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

January 3, 2018

MEMORANDUM

TO: **Council Members**

FROM: **Gillian Charles**

SUBJECT: **PNW Resource Update and Demonstration of Enhanced Website Mapping Tool**

BACKGROUND:

Presenter: Gillian Charles, Eric Schrepel

Summary: Staff will provide an update on generating resources in the Pacific Northwest, annual generation and carbon emissions through 2016 (the latest year we have data for), and a look forward to resource changes coming up in the next few years.

In addition, staff will provide a preview of the updated power supply website and enhanced generating resources project map. Improvements include a new interface that allows for additional ways to filter projects on the map – by resource, size, and operating year.

Relevance: Staff tracks existing and planned generating projects in the region through the Council's project database. It has evolved over the years to store and provide a robust amount of data that is used for various Council models and analyses. It is also a public data source that is used by regional and national stakeholders.

Workplan: Prepare for Eighth Plan/Generation Resources/Update generating resource datasets and tools (C.4.1)

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PNW Resource Update and Demo of Enhanced Mapping Tool

Northwest Power and Conservation Council

Gillian Charles

January 10, 2018

Today's Discussion

Current Regional Resources

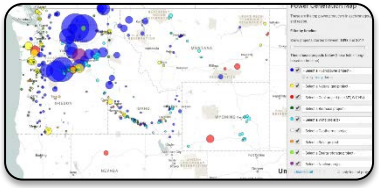
Resource Profile, Development Trends, Annual Generation

Carbon Emissions

Region, United States, Carbon Intensity

Future Resource Activity

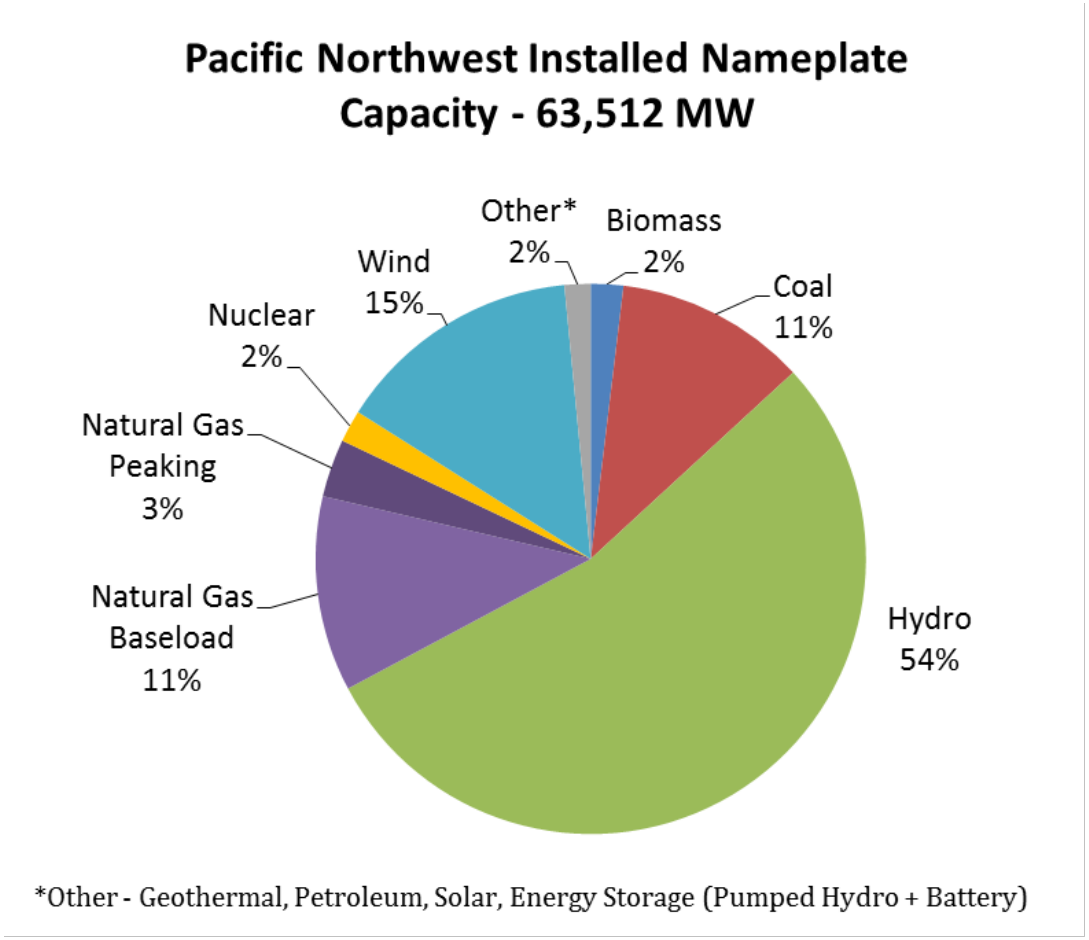
What resources and projects are coming next?



Demo of Enhanced Project Map

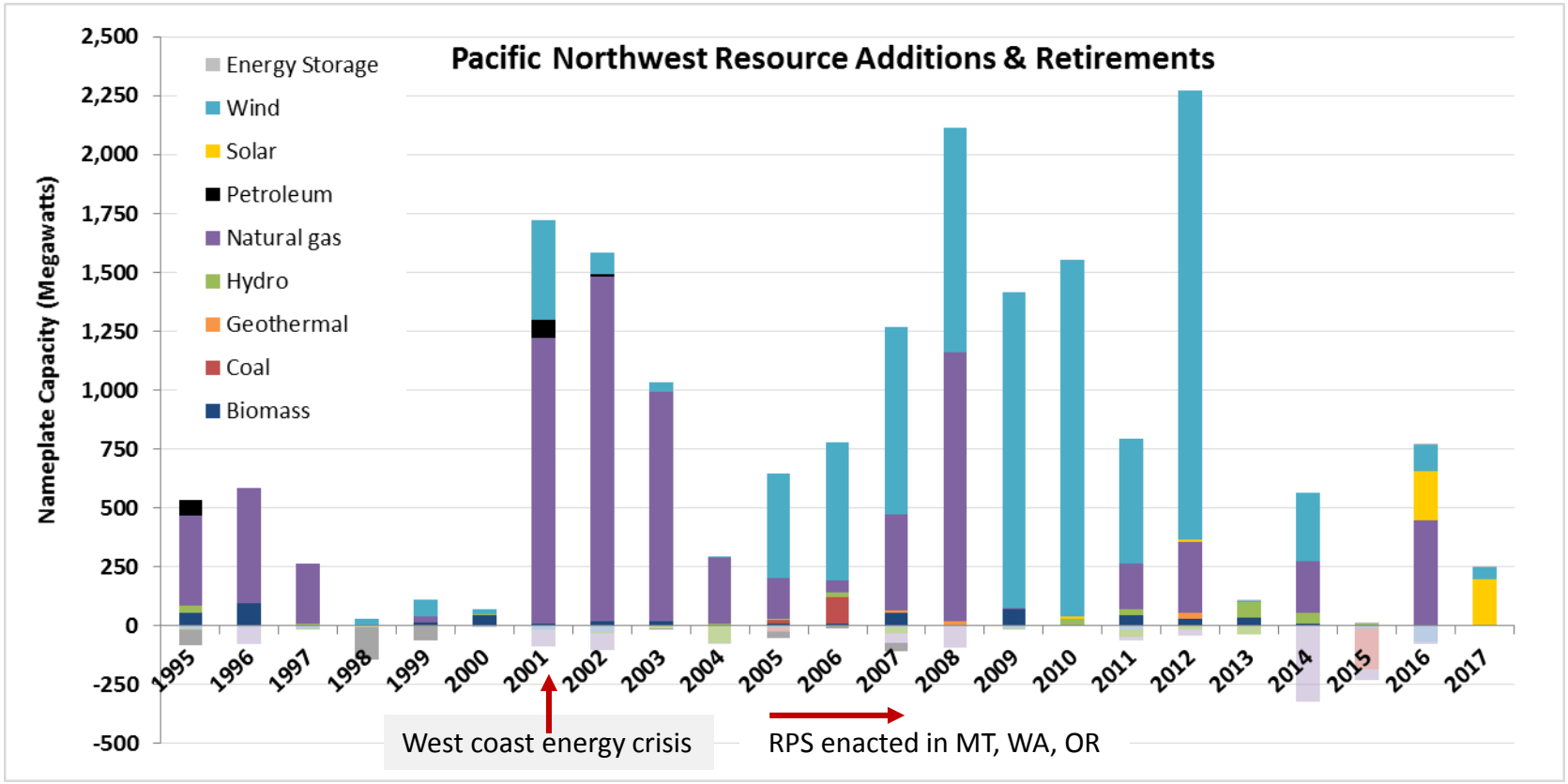
Power supply webpage and project map feature

The Regional Resource Profile

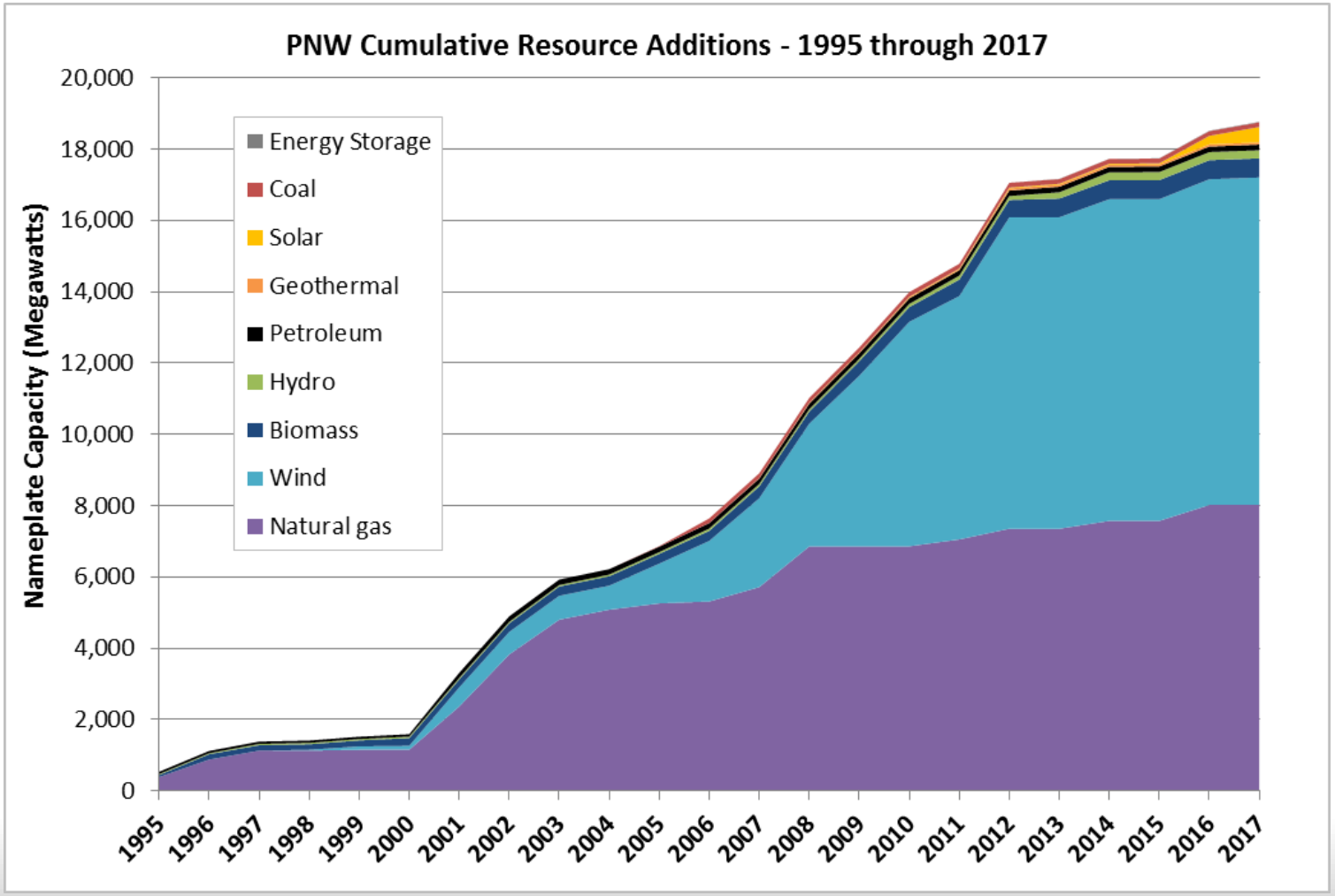


The Region is considered physical plants located within the Power Act Region or plants outside the physical boundary but contracted to PNW loads

Resource Activity in the Pacific Northwest ~ 20 years



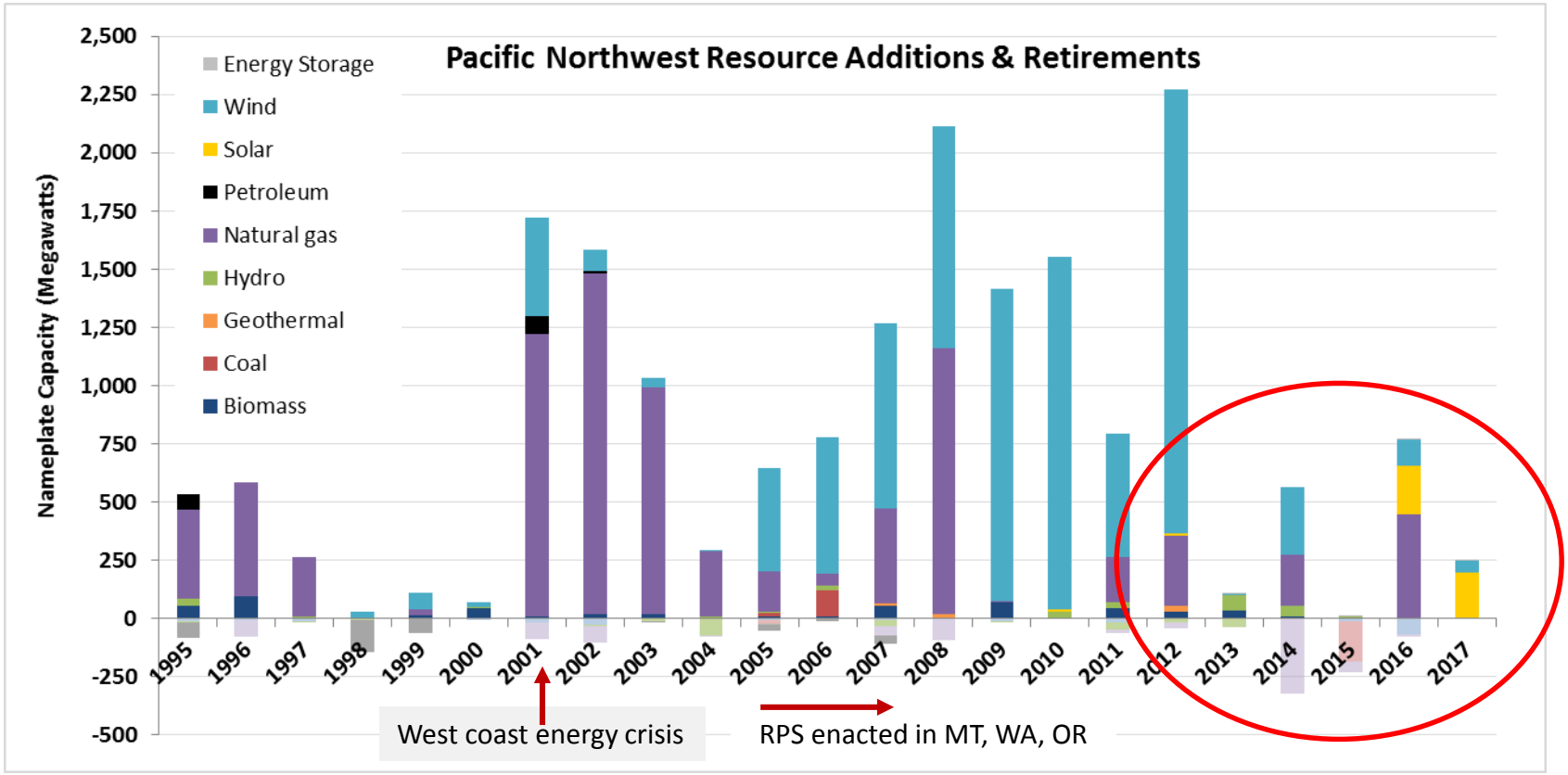
Cumulative Resource Activity in the Pacific Northwest



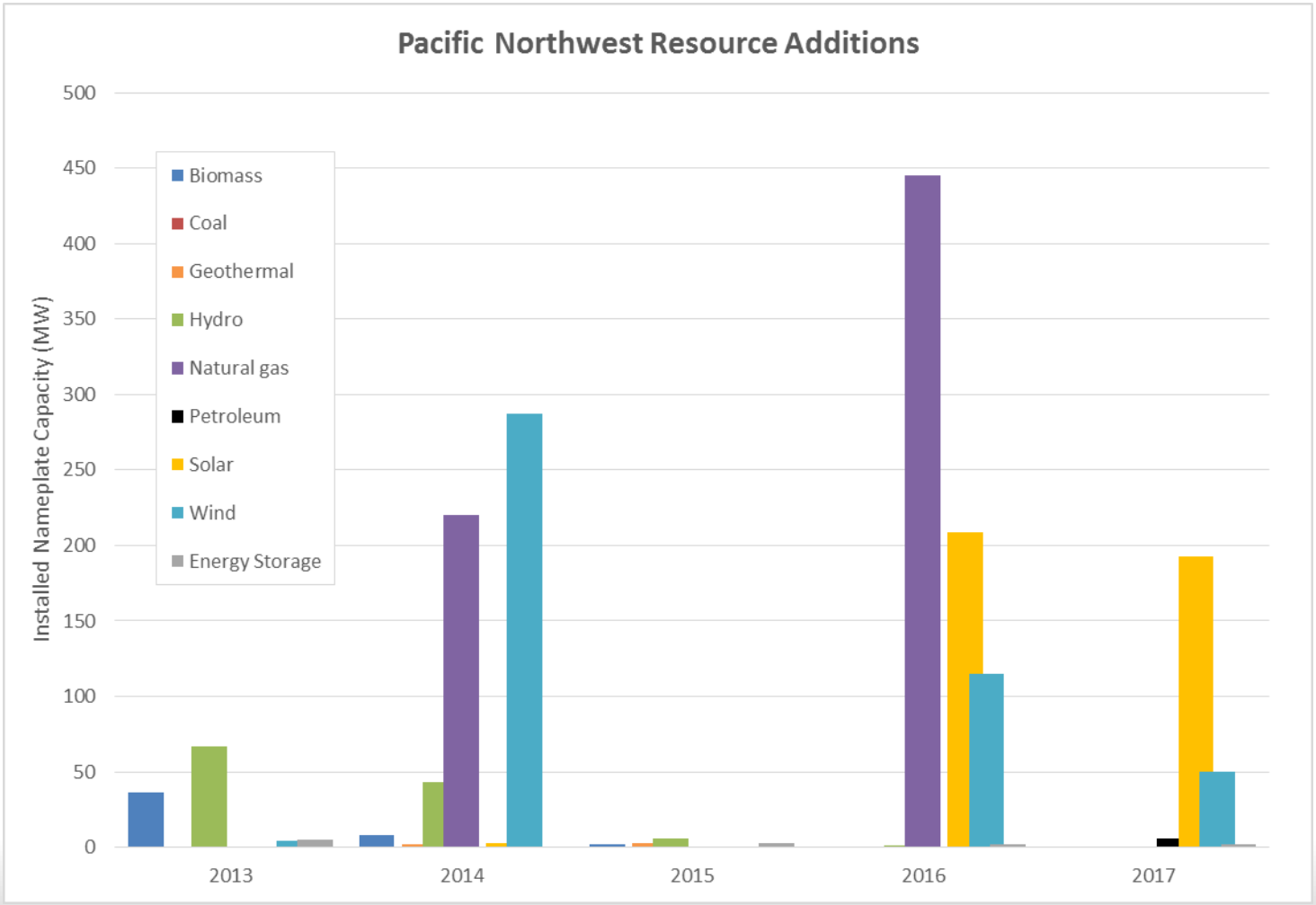
Past Trends in Development

- Development of baseload gas and gas peakers
  - Especially following the West Coast energy crisis in the early 2000's
- Introduction of renewable portfolio standards (RPS) in MT, WA, and OR
  - Development of wind, particularly in the Columbia River Gorge
- Development of small utility-scale resources, such as biomass

Resource Activity in the Pacific Northwest ~ 20 years



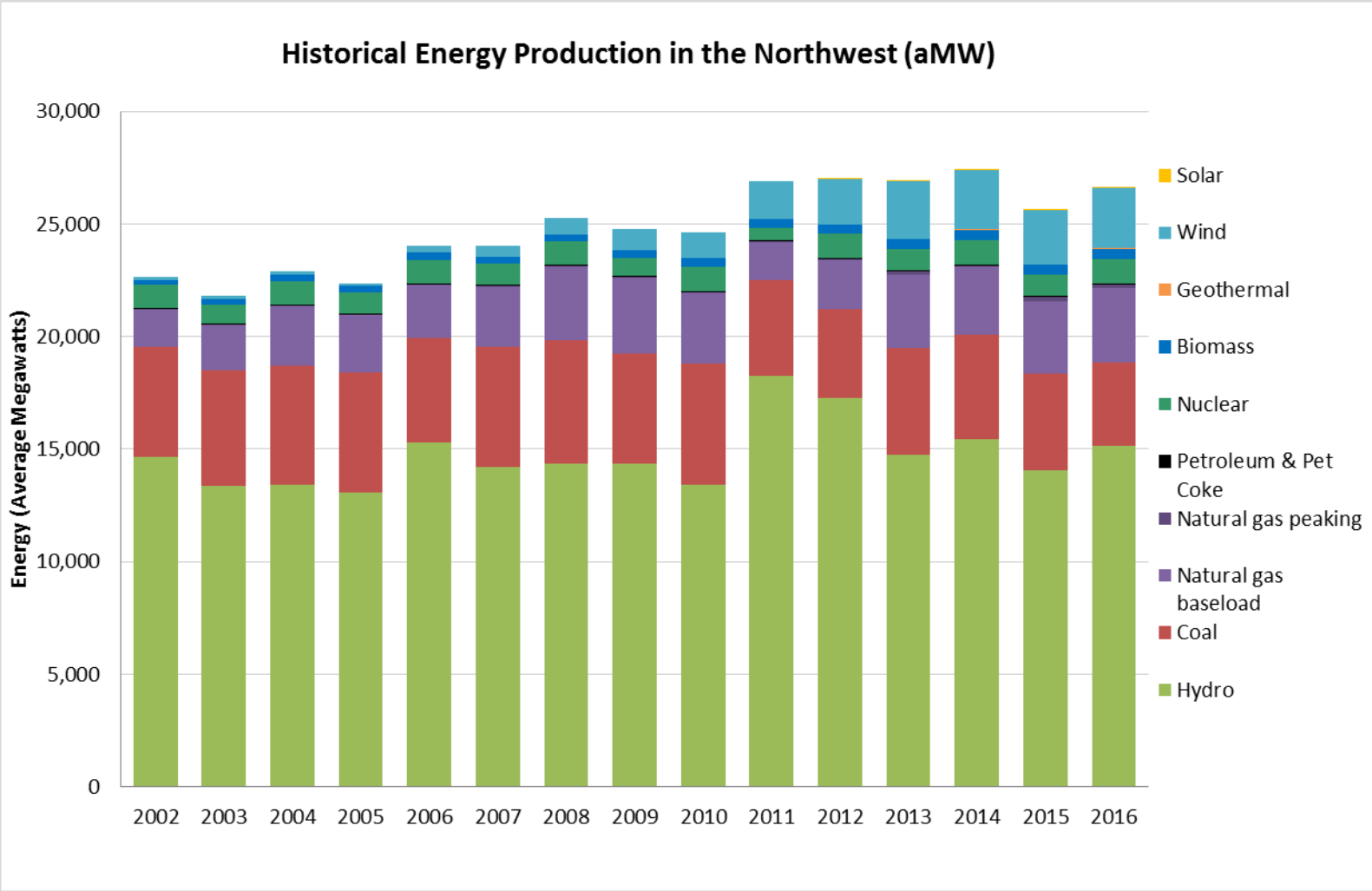
Resource Activity in the Pacific Northwest ~ 5 years



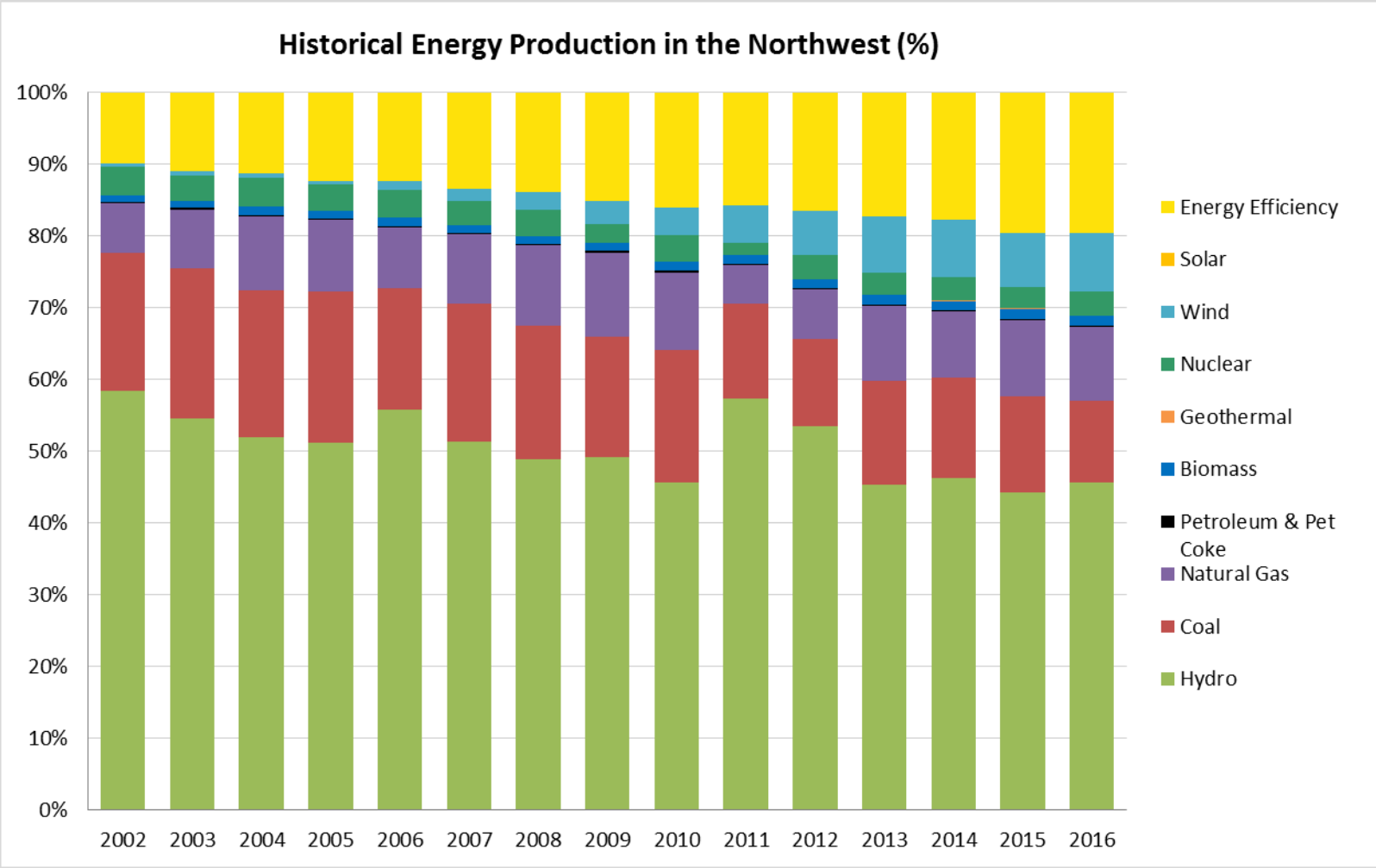
Current Trends in Development

- Flurry of development between 2000 and ~2012 followed by a noticeable drop-off
  - Near-term RPS obligations met
  - Uncertainty over federal tax incentives
- Introduction of solar PV as a PNW resource, particularly in S. Idaho and E. Oregon
  - Price of solar has dropped significantly and is now competitive with wind and other resources
  - Utilities looking for resource diversity within portfolio mix
  - Lots (!) of PURPA activity, particularly solar PV
- Introduction of battery energy storage, starting with pilots and concept projects

Historical Annual Generation (1)

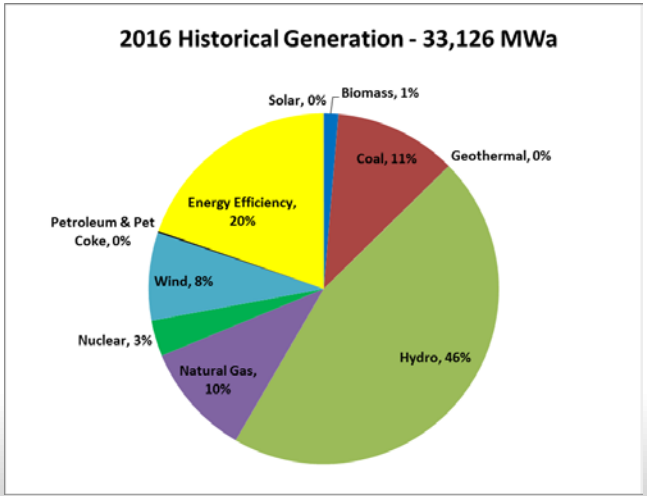


Historical Annual Generation (2)

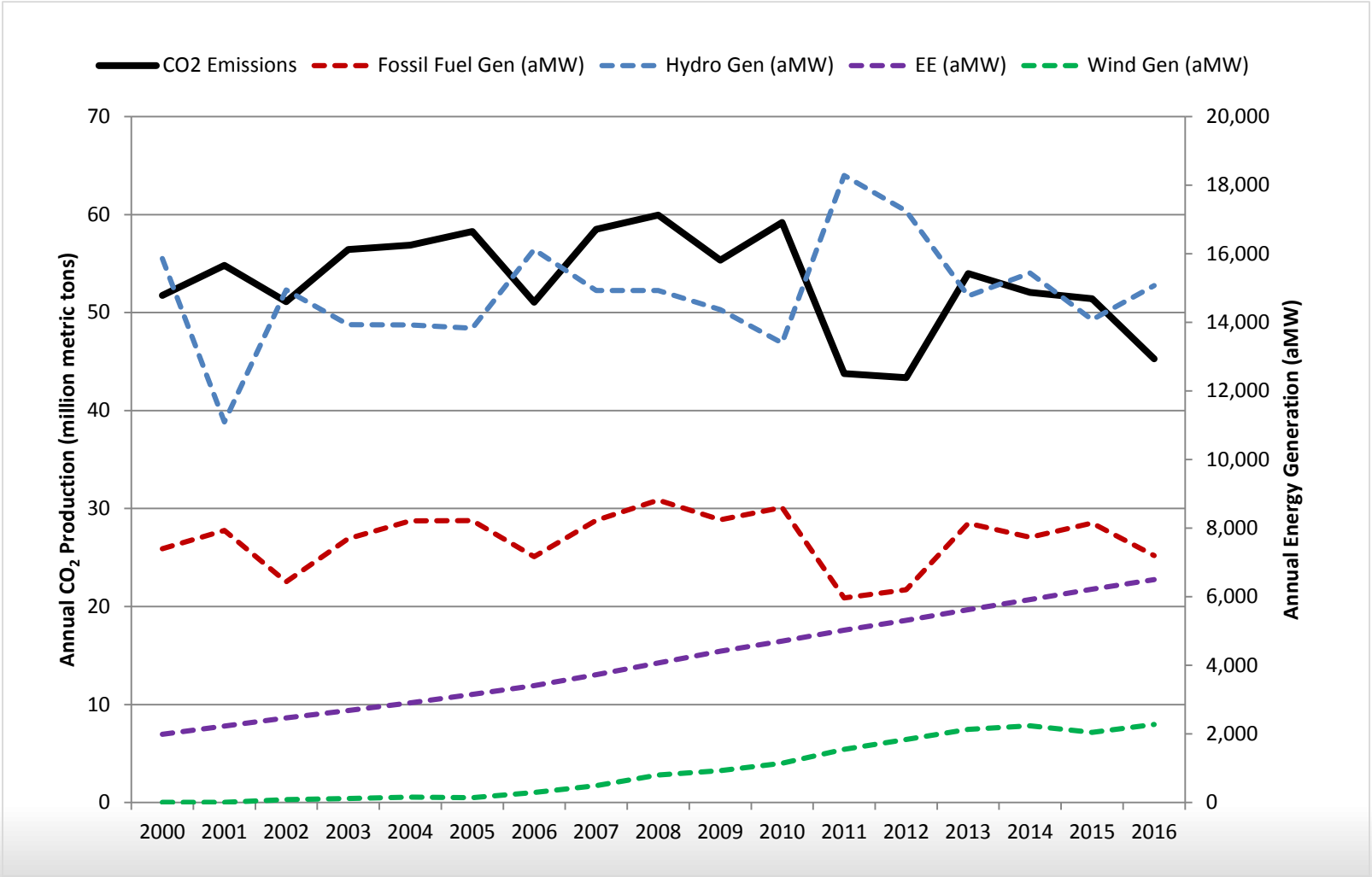


Trends in Generation

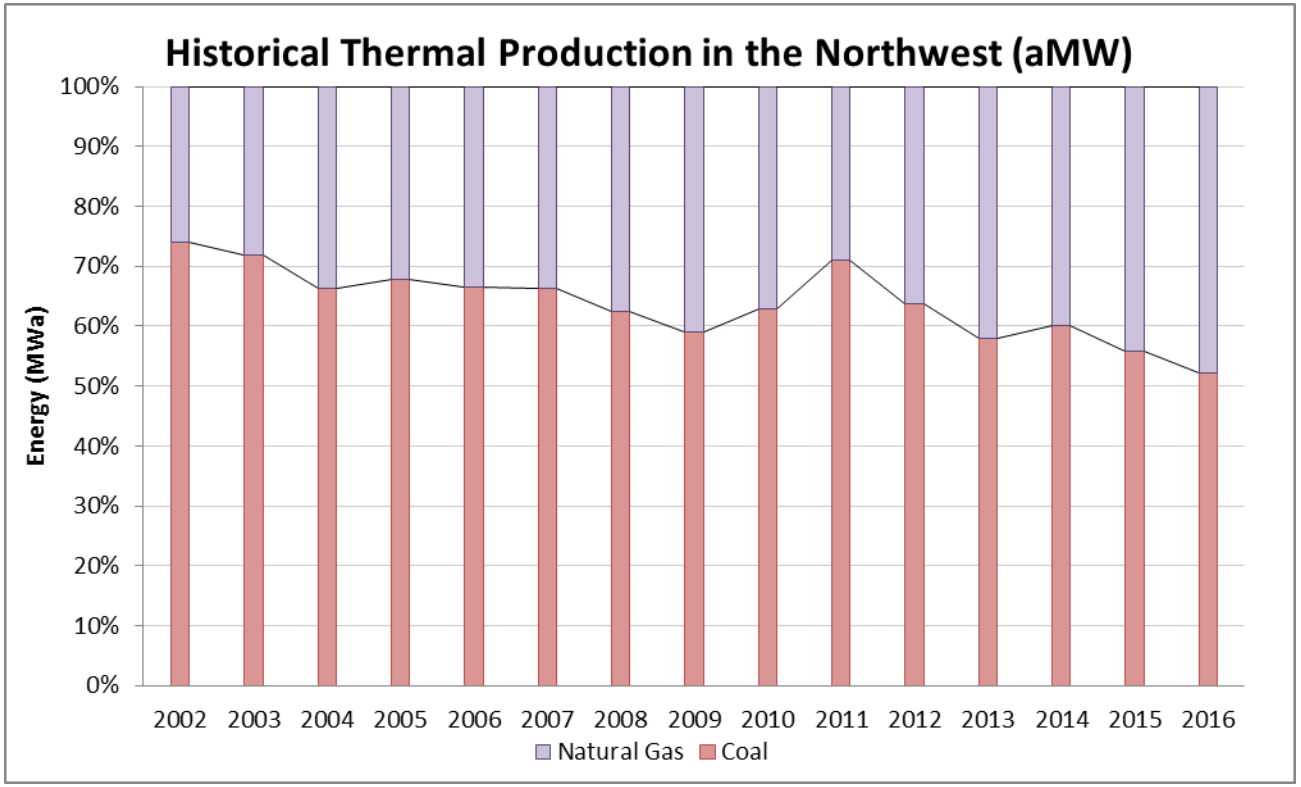
- Hydropower is still the reigning champion in the Pacific Northwest
  - Remaining resource dispatch highly dependent on the type of hydro year
    - "good" vs. "bad" hydro year (average hydro year = ~16,000 aMW)
- Baseload fossil fuel generation dynamic between coal and natural gas is changing
- Renewables making a greater contribution to energy
  - Wind now accounts for about 10% of the energy generated (however not all of this is designated to the PNW)
- Energy efficiency is the region's second largest resource



Regional Annual Carbon Emissions from Power Production

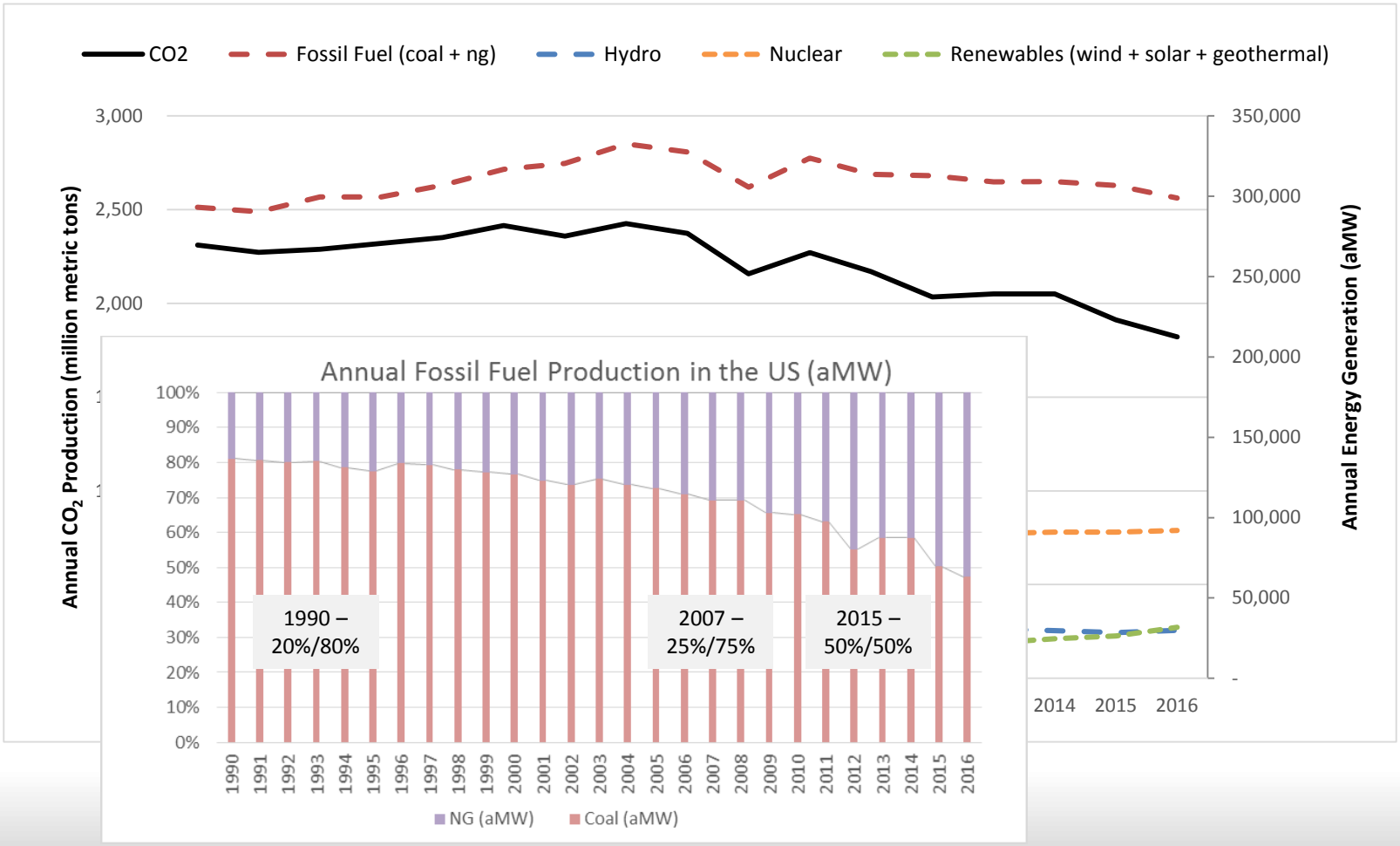


Fossil fuel production is changing

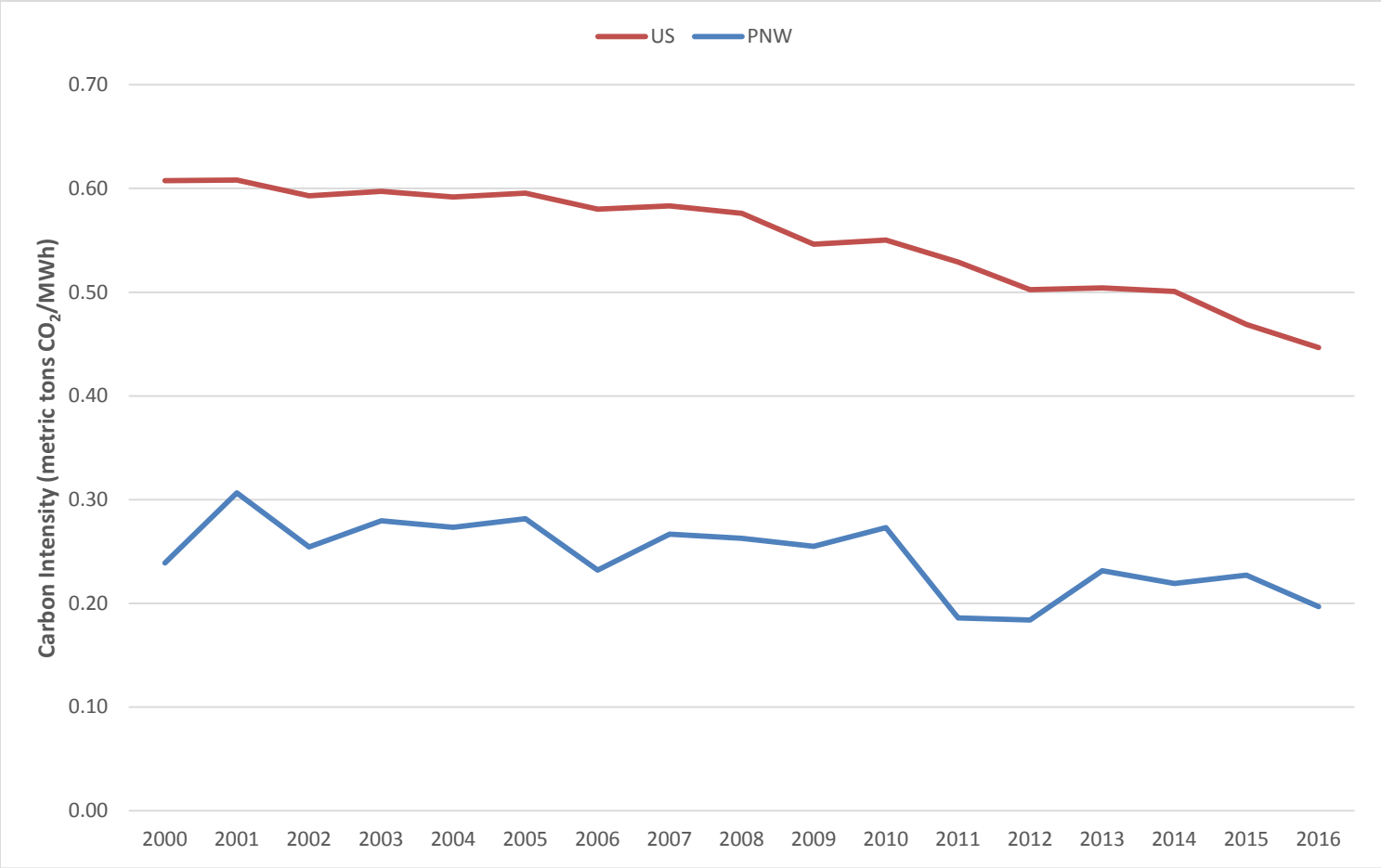


Fuel Type	Emissions (CO_2/MMBtu)
Coal	205.7 – 228.6 lbs
Petroleum/Oil	161.3 lbs
Natural Gas	117 lbs

National Annual Carbon Emissions from Power Production

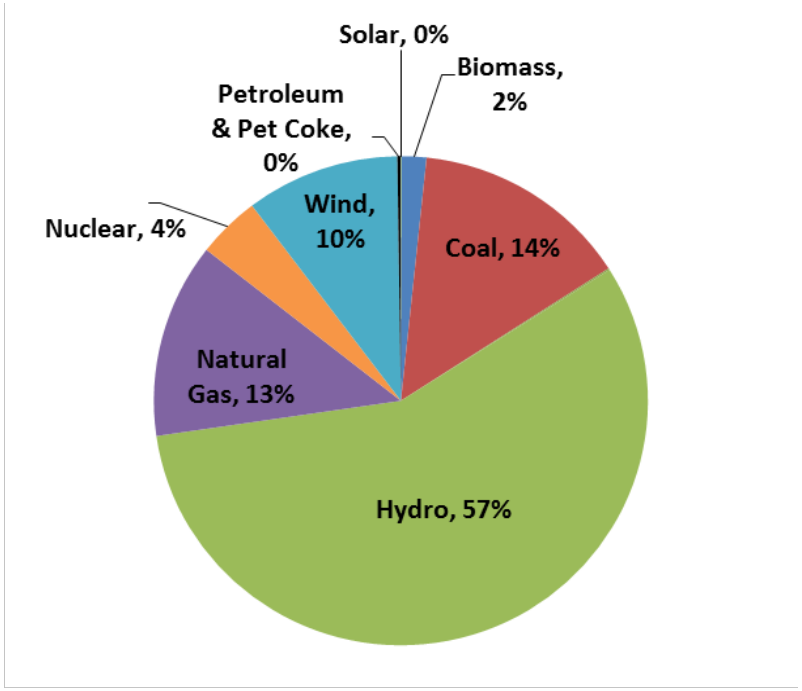


Carbon Intensity of the PNW versus the US

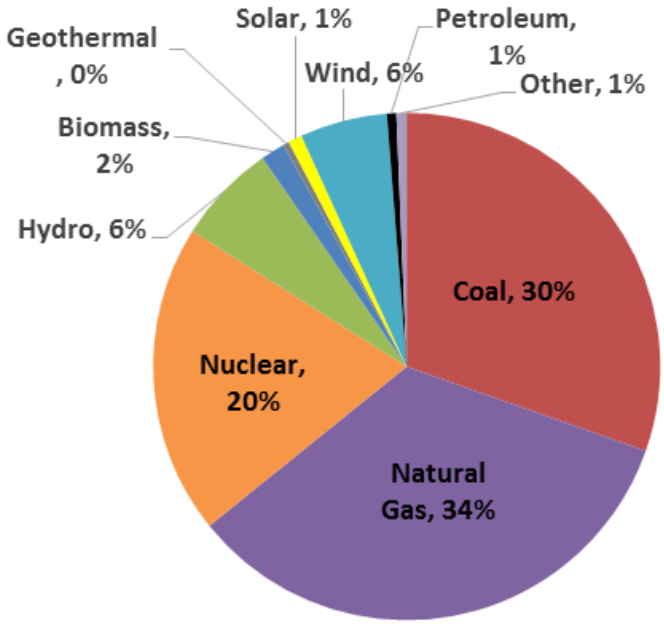


Region vs. U.S. Generation (2016)

Pacific Northwest – 26,626 aMW



United States – 465,391 aMW



Data Source: EIA

Trends in Carbon Emissions

- At the regional level, not a significant decrease… yet
  - PNW is rich in hydro
  - Addition of renewables and commitment to energy efficiency
  - Coal retirements have been announced
- At the national level, noticeable downward trend of emissions
  - Increased production of natural gas, decreased use of coal

Planned Coal Retirements - Region

Plant	Retirement Date	Capacity & Op Yr	Location	Ownership
J. E. Corette	2015	173 MW (1968)	Billings, MT	PPL Montana**
Hardin	2018	116 MW (2006)	Hardin, MT	Rocky Mountain Power (Not related to PAC)
Boardman*	2020	600 MW (1980)	Boardman, OR	PGE, Idaho Power (90/10)
Centralia – 1 Centralia – 2	2020 2025	670 MW (1971) 670 MW (1971)	Centralia, WA	TransAlta
Colstrip – 1 Colstrip – 2	2022	360 MW (1975) 360 MW (1976)	Colstrip, MT	PSE, Talen Energy (50/50)
North Valmy – 1 North Valmy – 2	2019 2025	254 MW (1981) 268 MW (1985)	Valmy, NV	Idaho Power, NV Energy (50/50)
Jim Bridger – 1*** Jim Bridger – 2***	2028 2032	578 MW (1974) 578 MW (1975)	Sweetwater, WY	PAC (2/3), Idaho Power (1/3)
Regional Total		**3,037 MW****		

* Ceasing coal-fired production; future of Boardman plant TBD
** Out of region (OOR)
*** Not a commitment; only part of PAC 2017 IRP forecast. Decision on SCR to be made by PAC in early 2018. Idaho power also evaluating SCR and early retirement in their IRP process with no decision yet.
**** includes 50% of North Valmy; does not include Corette or Bridger

Resource Activity: What's coming next?

- Lots of solar PV activity
  - Hundreds of MWs in proposed QF projects
- Wind projects under construction
  - Montague (220MW), Montana projects (185 MW)
- RFPs out for renewables (PGE, PAC)
- Hydro upgrades ongoing

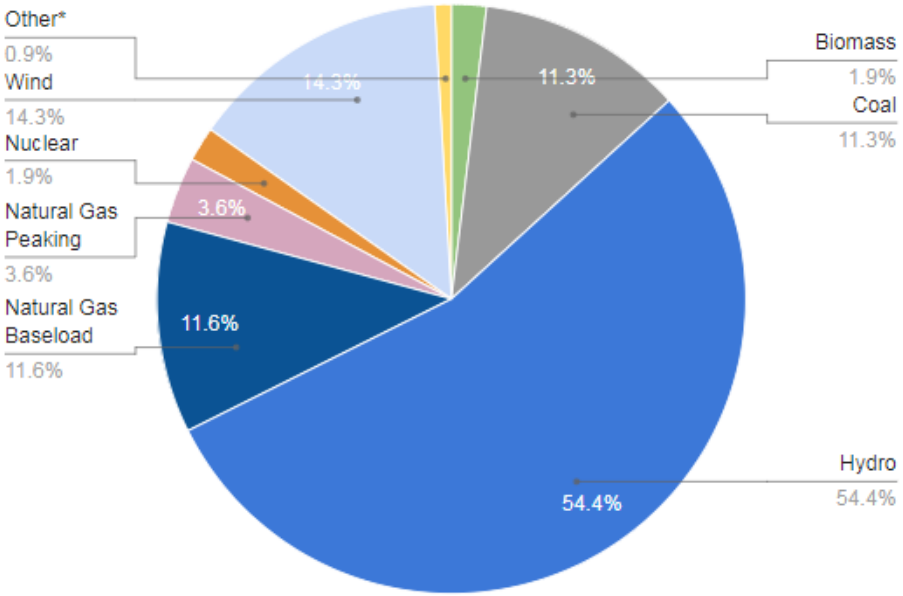
Stay tuned: Future Power Committee/Council Meeting, presentation on anticipated aggregated resource supply needs from the region's Integrated Resource Plans (IRPs)

POWER SUPPLY

Existing and new/proposed power plants

Charts below are based on the Council's generating resources project database (Excel file, updated Jan 2018) of projects under construction, permitted sites, proposals, recently-completed projects and recent retirements. Email corrections/updates to Gillian Charles.

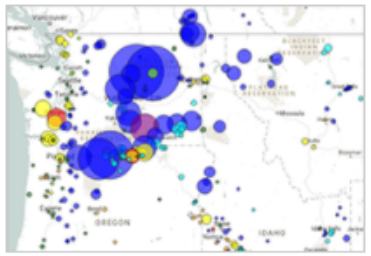
Pacific Northwest Generating Capacity: 63,104 mw*



Capacity is essentially the 'horsepower' rating of power plants, or how much they are designed to produce at full load operation. Download chart as PNG

* Other includes geothermal, petroleum, and solar

Power generation map



View hundreds of Northwest power facilities with links to detail for each facility. Also see the Dam Guide.

Power supply outlook

The outlook provides a daily snapshot of reservoir levels, water flows, and power flows in the Northwest.

Reports

- Power Supply Adequacy Assessment for 2022 (July 2017)

California ISO outlook

California leads the nation in

Improvements to the Resource Map

- Map markers reflect magnitude of the project (MW), in addition to resource type
- Added new timeline feature, to filter projects based on service date
  - As you change the slider markers, the map and lists of projects in the drop-downs change

Stay tuned: Still working on a few new features and are always open to additional suggestions!

- Add the ability to download filtered map as an image
- Add a second map that shows proposed projects
- Additional ways to filter – for example, by balancing authority

Interactive Project Map on Council Website