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

June 3, 2014

MEMORANDUM

TO: Council Members

FROM: Charlie Black, Power Planning Division Director

SUBJECT: Briefing on EPA Proposed Rule to Cut CO2 Emissions from Power Plants

On Monday, June 2, 2014, the U.S. Environmental Protection Agency announced a proposed federal rule to limit emissions of carbon dioxide from power plants. The proposed rule would require power plant CO2 emissions to be reduced by 30 percent from 2005 levels by 2030.

EPA has developed the proposed rule within its authority under Section 111(d) of the federal Clean Air Act. EPA proposes to make the new rule final in June 2015. Then each of the states across the nation would have until June 2016 to develop their plans to implement the federal rule.

EPA's proposed rule would allow states to include various CO2 reduction approaches in their implementation plans. Examples include use of energy efficiency and renewable resources, participation in greenhouse cap and trade programs, or other multi-state collaborative efforts.

At the Council meeting in Missoula on June 10, 2014, I will provide a brief report on the proposed EPA rule and some potential implications for the Pacific Northwest region.

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

June 10, 2014

MEMORANDUM

TO: Council Members

FROM: Charlie Black, Power Planning Division Director

SUBJECT: EPA's Proposed Rule to Reduce CO2 Emissions from Existing Power Plants

As part of a preliminary analysis of the Environmental Protection Agency's recent proposed rule to reduce carbon dioxide emissions from existing power plants, staff has analyzed the state goals set forth in the proposed ruling. Gillian Charles, energy policy analyst, developed a report describing the methodology used by the EPA to calculate proposed CO2 reduction goals for each state and application of the methodology to Idaho, Montana, Oregon, and Washington. The report includes a preliminary estimate that Tom Eckman, manager of conservation resources, has prepared on the energy efficiency aspect of the EPA methodology and how its results compare to the Council's Sixth Power Plan energy efficiency goals.

EPA's Clean Air Act Section 111d Proposed Rule – State Reduction Goals

As part of its proposed rule under section 111d of the Clean Air Act, the Environmental Protection Agency (EPA) has identified carbon reduction goals for each state to meet by 2030 (with interim goals annually in 2020-2029). EPA calculated these goals using a "pollution-to-power" ratio applied to each state's existing fossil-fueled power plants. The goal <u>does not reduce net generation</u> from existing fossil-fueled power plants; however it <u>does reduce carbon emissions from the existing power plants by redispatching generation between coal, oil/gas steam, and natural gas power plants</u>. Using 2012 historical net generation for each state as the starting point, EPA has based its "pollution-to-power" ratio on a set of four building blocks that when applied to each state, determine the emission reduction goals, measured in pounds per megawatt-hour for 2030.

The proposed ruling identifies only the generation of power using coal, oil and gas steam, and natural gas combined cycle (NGCC) as fossil-fuel emitters (excluding generation from single cycle, for example). In addition, the proposed rule focuses on source-based electricity generation, not end-use based. For example, if there is a coal plant within a state's boundaries but that plant delivers 100 percent of its generation to other states, it is still the state in which the power plant is physically located in that is responsible for the emission reductions – not the out-of-state consumers.

Due to the nature of these building blocks, and the fact that they are based on the historical generation by each state's existing power plants, the 2030 reduction goals for each state vary greatly. Washington has the nation's highest reduction at 72%, while North Dakota has the lowest reduction at 11%. Why the disparity?

The formula used to derive individual state reduction goals includes a sequential application of four building blocks. These building blocks use the 2012 historical fossil-fuel generation (see Figure 1) but redispatch the generation to reduce emissions by reducing coal-fired and oil/gas generation and increasing natural gas combined cycle generation. In addition, low-or zero-emitting resources (nuclear and renewable energy) and demand side energy efficiency measures are added to the resource mix. The formula for each state is essentially:

$$\frac{\text{CO2 emissions from fossil-fuel fired generation (lbs)}}{\text{Generation from fossil-fuel power plants + some nuclear, renewables, and energy efficiency (MWh)}}$$

The state reduction goals for the Pacific Northwest are:

	2012 Actual (lbs CO_2/MWh)	2030 target (lbs CO_2/MWh)	Percent Reduction
Idaho	339	228	32.7%
Montana	2,245	1,771	21.2%
Oregon	717	372	48.1%
Washington	763	215	71.8%

Figure 1: 2012 Historical Fossil-Fuel Net Generation
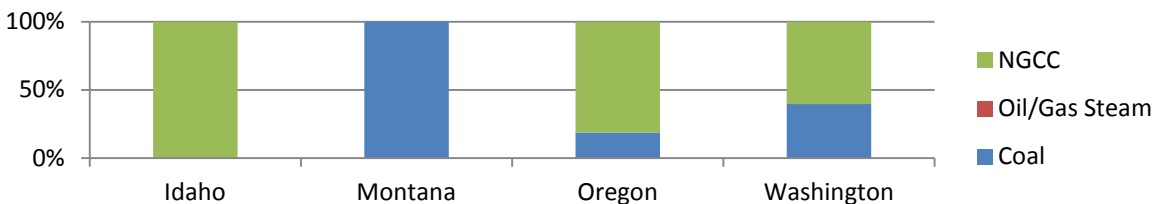
In the Pacific Northwest, our resource mix and energy generation is unique compared to the rest of the nation. We rely on the hydropower system for over half of our power generation, with natural gas, coal, nuclear, wind, geothermal, and solar making up the rest. The natural gas power plants supplement the hydropower system. In good hydro years, the natural gas plants generate less electricity. In poor hydro years, the natural gas plants generate more electricity to compensate for low hydro production.

Beginning with state-specific 2012 historical net generation, the following building blocks are applied to reduce the amount of carbon emissions from existing fossil-fueled generation:

Building Block 1 (applied to the formula's nominator): Improve the heat rate of the state's existing coal fleet by 6%. By improving the heat rate, the efficiency of the coal plant is increased, resulting in lower emissions rate for coal-fired generation.

Application to Pacific Northwest States:
Idaho does not have existing in-state coal generation and therefore this building block has no effect on reducing emissions. However, for Oregon, Washington, and Montana, there is a reduction in emissions from improving the heat rate at existing coal plants.

Building Block 2 (applied to the nominator): Increase the capacity factor (the actual output compared to the potential output if operated at full nameplate capacity) of existing NGCC plants. Redispatch generation to NGCC electric generating units (up to a 70% capacity factor ceiling), and adjust (reduce) the remaining fossil-fuel generation to maintain the 2012 historical net generation.

Result of Building Block 2: Fossil-Fuel Net Generation
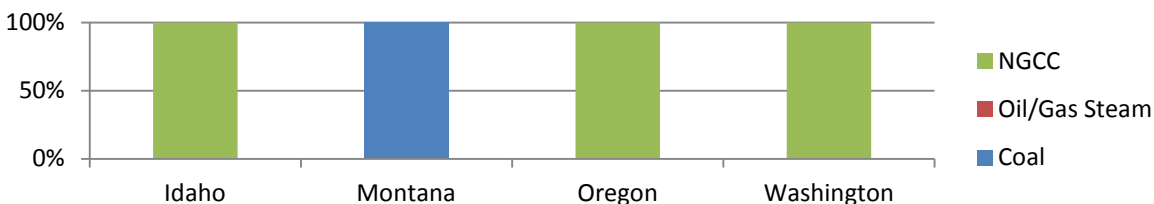
Application to Pacific Northwest States:
Of the fossil fuel generators identified by the EPA for carbon emission reduction, Idaho only has NGCC electric generating units and therefore there is no redispatch of generation. After two

building blocks, Idaho's proposed emission rate reduction (lbs/MWh) is unchanged from its 2012 historical rate.

Montana does not have historic 2012 NGCC generation, and therefore there is no redispatch and no resulting reduction in emissions.

For Oregon and Washington, there is a reduction in emissions from this redispatch from the increase in NGCC generation and reduction in coal. For both states, this building block redispatches 100% of its fossil-fuel generation to existing NGCC plants and reduces generation from coal plants to 0%.

Building Block 2 is essentially **replicating the retirement of the Centralia coal plant in Washington and the Boardman coal plant in Oregon** and replacing 100% of the coal generation through increasing the use of existing natural gas combined cycle power plants. The retirement of Centralia reduces Washington's 2012 emission rate by 38%, comprising just over half of Washington's emission reduction goal of 72%. The retirement of Boardman reduces Oregon's 2012 emission rate by 19%, which accomplishes 40% of Oregon's emission reduction goal of 48%.

Building Block 3 (applied to the denominator): Increase the amount of low and zero-carbon nuclear and renewable energy generating capacity. States with existing or under construction nuclear generation were given a credit for a percentage of nuclear generating capacity. The increase of renewable energy resources was based on a calculation of existing renewable resources (existing hydropower is not included) in the state and availability and future plans to build renewable resources. For states with Renewable Portfolio Standards (RPS), this was factored in as well.

Application to Pacific Northwest States:
Montana, Oregon, and Washington all have RPS. The expected development of renewable resources to meet the targets has been included in the state's emission reduction goals for 2030. While Idaho does not have an RPS, its Energy Plan encourages the development of cost-effective local renewable resources and there has been significant development over the past decade or so.

PNW individual state renewable energy generation levels as a percentage of total generation as targeted by the proposed 111d are shown in the blue section in the table below. The green section shows the state's RPS targets, which are based on renewable energy as a percentage of electricity sales. All PNW RPS allow for the purchase of renewable energy credits from out of state generation, so the current historic 2012 percentage is not an apples to apples comparison with the historic RPS percentage. For example, Montana is on track to meet their 15% RPS target in 2015 (and already met their interim target of 10% in 2010), but some of that includes the purchase of RECs from out of state generation. For 111d purposes, the renewable energy was calculated as in-state development and generation.

	Historic 2012	Target 111d Proposal 2029	State RPS Targets		
			2015	2020	2025
ID	16%	20.6%			
MT	5%	10.2%	15%		
OR	12%	20.6%			25%
WA	7%	15.9%		15%	

Washington is the only PNW state with an operating nuclear plant, so a portion of Columbia Generating Station's capacity was factored into its emissions reduction formula.

Building Block 4 (applied to the denominator): Increase demand-side energy efficiency. The state-specific percentage value represents the total amount of MWh sales that could potentially be avoided through energy efficiency measures. EPA has set forth two levels of energy efficiency achievements that could be used to reduce emissions. In its "best practices" scenario it assumes that beginning in 2017, each state ramps ups it energy efficiency actions to a level that produces annual savings equivalents to one and one-half percent of retail sales. Under its second option states increase their annual electricity savings to the equivalent of one percent of annual retail sales.

Application to Pacific Northwest States:
EPA assumes that in 2017, the first year of required compliance, each state will secure electricity savings equivalent to their 2012 achievements. The following table shows EPA's estimate of individual PNW state annual savings as percent of total retail sales in 2012 in the first column. In the second column shows the cumulative savings from 2017 targeted by the end of 2029 under the 111d proposal as a share of the forecast 2029 retail sales without further efficiency savings. The third column shows the Council's estimate of electricity savings as a share of 2012 retail sales based on the Regional Technical Forums annual conservation survey. The final column shows the Sixth Plan's target for cumulative savings from 2017 through 2029 as a share of forecast 2029 retail sales. A comparison of the second and final columns indicates that achievement of the Sixth Plan's energy efficiency goals will slightly exceed the EPA proposal for the contribution of the energy efficiency building block *at the regional level.* However, since the Sixth Plan does not specify state level efficiency targets it is not possible to compare its goals with EPA's proposal at that level.

	EPA Estimate of 2012 Savings*	Target Cumulative Savings from 2017-2029 As A Share of 2029 Retail Sales (111d Proposal)	Council/RTF 2012 Reported Savings As A Share of 2012 Retail Sales**	Sixth Plan EE Target Cumulative Savings from 2017-2029 As A Share of 2029 Retail Sales***
ID	0.76%	11.10%		
MT	0.90%	10.90%		
OR	0.57%	11.41%		
WA	1.02%	11.26%		
PNW	0.86%	11.25%	1.23%	14.8%

*Savings As AShare of 2012 Retail Sales
**Council Conservation Achievements Are Not Tabulated by State
***Council Plan does not specify state level targets

State Goals are not Recipes for State Plans
Based on these formulated emission reduction goals (lbs/MWh), it is up to each individual state to determine a plan to meet their 2030 emissions goal. The plans <u>do not have to follow the building blocks in order to reduce their emissions</u>.

There are two technical support documents that describe in detail the application of the formula used to calculate individual state reduction goals ([Goal Computation Technical Support Document](#)) and the background information and assumptions used to derive specific aspects of the building blocks (for example the 70% capacity factor for NGCC) and formula ([GHG Abatement Measures](#)).

Briefing on Proposed EPA Rule to Reduce Carbon Dioxide Emissions from Existing Power Plants

Council Meeting
Missoula, Montana
June 10, 2014
Charlie Black

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

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Overview

- On June 2, 2014, the U.S. Environmental Protection Agency proposed a rule to require states to reduce carbon dioxide emissions from <u>existing</u> power plants
- The rule is proposed under Section 111(d) of the federal Clean Air Act
- The proposed rule sets a target to reduce U.S. emissions 30 percent below 2005 level by 2030
- Compliance would begin in 2020; targets can be met on an average basis during 2020-2030

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Overview

- The proposed rule is source-based, that is, it applies to the existing CO2-emitting power plants located within any given state, regardless of whether the power is ultimately consumed in another state
- Other approaches such as California's cap and trade program are load-based, that is, they apply to in-state and out-state CO2-emitting power plants used to serve the state's electricity loads

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Overview

- Compliance with the federal law would be for power plant emissions by the whole state, not for individual power plants
- The proposed rule only addresses CO2 emissions, not other forms of greenhouse gases
- Actual reduction in CO2 emissions is required; offsets would not be an eligible means of compliance

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EPA Rulemaking Schedule

- Proposed rule issued June 2, 2014
- 120 day public comment period
- Four public hearings week of July 28, 2014 (Atlanta, Denver, Pittsburgh, Washington DC)
- Proposed rule subject to revision
- EPA scheduled to issue final rule June 2015

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Reduction Targets Vary by State

State	Pounds of CO2 per Megawatt-Hour		Percent Reduction
	2012 Actual	2030 Target	
Idaho	339	228	32.7%
Montana	2,245	1,771	21.1%
Oregon	717	372	48.1%
Washington	763	215	71.8%
Arizona	1,453	702	51.7%
California	698	537	23.1%
Colorado	1,714	1,108	35.4%
Nevada	988	647	34.5%
New Mexico	1,586	1,048	33.9%
Utah	1,813	1,322	27.1%
Wyoming	2,115	1,714	19.0%

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Four Building Blocks Used to Determine Each State's Target

- **EPA has determined that the best adequately demonstrated system of emissions reductions (BSER) is a combination of four building blocks:**
  - Increase heat rate efficiency of existing coal-fired power plants by six percent
  - Shift dispatch from coal-fired power plants to combined-cycle natural gas-fired power plants
  - Increase use of renewable generation; keep open nuclear power plants that are at risk of closing
  - Improve energy efficiency by about 1.5 percent per year

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Application of the Redispatch Building Block to Northwest States

- Idaho: not applied (no in-state coal plants)
- Montana: not applied (no in-state combined-cycle natural gas-fired generation in 2012)
- Oregon: increase combined-cycle natural gas-fired generation to replace all coal-fired generation (achieves 19% reduction, compared to 48% target)
- Washington: increase combined-cycle natural gas-fired generation to replace all coal-fired generation (achieves 38% reduction, compared to 72% target)

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States' Role in Implementation

- Each state's reduction in CO_2 emissions must be from its actual rate in 2012
- States may, but are not required to, use the four building blocks – each state has flexibility to decide how to meet its CO_2 emissions reduction target
- Additional mechanisms may be used (e.g., carbon taxes, cap and trade markets)

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States' Role in Implementation

- Each state with existing CO_2 emitting power plants is required to develop an implementation plan (SIP)
  - States developing their own SIPs must file them with EPA by June 2016
  - Multiple states may work together to develop a joint SIP; these must be filed with EPA by June 2017
  - If any state fails to file an SIP, EPA will develop its own plan for that state

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Potential Council Activities

- Monitor and report on EPA rulemaking process and related developments
- Assess possible implications for Seventh Power Plan environmental methodology
- Check in with Northwest (and possibly other) state agencies on their activities related to the rulemaking
- If requested, provide analytical support for consideration of multi-state approaches to compliance

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