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

July 1, 2014

MEMORANDUM

TO: Council Members

FROM: Ben Kujala

SUBJECT: PNUCC presentation: Carbon - a Northwest perspective

PNUCC has recently been analyzing the carbon footprint of the Northwest. The analysis defines a footprint for the Northwest power system, examines the associated carbon emissions and discusses options for carbon reduction. PNUCC will be releasing a white paper to help provide context for policy conversations about carbon emissions, including conversations about the new EPA 111(d) regulations.

Staff supplied some input data from the Council. PNUCC incorporated these Council data with PNUCC member data to pursue this analysis. Dick Adams, the PNUCC Executive Director, and Tomás Morrisey, a PNUCC Policy Analyst, will discuss this work and share results with the Council Members.

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Carbon Emissions: a Northwest Perspective

A discussion on carbon dioxide emissions and the Northwest electric power sector

Northwest Power & Conservation Council

July 9, 2014

Carbon Paper Purpose

- Hit the Refresh Button
- Inform Ongoing Policy Discussions
- Provide Context for Northwest Power Sector Emissions
- Contribute to Council Power Plan Development

For Today's Discussion

Game Plan

- Share our observations
- Stop Ask Listen

Goal

- Do the key points resonate with you?
- Are there are other concepts to address?

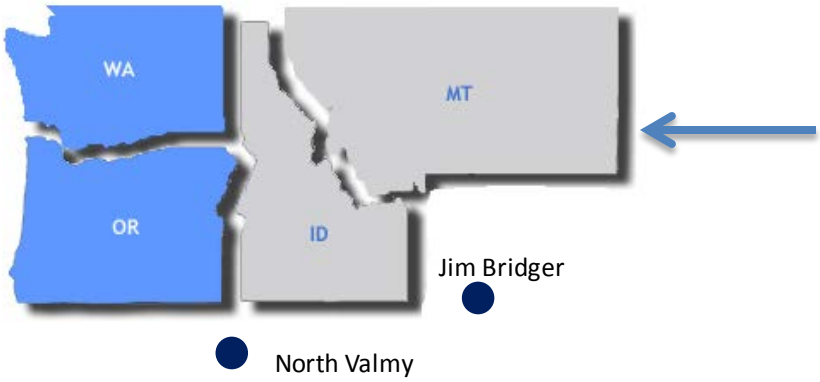
PNWCC

Seven Key Points

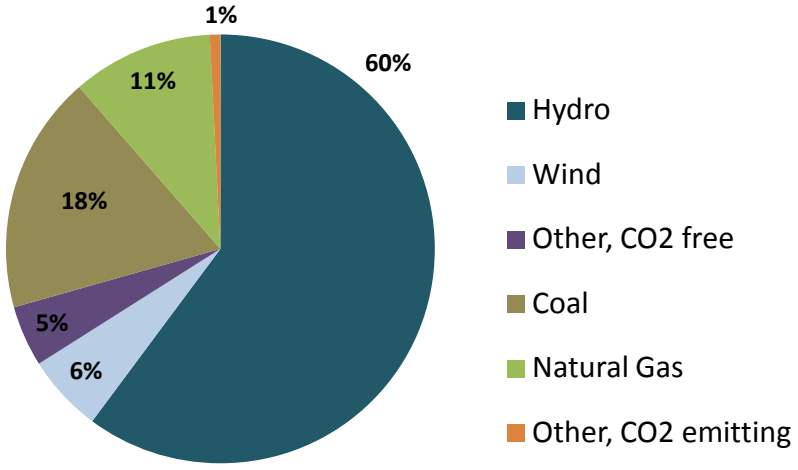
- There are many ways to define a carbon footprint
- Transportation is the largest contributor of CO_2 in the Northwest
- Northwest produces low carbon power
- Large changes in annual carbon emissions
- Big differences in utility portfolio emissions
- Northwest is actively reducing carbon
- Many options for reducing carbon

PNUCC

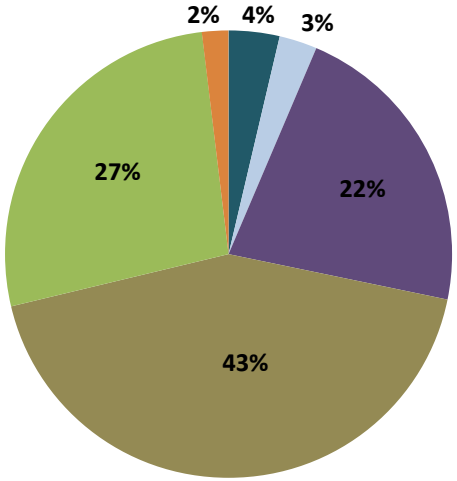
1 - Many Ways to Define a Carbon Footprint



All generation in ID, MT, OR, WA, Jim Bridger and 50% of Valmy



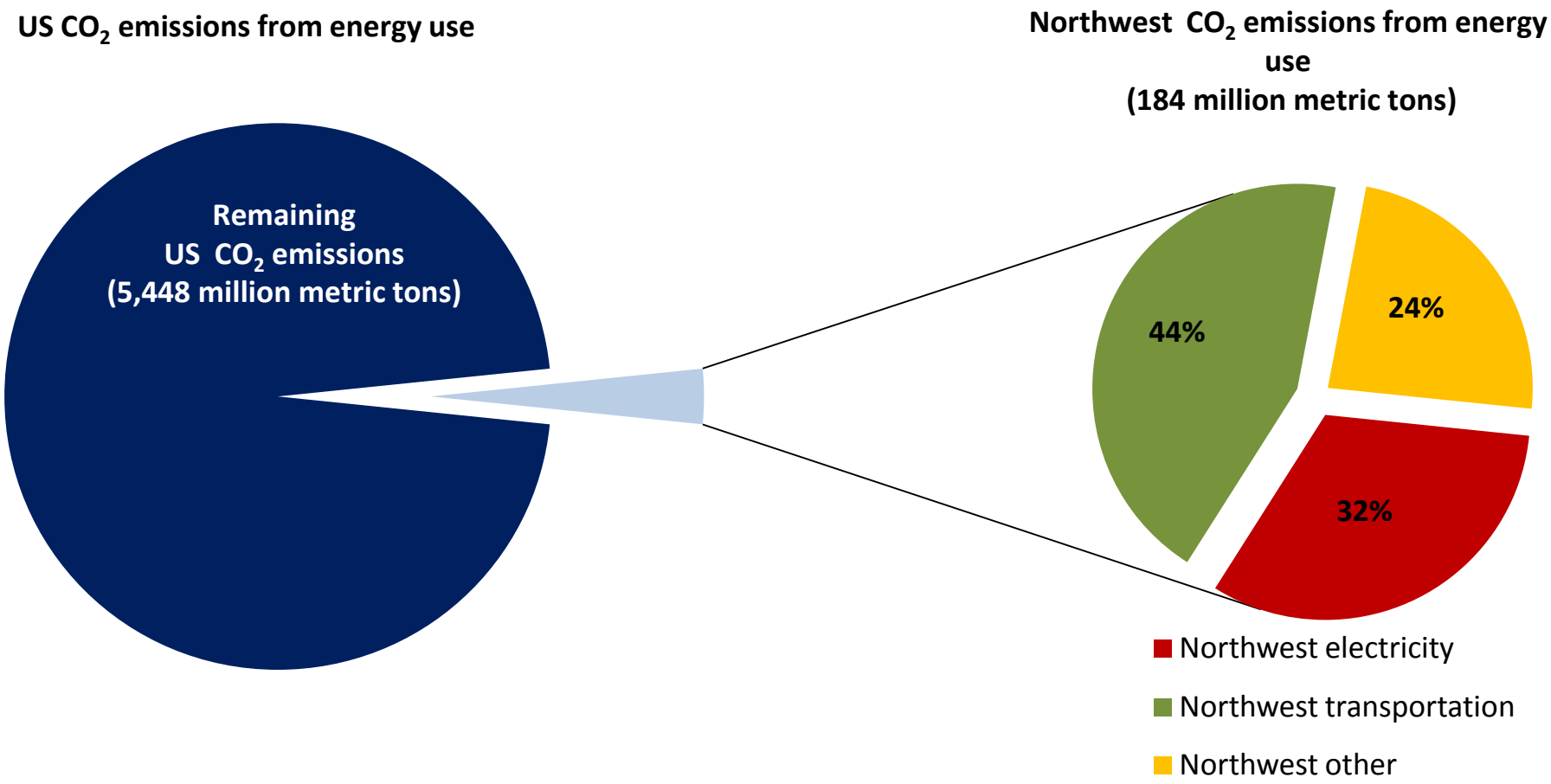
Northwest generation



Remaining US generation

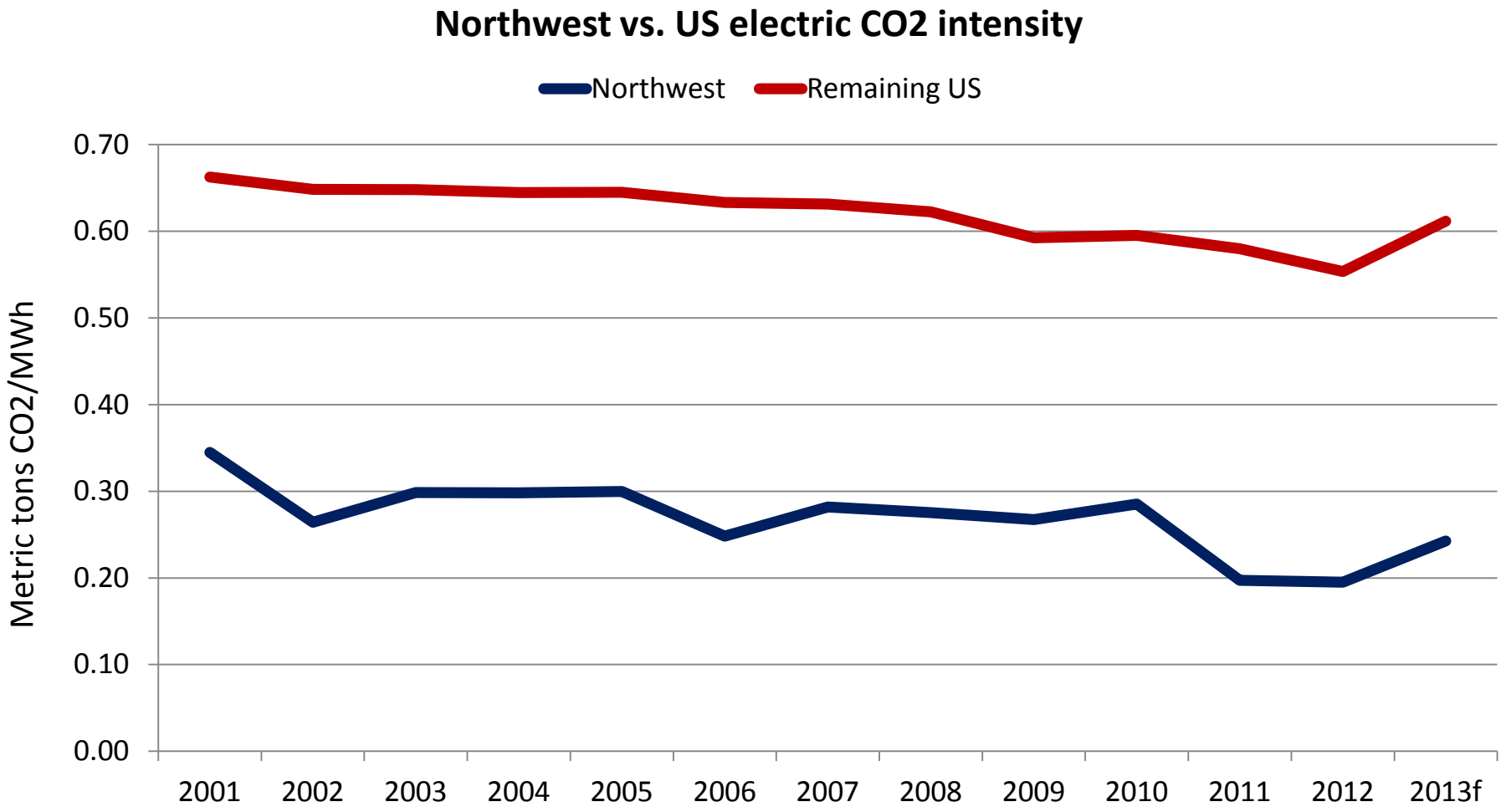
2009 – 2013 average. EIA data.

2 - Transportation is the Largest Contributor



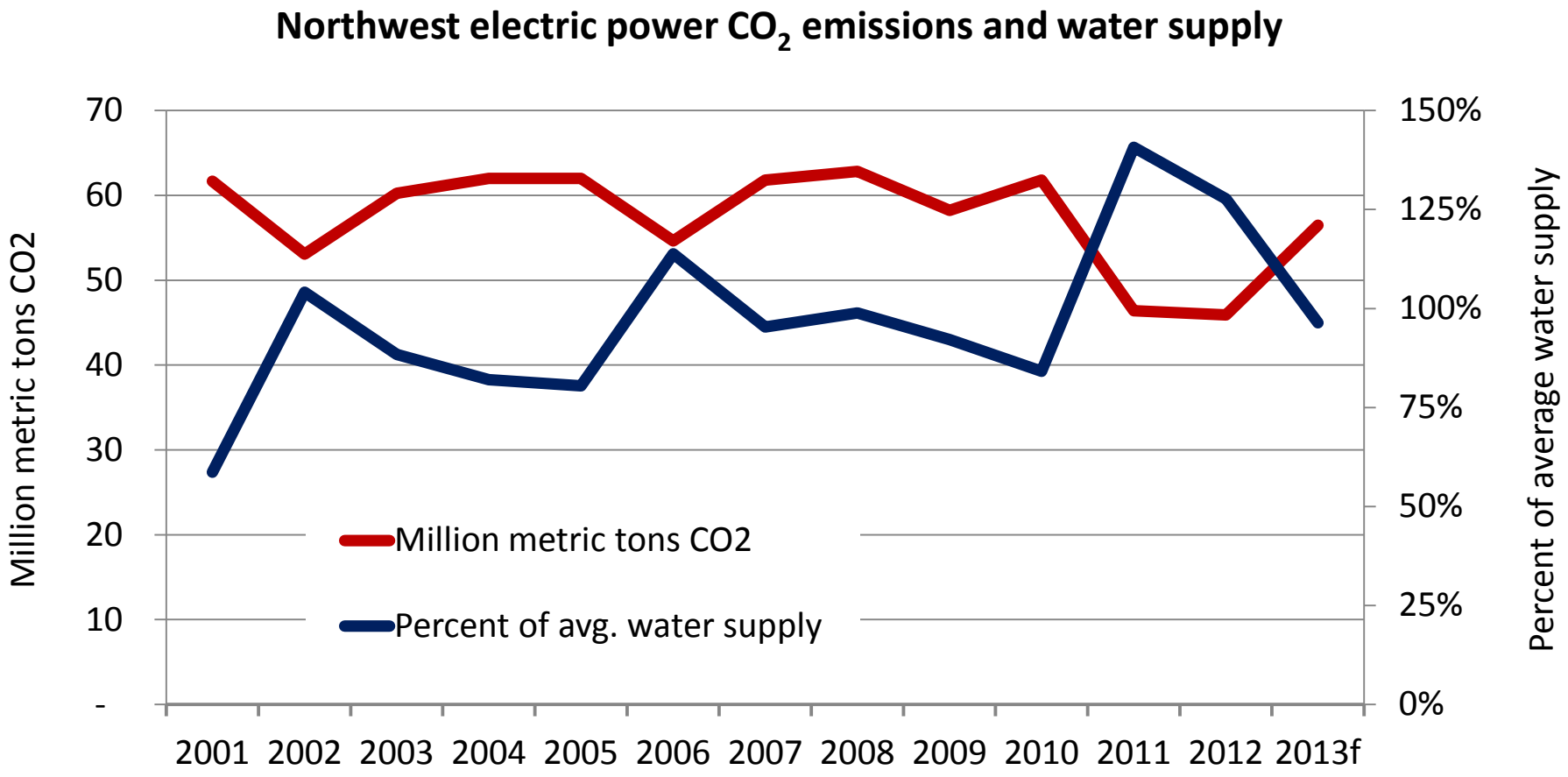
Emissions from the consumption of energy. EIA Data, 2010.

3 - Northwest Produces Low Carbon Power



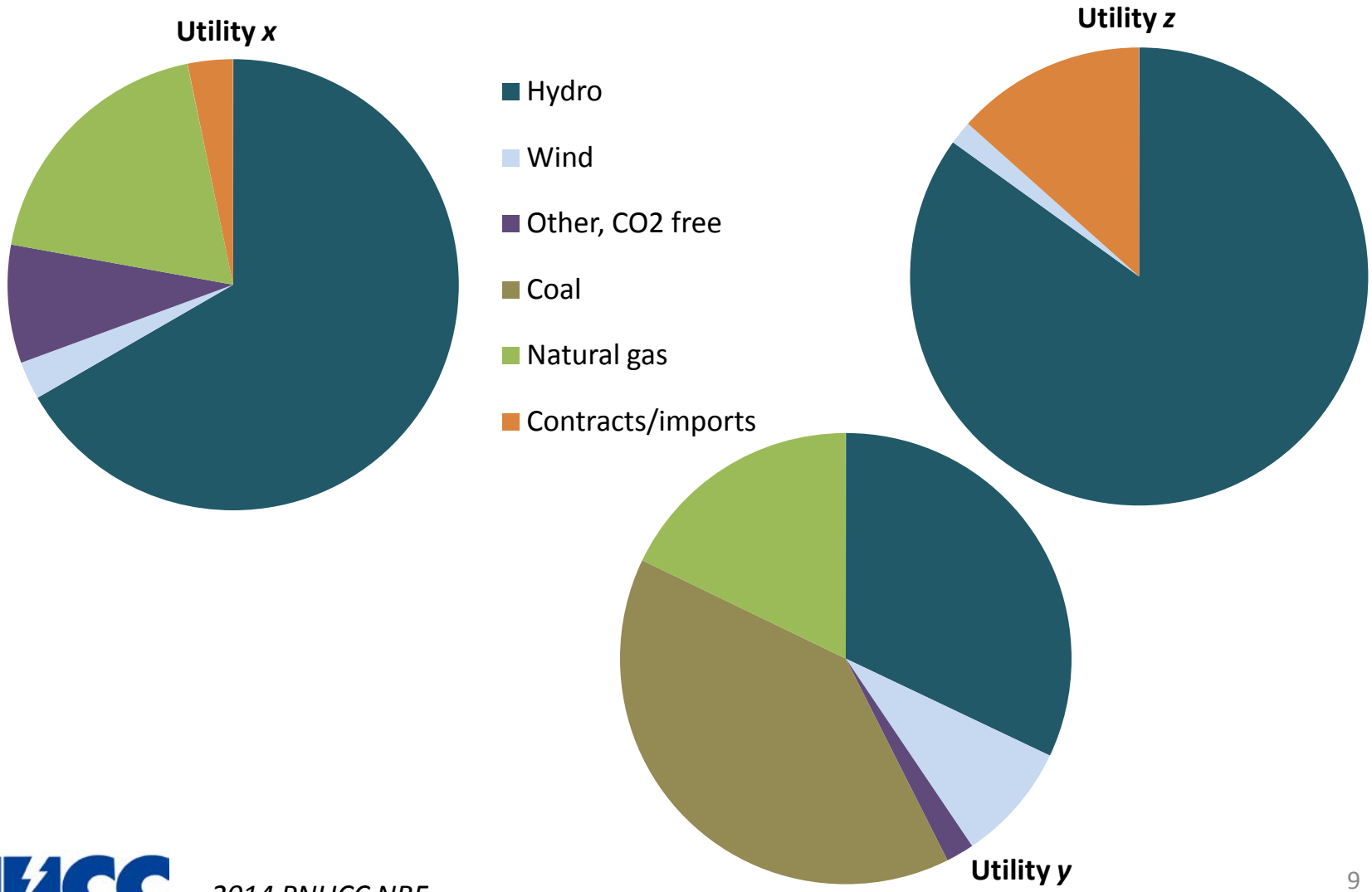
EIA data.

4 - Large Changes in Annual Emissions



EIA and NOAA data.

5 - Big Differences in Portfolio Emissions



6 - Northwest Actively Reducing Carbon

- Report focuses on three main efforts:
  - Energy efficiency
  - Coal plant retirements
  - Renewable portfolio standards

Coal Retirements Will Reduce Carbon

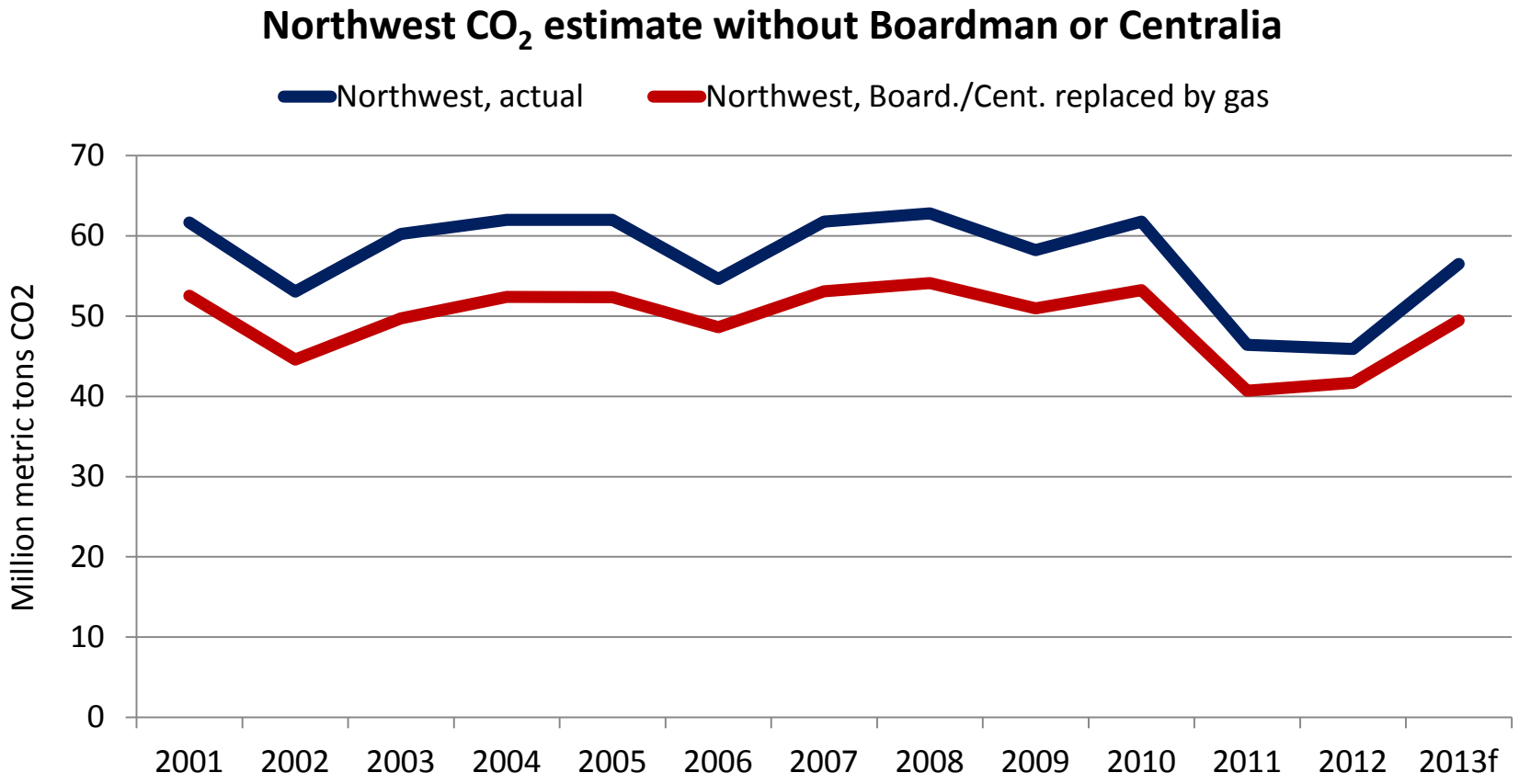


Chart made by removing Board./Cent. Emissions and replacing with a high efficiency CCCT. This was done by multiplying the coal units MWh production by 0.37 tons/MWh. EIA data.

7 - Many Options for Reducing Carbon

Group	Measure	Cost/metric ton (2014$)
E3 for PGE	Gorge wind built in 2030	$161
E3 for California group	Increased RPS, 33% to 40% or 50%	$350 to $1,050
Bloomberg	High/average quality wind built in 2030	$0 to $30 (assumes wind built in lieu of coal plants)
Avista	Early coal retirement	$95
PSU	Carbon tax at $60/ton*	

**The study estimated that in 2035 a CO_2 tax of $60 per ton would reduce 6 million metric tons of CO_2 and collect 2 billion dollars of revenue.*

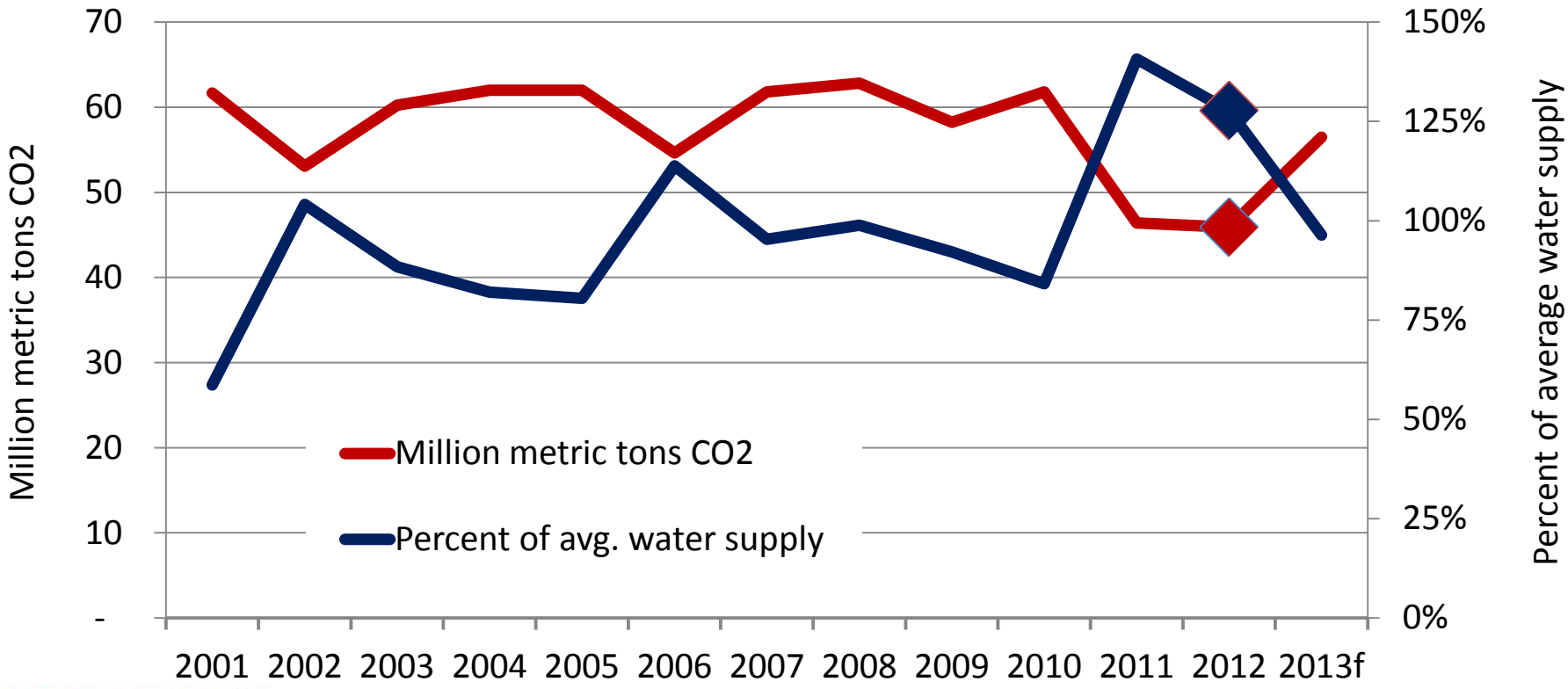
EPA Proposed Rule Under 111(d)

- Instructs states to create plans to reduce carbon intensity or total CO_2 tonnage

State	2012 CO_2 Emissions Intensity (pounds/MWh)	2030 CO_2 Emission Intensity Goal (pounds/MWh)	Percent Reduction
Idaho	339	228	33%
Montana	2,246	1,771	21%
Oregon	717	372	48%
Washington	756	215	72%

Potential Northwest Issues

- 111(d) uses a specific year, 2012, as the baseline year
  - Could give Northwest states unintentionally low targets



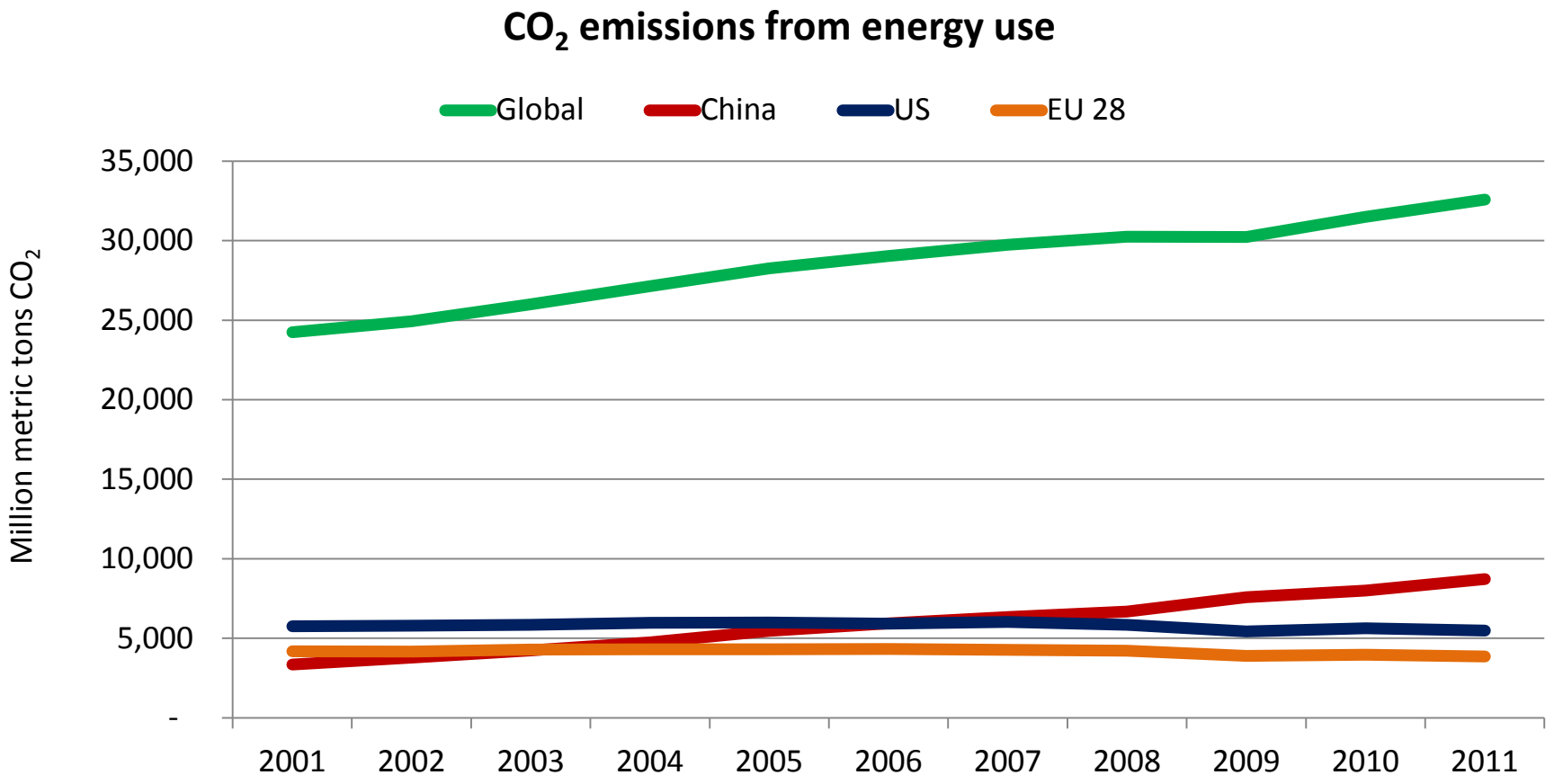
EIA and NOAA data

Thank You

Taskforce participants

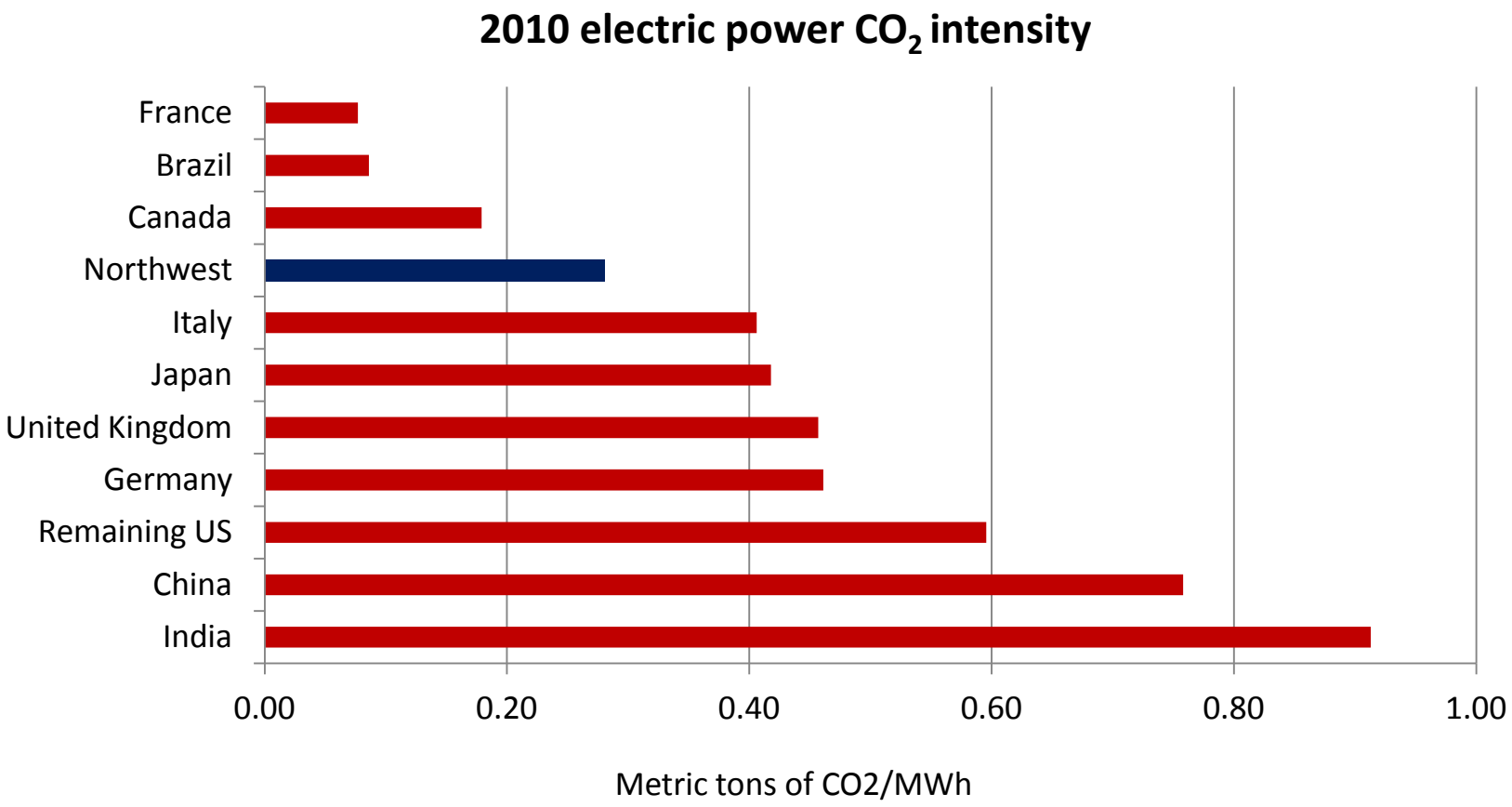
John Lyons	*Avista*	Stefan Brown	*Portland General Electric*
Larry Stene	*BPA*	Brendan McCarthy	*Portland General Electric*
Tom Haymaker	*Clark PUD*	Steve Schue	*Portland General Electric*
Terry Toland	*Clark PUD*	Elysia Treanor	*Portland General Electric*
Philip DeVol	*Idaho Power*	Phillip Popoff	*Puget Sound Energy*
Mark Stokes	*Idaho Power*	Keith Faretra	*Puget Sound Energy*
Phil Obenchain	*PacifiCorp*	Zac Yanez	*Snohomish PUD*
Tomás Morrissey	*PNUCC*	Cathy Carruthers	*Tacoma Power*

Global Trend is Up



Emissions from the consumption of energy. EIA Data.

Northwest v. Top Ten Global Economies



EIA, IEA and World bank data. Note that accounting in IEA data may differ from accounting in EIA data.

CO2 reduction estimate via wind

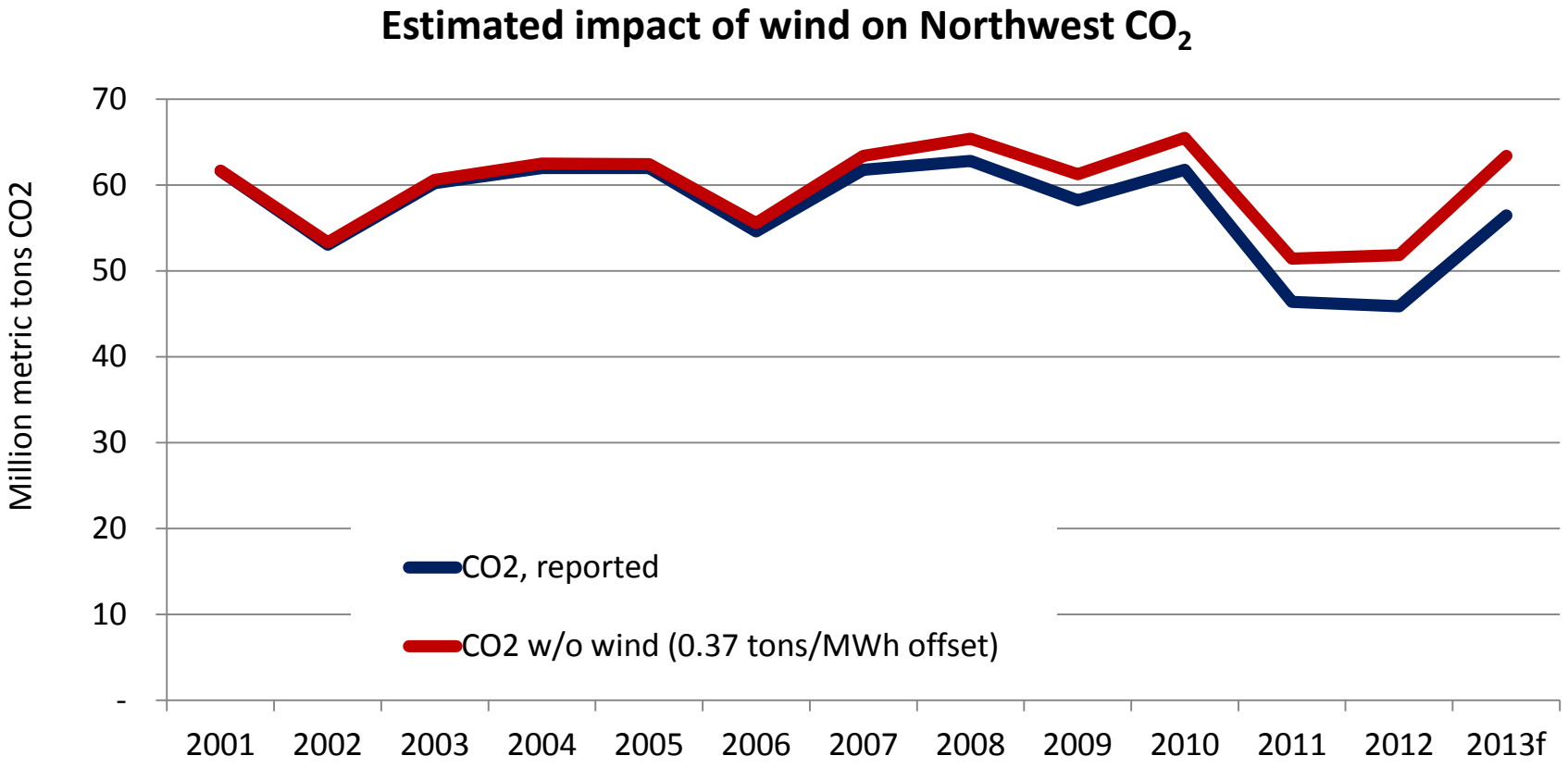
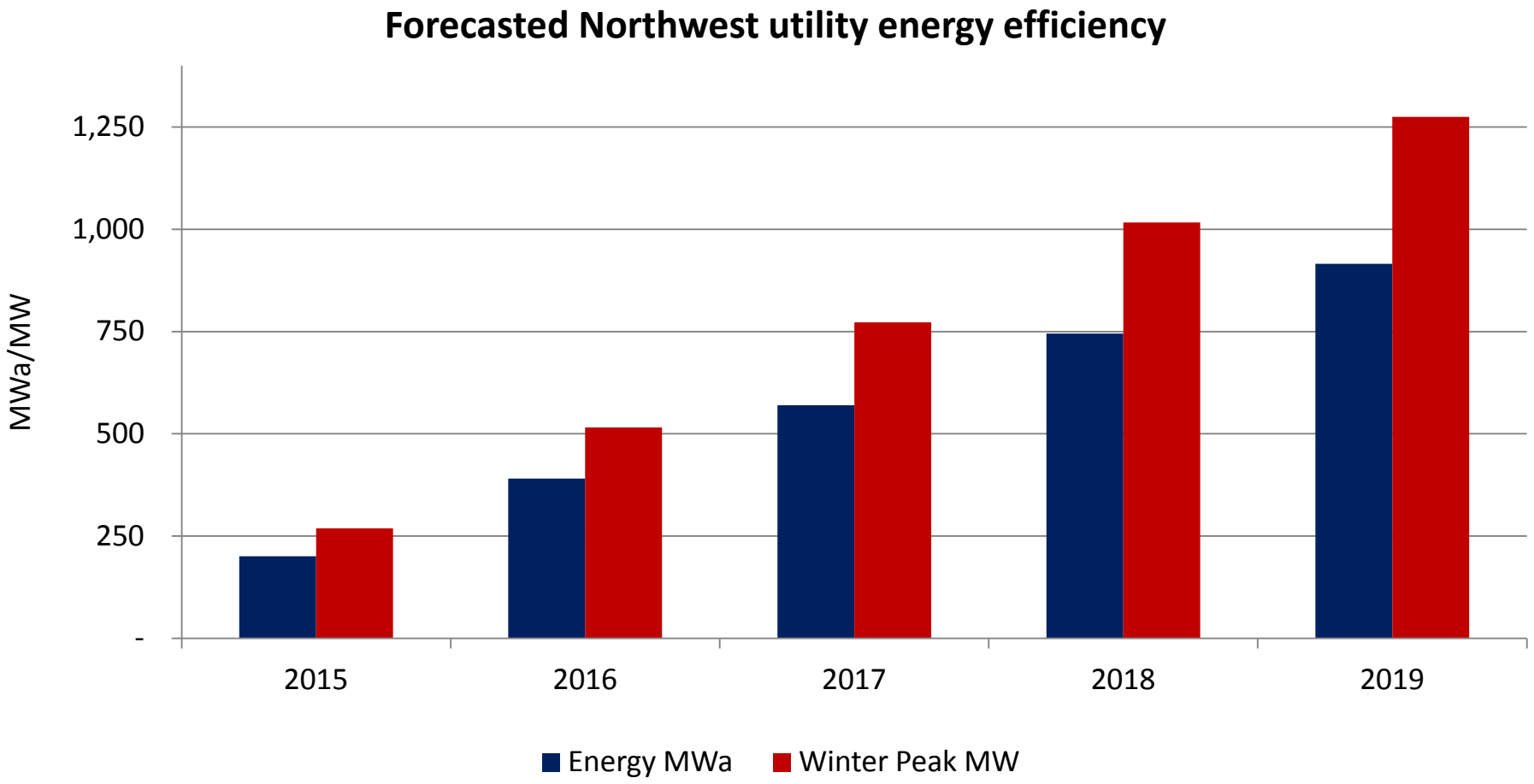
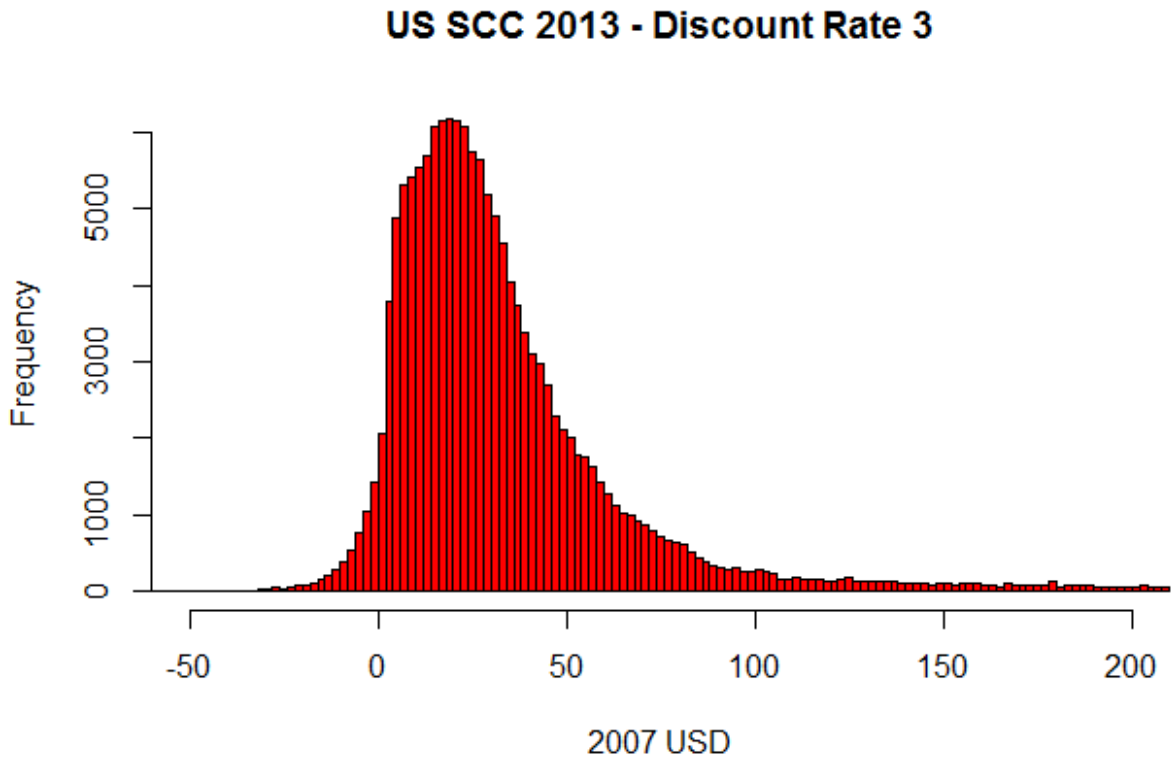


Chart made by multiplying the MWh production of wind by an offset of 0.37 tons/MWh and adding it to the reported CO2 emissions. Not adjusted for imports/exports. EIA data.

Energy Efficiency Dampens Emissions



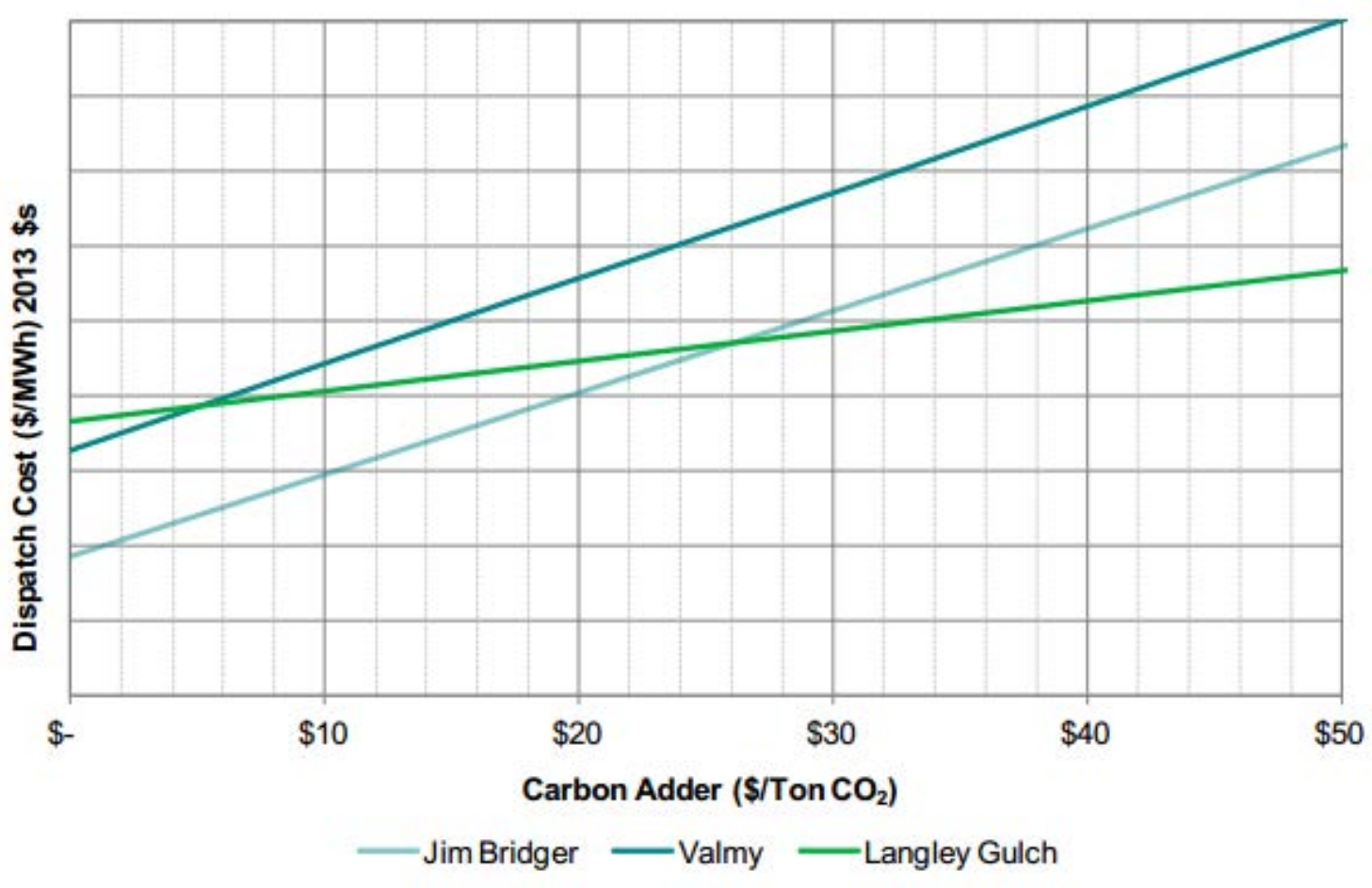
US Social Cost Carbon Histogram, 3%



Min	5%	25%	50%	75%	95%	Max	Mean
$(25,790.00)	$ 2.17	$ 13.89	$ 26.23	$ 44.46	$ 128.79	$ 11,800.00	$ 43.16

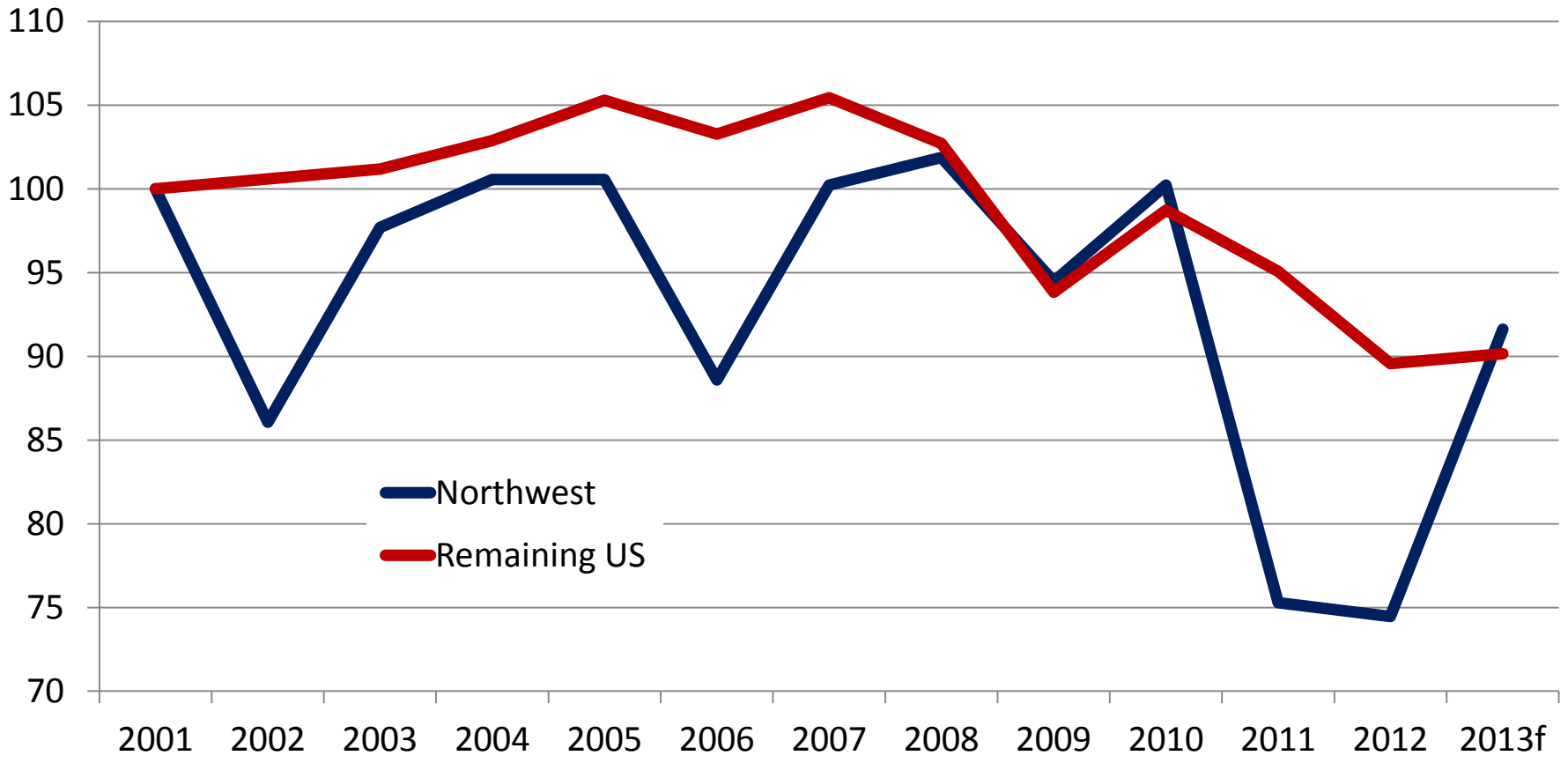
EPA. Discount rate year 2020. 150,000 games.

Carbon Tax Dispatch Order



Idaho Power 2013 IRP.

Northwest and US CO2 Variations



EIA data. 2001 set to equal 100.

Cost per Ton for Reducing CO2 with Wind

Levelized cost/MWh	$	95
Transmission cost	$	6
Integration cost	$	10
Energy value	$	(40)
Capacity value	$	(4)
Net Cost	**$**	**66**
Metric tons CO_2 offset		**0.41**
Cost/metric ton CO_2	$	162

E3 analysis for PGE's 2013 IRP. Examines building wind in the Columbia River Gorge in 2030. $2014. Energy and capacity from PGE Schedule 201.

Coal and Gas Power in the Northwest