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

March 4, 2014

MEMORANDUM

TO: Power Committee

FROM: John Fazio, Massoud Jourabchi and Gillian Charles

SUBJECT: Net Changes in Regional Loads and Resources since 1995

At the January Power Committee meeting, staff presented a review of how Pacific Northwest electricity peak and energy loads have changed since 1995. That was followed, at the February meeting, with a review of how regional generating resources have changed over the same time period. At the March meeting, the final piece of this work will be presented, which shows the net change in regional loads and resources.

On the load side, observed regional system energy loads (net of direct service industries) grew at an average rate of 0.40 percent per year from 1995 through 2012. After removing impacts of weather, the average growth rate for regional energy loads was 0.46 percent per year. Coincident winter peak loads (net of direct service industries) during that same period decreased by about 0.10 percent per year while summer peak loads increased by about 0.8 percent per year. Overall, annual load has increased a little over 1,300 average megawatts since 1995. The winter peak load dropped 520 megawatts and the summer peak load increased by 3,500 megawatts during the same period.

On the resource side, about 16,600 megawatts of new installed capacity has been added to the regional power supply, while only 870 megawatts has been retired. During that same period, the generating capability of the existing hydroelectric system was reduced due to increasing non-power constraints and increasing needs for within-hour balancing reserves. Overall, the power supply has gained about 8,200 average megawatts of energy capability but only about 2,000 megawatts of increased peaking capacity.

At the March Power Committee meeting, we will present information showing the net impacts of changes in regional loads and resources since 1995.
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Net Changes in Northwest Loads and Resources Since 1995

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Power Committee Meeting
March 2014

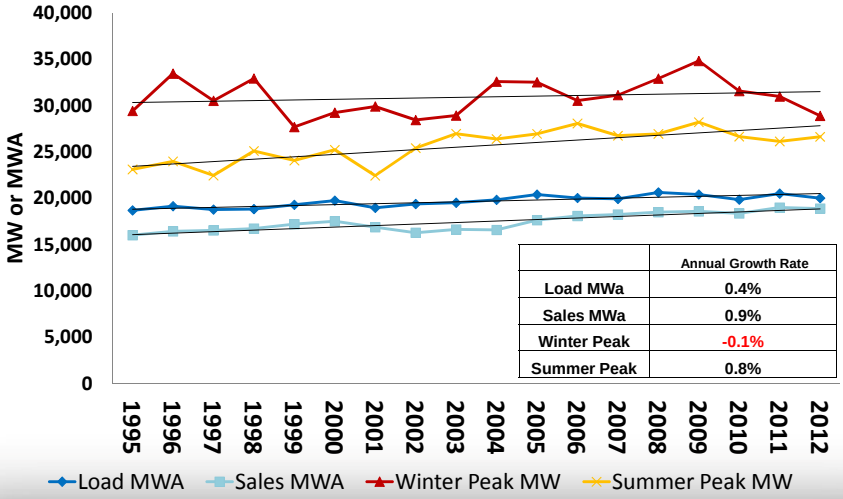
Recap of Loads and Sales

- In January, trends for system loads and retail sales were presented for the 1995-2012 period.
- Annual growth rates:
  (net of DSI and energy efficiency savings)

1995-2012	Annual Growth Rate
Load MWa	0.4%
Sales MWa	0.9%
Winter Peak	-0.1%
Summer Peak	0.8%

Trends in Regional Loads and Sales

Net of DSI and EE Savings

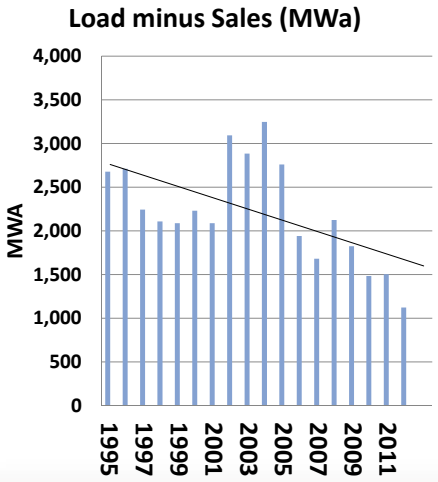


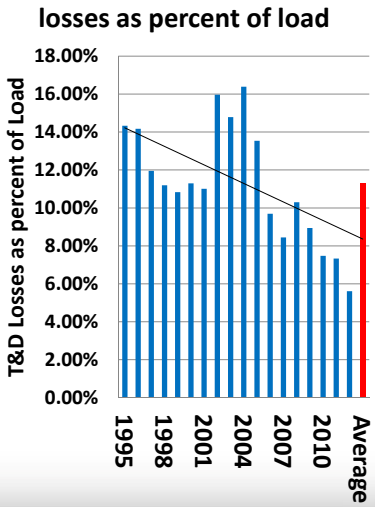
	Annual Growth Rate
Load MWa	0.4%
Sales MWa	0.9%
Winter Peak	-0.1%
Summer Peak	0.8%

Reconciling Different Growth Rates for System Load and Retail Sales

- At first glance one would expect growth rate in load and sales to be the same.
- Why are sales growing faster than loads?
- Council staff discussed this question with the Demand Forecast Advisory Committee.
- A number of contributing factors were identified.
- Changes in T&D losses is a key factor.
- Also asked PNUCC to ask their member utilities for their experience with meter replacement/AMR.

Losses Declined During 1995-2012





Some of the Factors that May Be Reducing T&D Losses

Factors Reducing Losses	Factors Increasing Losses
Better/more accurate Meter reading (AMI/AMR)	Increase in Sales far from generation
Reduced theft- increase in retail sales without increase in system load.	Increase in transmission loading
Investment in T&D efficiency (e.g., conservation voltage reduction programs)	Increase in summer temperature
Energy efficiency - resource and sales are in the same location. (load losses)	
Large Industrial Sales have been recovering - motor loads are smaller	
Greater generation coming from Renewable resources and onsite generation	
Greater reliance on market (monetized losses)	
Increase in Winter temperatures	

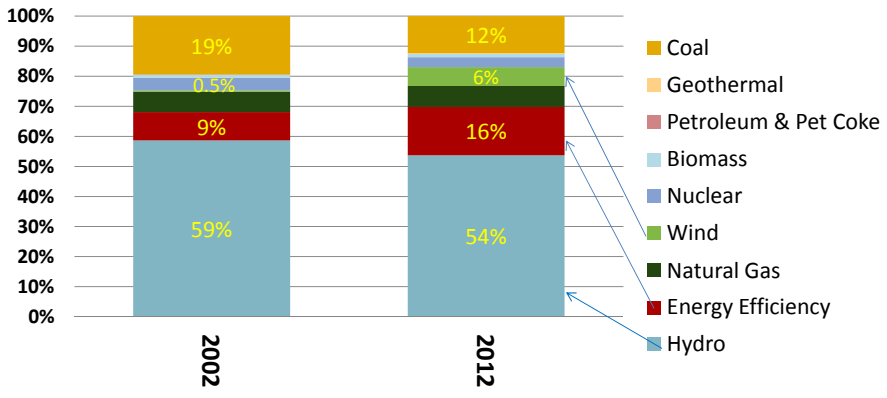
Percent of Customers on Advanced Metering in 2012

	Residential	Commercial	Industrial
ID	90%	86%	72%
MT	94%	63%	63%
OR	64%	58%	47%
WA	55%	54%	21%

Source: utility filing with DOE. Through EIA 861 filing for 2012.

There may be further opportunities for reducing losses through more efficient metering.

Reduced Generation from Remote Resources also Lowers Losses



Share of total generation from NW plants.

2002 was a very close to a normal hydro year.

2012 was a wet year by 30%.

Recap of Resource Changes

- In February, changes in resource supply were presented for the 1995-2012 period.
- Changes in resource availability and peak:

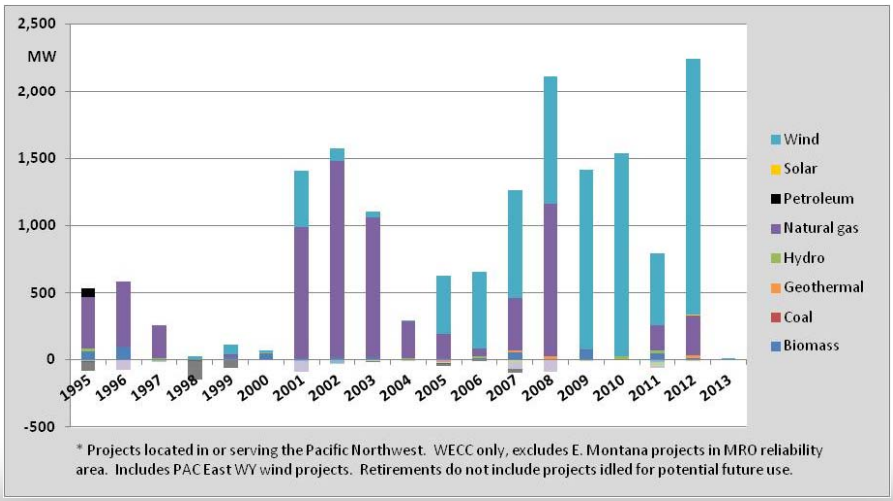
Resource	Installed	Availability	Peak
Natural Gas	6,886 MW	6,656 MWa	6,886 MW
Wind	8,737 MW	2,752 MWa	437 MW
Other[1]	140 MW	20 MWa	140 MW
Hydro	(see Other)	- 1,200 MWa[2]	- 5,400 MW[3]
Total Change	**15,763 MW**	**8,228 MWa**	**2,063 MW**

[1] Includes biomass, coal, geothermal, hydro, petroleum, solar
[2] Since 1980
[3] Since 1999 for winter peak, summer peak is reduced by -5,100 MW

Impact of INC/DEC Reserves

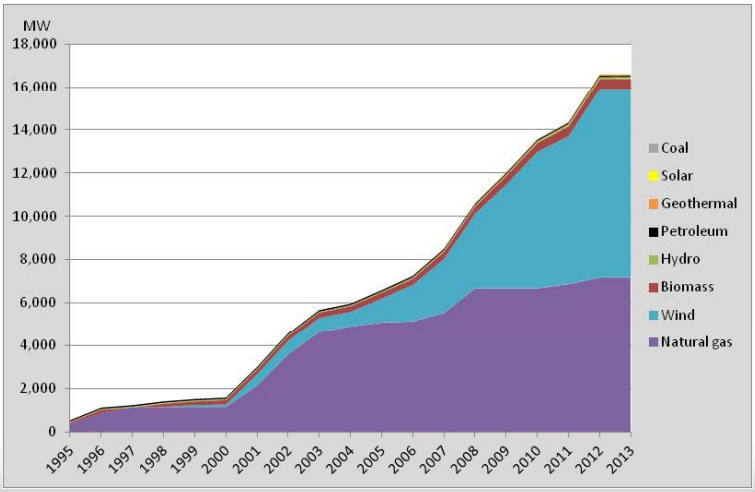
- Reduction in hydro peaking on previous slide includes increased INC/DEC reserves for within-hour variation in load and wind generation
- Total INC/DEC provided by BPA hydro is now 900/1,100 MW
- About 250 MW of the total INC and DEC are used for within-hour load variation

Additions and Retirements of Installed Generating Capacity (MW)



* Projects located in or serving the Pacific Northwest. WECC only, excludes E. Montana projects in MRO reliability area. Includes PAC East WY wind projects. Retirements do not include projects idled for potential future use.

Cumulative Change in Installed Generating Capacity (MW) Since 1995



Resources We Have Included as Available for Regional Use

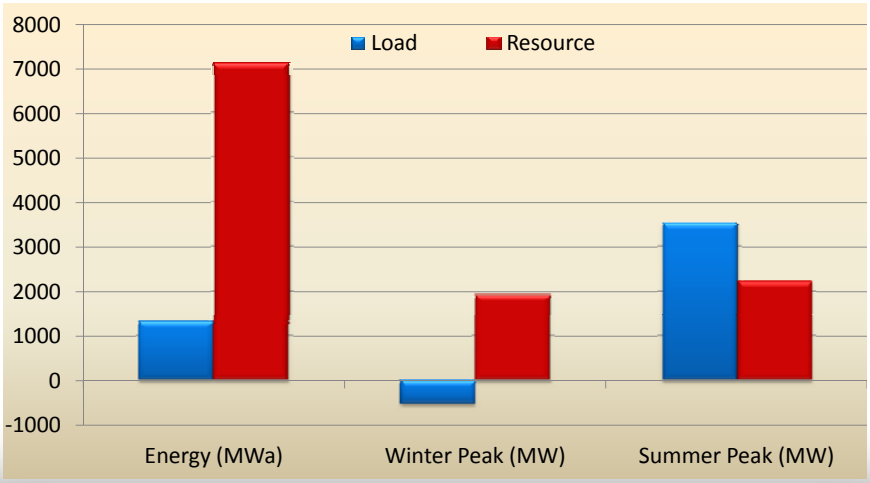
- All resources physically in the region, serving NW load
- Some out-of-region resources (including wind) that are committed to serve NW load
- About 2,200 MWa of independent resources inside the NW

Resources We Have Not Included as Available for Regional Use

- About 3,000 MW of wind physically in the NW but serving California loads
- Resources physically inside the NW but committed to serve out-of-region load
- Out-of-region market supplies (imports)
- PacifiCorp resources dedicated to serving their loads outside of the NW

Putting it All Together: Load[1,2] and Resource Changes

1995 - 2012



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[1]Based on weather normalized data
[2]Slide 10 totals include CA wind in the NW

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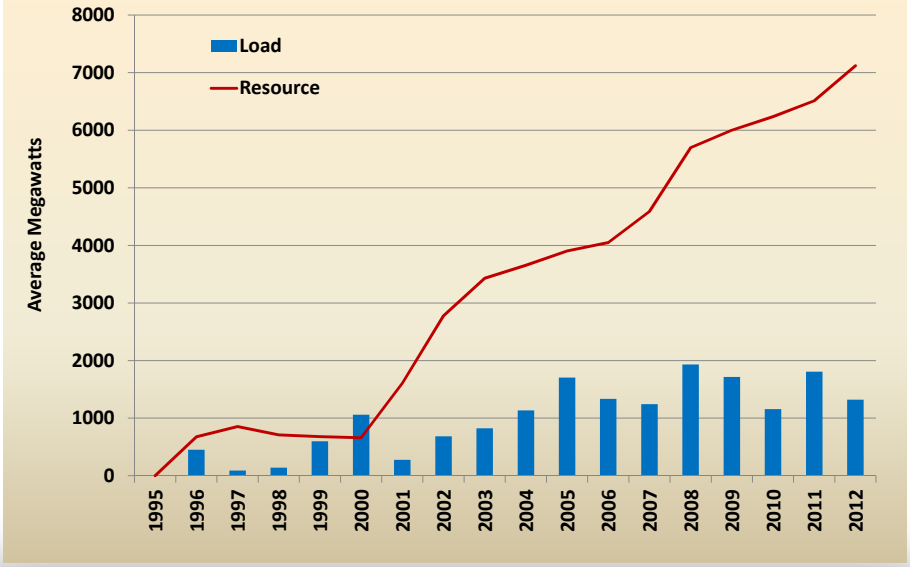
Cumulative Change in Load and Resource Energy since 1995[1]



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[1]In 2012, includes about 2,200 MWa of IPP (market) availability and about 1,500 MWa of available but normally uneconomic firm generation.

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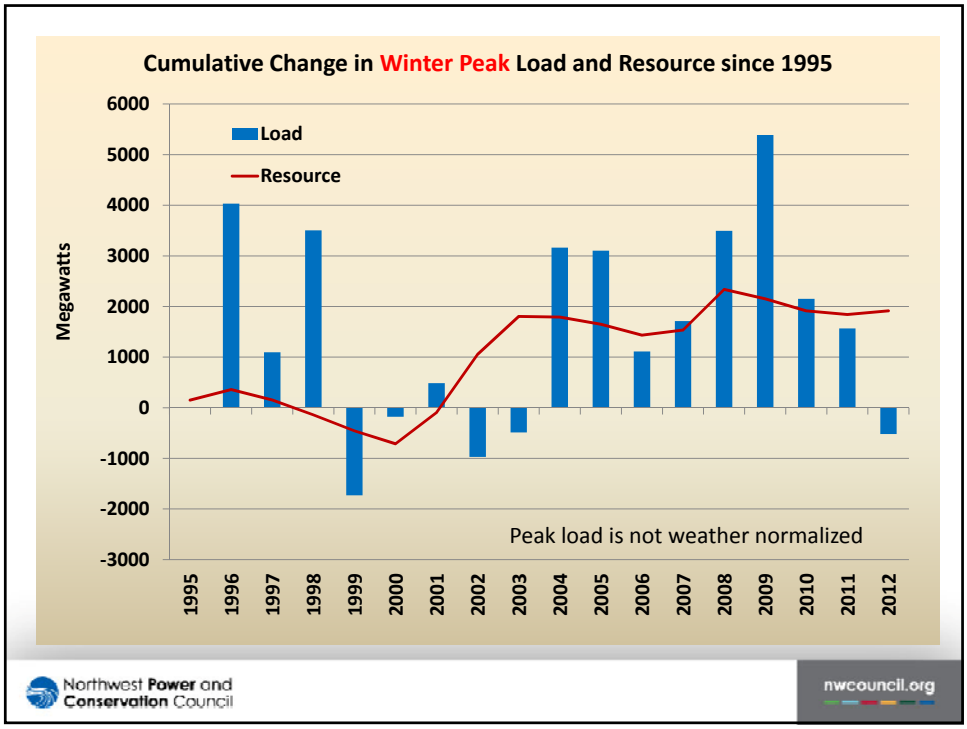
Cumulative Change in Winter Peak Load and Resource since 1995
Load
Resource
Megawatts
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
Peak load is not weather normalized
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
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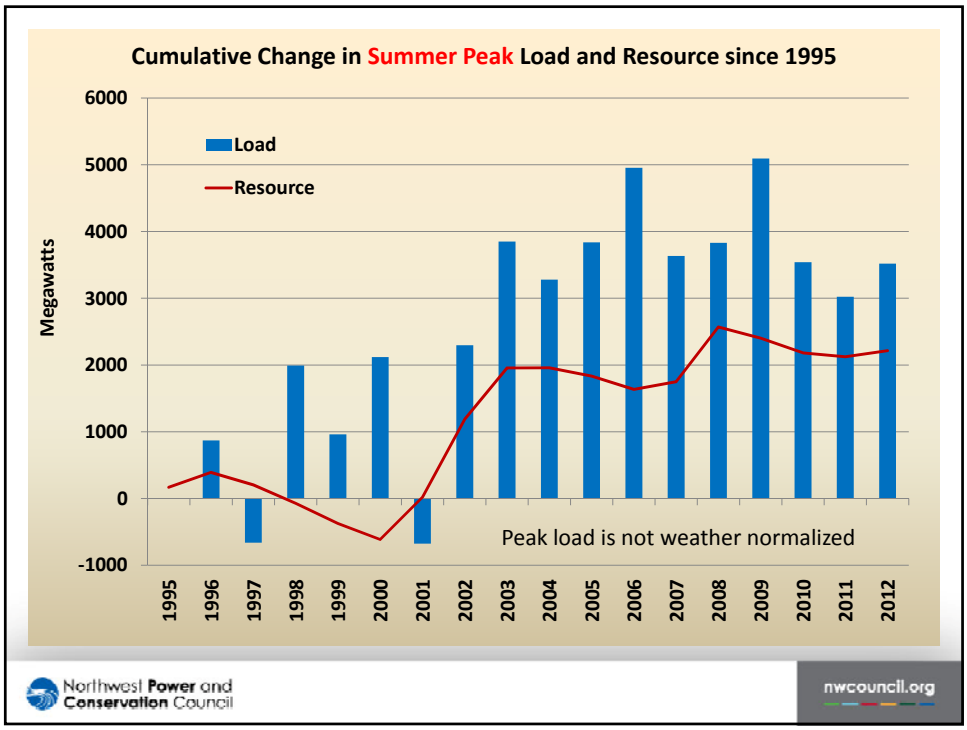
Cumulative Change in Summer Peak Load and Resource since 1995
Load
Resource
Megawatts
6000
5000
4000
3000
2000
1000
0
-1000
Peak load is not weather normalized
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
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Conclusions

- Energy efficiency is effective in keeping load growth low
- Summer peak load has grown slightly faster than winter peak load
- Biggest narrowing of resources and loads seems to be for winter peak
- This is not an adequacy assessment – that will come later this year