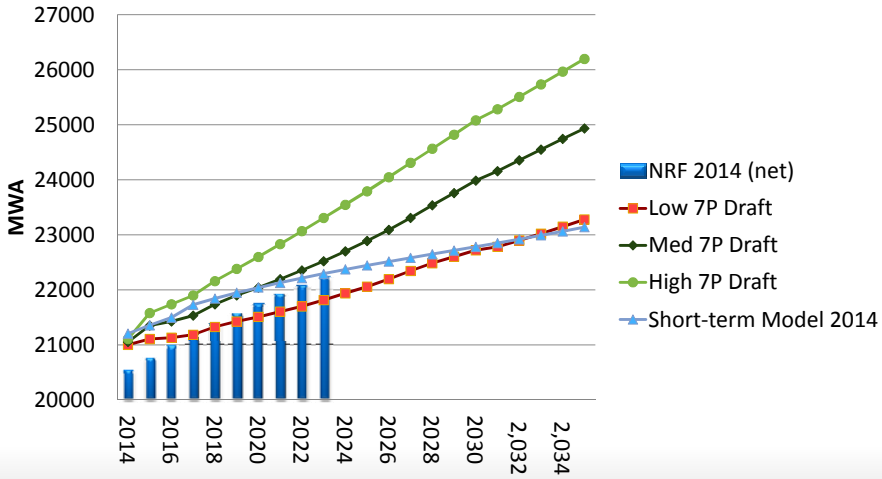
Thank You.

Additional slides not part of presentation

Draft Load Forecast 2015-2035

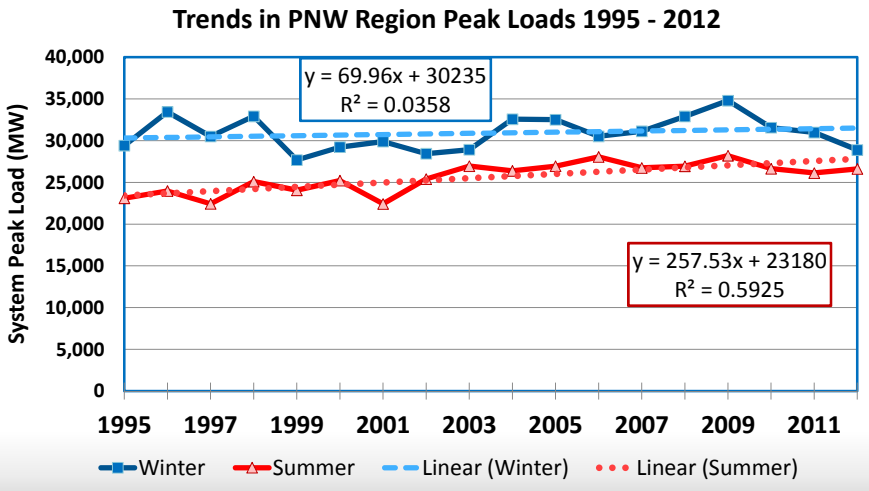


Comparison of 7th Plan Load forecast with Other forecasts



Source: 2013 G.R.A.C2

Winter Peaks Haven't Grown, While Summer Peaks Have



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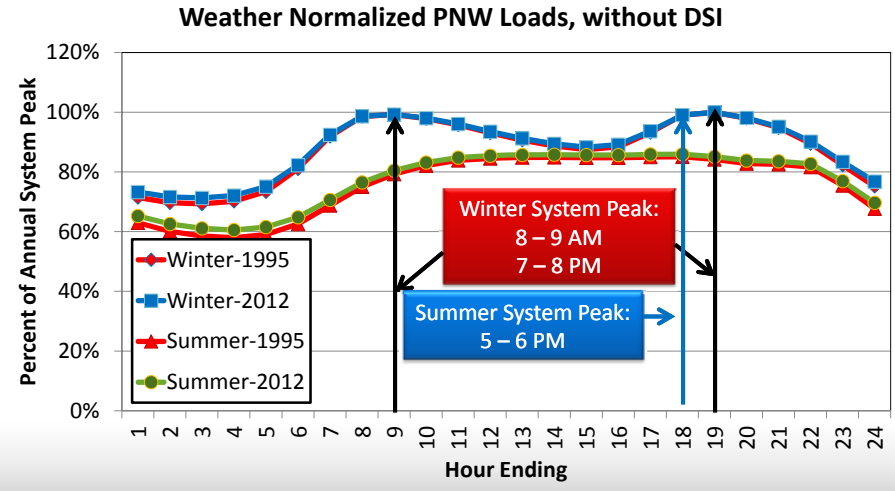
The PNW System's Daily Load Profile Largely Unchanged Since 1995



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