

# Coal in Washington State: Past, Present, and Future



Energy Transitions Laboratory

Western Washington University

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## ABOUT THE ENERGY TRANSITIONS LABORATORY

The Energy Trans Lab at Western Washington University is a place where undergraduate and graduate student researchers and faculty work together to enhance our understandings of the energy transition. Our focus is on historical and contemporary changes to energy systems in Washington State and the Pacific Northwest.

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## AUTHORS AND INVESTIGATORS

Emily Krieger and Thomas Webler

## CREDITS

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## Executive Summary

This paper explores the historical and contemporary role of coal in Washington State's energy picture.

Concerns for anthropocentric climate change and national energy independence are driving an energy transition in the United States. Coal, the most carbon-intensive fossil fuel and the most abundant, plays competing roles. In 2014 coal was responsible for 76% of the CO<sub>2</sub> emissions for the electricity sector in the United States, or about 1.5 GT of carbon dioxide.<sup>1</sup> Nationwide, coal provided 39% of electricity in 2014, far above the 22% generated by natural gas. Nearly all coal burned in the USA is domestically produced, although jobs in the industry have been declining. While Washington State has few coal reserves and no active coal mines, it does rely upon electricity generation via combustion of coal and it is an important "pass through" state for American coal destined for Asia. Puget Sound Energy, the state's largest utility, sourced 31% of its electricity from coal.

According to 2013 statistics from the Energy Information Administration (EIA), Washington State consumed [4,534 thousand](#)<sup>2</sup> short tons of coal in

that year, nearly all at the TransAlta Power plant, located in Centralia, Washington (see cover). The plant's capacity is [1,340 MW](#)<sup>3</sup> and is Washington's single coal-fired facility. It accounts for 10% of the total electric capacity in Washington State. As Figure 1 shows, the Centralia power plant and mine both began operation in 1971.<sup>4</sup> One burner will be transitioned to natural gas by 2020, the other by 2025, in compliance with the TransAlta Energy Transition Bill<sup>6</sup>. The bill was the result of an agreement between TransAlta and stakeholders in Washington State, including the Department of Ecology and Governor Christine Gregoire. This agreement, as well as the emissions reductions that have been made, have largely been a result of laws passed throughout the years that have put increasingly stricter standards on allowed emissions. The specifics of these laws and the agreement to transition the Centralia Power Plant to gas are discussed in in this paper.

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<sup>1</sup> <http://www.eia.gov/tools/faqs/faq.cfm?id=77&t=11>

<sup>2</sup> "Annual Coal Report 2013." U.S. Energy Information Administration. 1 Apr. 2015. Web. 5 May 2015.

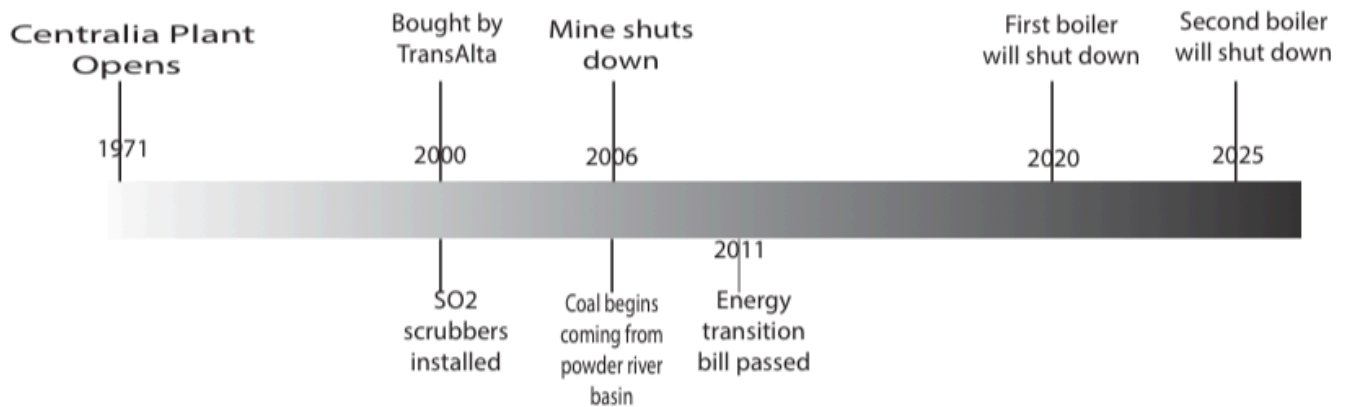
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<sup>3</sup> "Centralia." TransAlta. 4 Nov. 2014. Web. 15 Feb. 2015.

<sup>4</sup> "TransAlta US | Archive | See Our Facilities." TransAlta. Web. 15 Feb. 2015.

<sup>5</sup> "Centralia Mine." TransAlta. 28 Jan. 2013. Web. 16 Feb. 2015.

<sup>6</sup> "SB 5769 - 2011-12." *Washington State Legislature*. 2011. Web. 5 Mar. 2015.



**Figure 1:** Timeline of the Centralia Power Plant, 1971-2025.

## Coal: The Basics

Coal is a nonrenewable source of energy because it cannot be replenished naturally within a reasonable energy-planning period. It is formed over millions of years of organic material decomposing so once the resource is exhausted, it will not be a viable means of producing energy. There are four different classifications of coal: lignite, sub-bituminous, bituminous, and anthracite. Lignite is the least mature form and anthracite is the most mature form, meaning it has higher energy content. As coal matures, it increases in carbon content, resulting in higher energy content, making it more desirable for our uses. Extraction methods include both underground mining methods and surface mining methods. Underground mining is done

by using either slope mining methods, where a tunnel runs at an angle into the coal mine, or by using vertical shafts to create an elevator down to the coal. On the surface, coal is mined using strip mining methods, contour mining, or mountaintop removal.

Coal must be mined, cleaned, transported to power plants, and then burned to produce power. Coal is consumed directly in a few industrial and residential settings. The process of burning coal emits particulates, sulfur dioxide, nitrogen oxides, and mercury compounds. The Clean Air Taskforce, an advocacy group, has calculated that emissions from coal-fired power stations are responsible for 13,000 premature deaths in the United States, annually and 7,500 of these are caused

by fine particulates.<sup>7</sup> These negative health effects to humans are the reason coal fired power plants are required to implement pollution control technology. Mining is also a dangerous occupation and coal mining and production also emit methane, a potent greenhouse gas that is trapped in the coal.

Coal also produces carbon dioxide, a greenhouse gas that is the [leading cause of global warming](#)<sup>9</sup>, and is causing long-lasting environmental

the increase is that coal is mostly carbon [atomic weight = 12] and when it is burned carbon links up with oxygen atoms [atomic weight = 16 each).

## Coal in the United States

The United States is self-sufficient when it comes to coal. It consumes the vast majority of coal it produces, exports only about 10% of production and imports very little.

**Table 1: Total energy consumption in the U.S. per sector (2011 data) by fuel type. Source: [EIA](#)<sup>8</sup>**

	<b>Total Primary Energy Consumption</b>	<b>Electricity (40%)</b>	<b>Transport (28%)</b>	<b>Industrial (21%)</b>	<b>Residential/ Commercial (11%)</b>
<b>Natural Gas</b>	26%	20%	3%	41%	75%
<b>Coal</b>	<b>20%</b>	<b>46%</b>		<b>8%</b>	<b>1%</b>
<b>Petroleum</b>	36%	1%	93%	40%	17%
<b>Renewables</b>	9%	13%	4%	11%	7%
<b>Nuclear</b>	8%	21%			
	100%	100%	100%	100%	100%

effects. Because of its carbon density, coal produces considerably more CO<sub>2</sub> than other fossil fuels. Coal produces about two pounds of CO<sub>2</sub> for every pound of coal burned (the reason for

According to [EIA statistics from 2014](#), 999.7 million short tons of coal were produced, and 916.9 million short tons were consumed. Our exports were 97.3 million short tons, while imports were 11.3 million short tons<sup>10</sup>. **Table 1** gives an overview of the different energy sources consumed, and how coal factors into that consumption. The

<sup>7</sup> [http://www.catf.us/fossil/problems/power\\_plants/](http://www.catf.us/fossil/problems/power_plants/)

<sup>8</sup> "Annual Energy Review." U.S. Energy Information Administration. 27 Sept. 2012. Web. 28 Mar. 2015.

<sup>9</sup> "Irreversible Climate Change Due to Carbon Dioxide Emissions." PNAS. 16 Dec. 2008. Web. 25 May 2015.

<sup>10</sup> "Coal Overview." U.S. Energy Information Administration. 1 May 2015. Web. 18 May 2015.

Table shows what percentage of total energy consumption is accounted for by each sector and what percentage of each sector is fed by various sources of energy. Coal is primarily used for the electric power sector, and accounts for 20% of the total energy consumption in the U.S.

The combustion of coal produces carbon dioxide, but the emissions factor is specific to the type of coal being burned. (The emissions factor is the amount of carbon dioxide emitted per million Btu of coal burned.) Anthracite coal has the highest emission factor, followed by lignite, subbituminous, and bituminous. Emissions also vary by region, so the emissions factor of coal burned at a particular power station can vary depending on where that coal is coming from (Table 2).

**Table 2:** Coal CO<sub>2</sub> emissions factors by state and type of coal (Pounds of CO<sub>2</sub> emitted per million Btu produced)  
Source: [EIA'](#)

State of origin	Bituminous	Sub-bituminous	Lignite
Washington	203.6	208.7	211.7
Wyoming	206.5	212.7	215.6
Montana	209.6	213.4	220.6

## Geography of Production

Coal is mined in 25 out of the 50 states in the United States. The top producer is Wyoming, the home of the famous Powder River Basin. Other important states are West Virginia, Kentucky, Pennsylvania, and Illinois.

**Figure 2** shows how this coal production is distributed throughout the country.

According to the Bureau of Land Management, the Powder River Basin in Wyoming and Montana produced 382 million short tons of coal in 2014 (about 38% of national production). This amount of coal is responsible for generating 17% of the nation's yearly electricity. Over 100 coal trains depart the Powder River Basin every day, feeding coal-fired power plants across the country (see **Figure 3**).

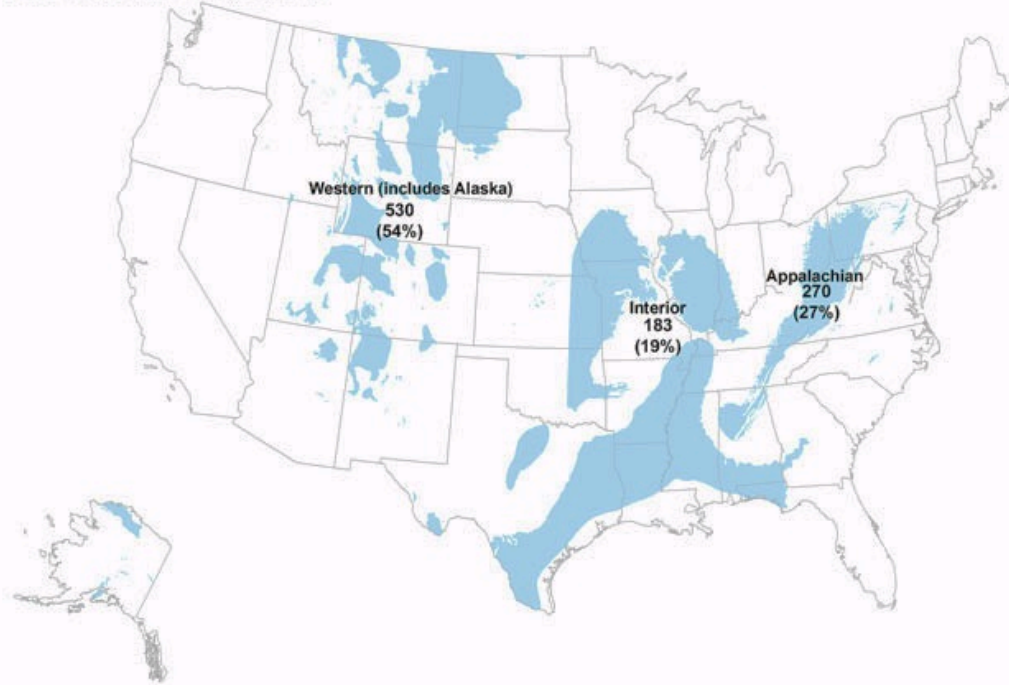
A similar map could be made for coal produced in Appalachia or Illinois. It is difficult to underestimate the country's heavy reliance on coal.

## Controversy

Even though coal is widely used and produced, there is controversy over what role it should play in the present-day and near future. Coal was *the* fuel that made the industrial revolution possible. Without it, it is difficult to see how the United States could have developed the industrialized economy that it did. And yet, there are also negative aspects of our reliance on coal.

Coal mining is ecologically damaging and hazardous work. Combustion of coal releases small particulates that aggravate respiratory and other diseases, particularly in vulnerable people. Mercury is emitted when coal is burned. It is released into

Coal production by region in million short tons, 2013  
share of U.S. total coal production



**Figure 2:** Coal Production by region in million short tons, 2013. *Source:* [EIA Annual Coal Report](#)

the ecosystem where it can bio-accumulate and create toxic effects. Likewise, coal combustion releases sulfur oxides and nitrogen oxides that are responsible for acid rain and ground level ozone formation. All of these impacts have been known for decades and the Environmental Protection Agency (EPA) has promulgated rules requiring coal-fired power plants to control emissions. These rules have been controversial and continue to be today. However, it is the CO<sub>2</sub> emissions that are sparking NGOs to act.

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<sup>11</sup> "Where the United States Gets Its Coal." U.S. Energy Information Administration. 30 Mar. 2015. Web. 2 Apr. 2015.

Many groups are pointing out the detrimental impacts to climate change that result from our reliance on coal. The Sierra Club is presently running a campaign dedicated to reduce our reliance on coal. It is called [Beyond Coal](#)<sup>12</sup>. In Washington State, a Bellingham based group known as ReSources have a campaign called [Clean Energy](#)<sup>13</sup>. It urges Washington to move past the burning of coal and toward clean energy.

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<sup>12</sup> "Beyond Coal." Sierra Club. Web. 15 May 2015.

<sup>13</sup> "Clean Energy." ReSources. Web. 15 May 2015.

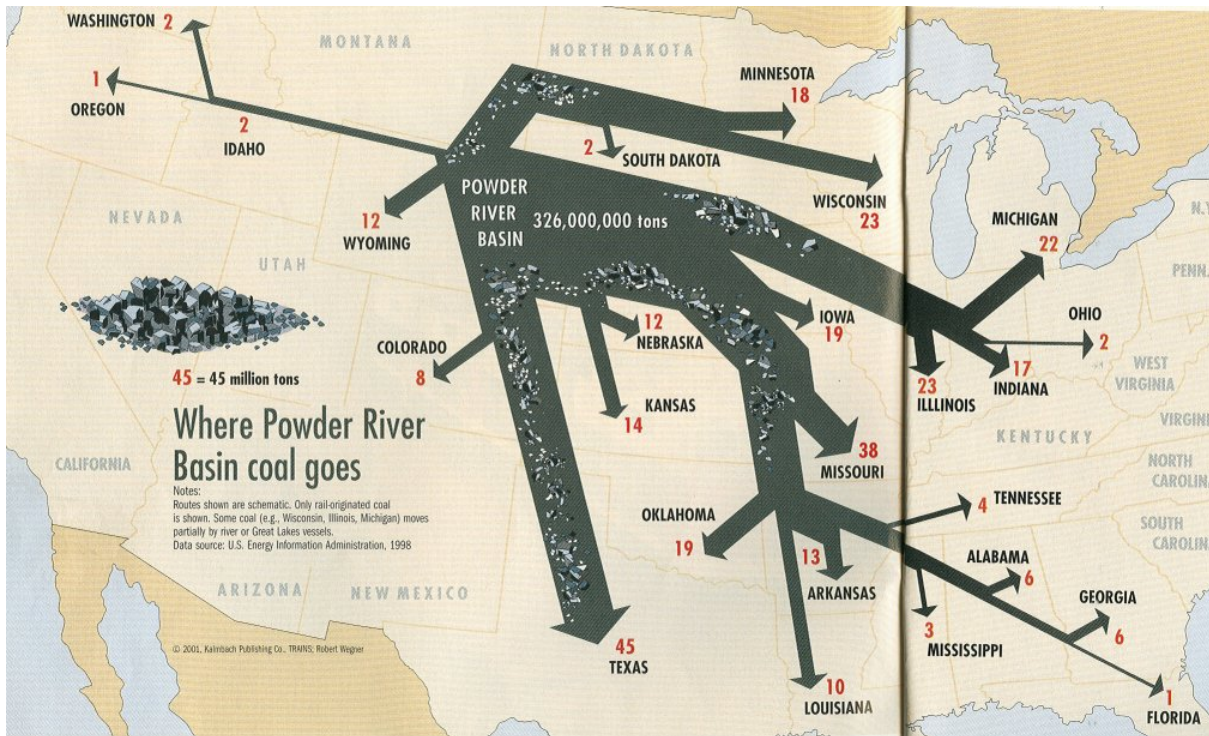


Figure 3: The movement of coal from the Powder River Basin. Source: [Power Past Coal](#)<sup>14</sup>

<sup>14</sup> "Power Past Coal-Frequently Asked Question." Power Past Coal. ReSources. Web. 4 Mar. 2015.



## Washington Energy Overview

Washington State has a population of approximately seven million people. Based on 2012 [statistics from the EIA<sup>15</sup>](#), (the most recent data available as of July 9, 2015) the total energy production in the state is 1,110 trillion Btu and the total energy consumption is 2057 trillion Btu. Washington State ranks [17<sup>th</sup>](#) [in production](#) and [16<sup>th</sup>](#) [in consumption](#)<sup>17</sup>. Consumption is commonly distinguished into four primary sectors: transportation, industrial, residential, and commercial. The transportation sector accounts for 620 trillion Btu, industrial accounts for 582 trillion Btu, residential accounts for 480 trillion Btu, and the commercial sector accounts for 375 trillion Btu. This amounts to about 300 million Btu per person <sup>18</sup>. Washington does have abundant resources for the production of hydropower, but still relies heavily on coal, natural gas, and petroleum for reliable sources of energy.

<sup>15</sup> "Washington State Energy Profile." U.S. Energy Information Administration. 17 July 2014. Web. 28 Mar. 2015.

<sup>16</sup> "Total Energy Consumption, Gross Domestic Product (GDP), Energy Consumption per Real Dollar of GDP, Ranked by State, 2012." U.S. Energy Information Administration. Web. 27 Apr. 2015.

<sup>17</sup> "Total Energy Consumption, Gross Domestic Product (GDP), Energy Consumption per Real Dollar of GDP, Ranked by State, 2012." U.S. Energy Information Administration. Web. 27 Apr. 2015.

<sup>18</sup> "Washington State Energy Profile." U.S. Energy Information Administration. 17 July 2014. Web. 28 Mar. 2015.

## Coal Consumption

Coal used in Washington State comes from the Powder River Basin area in Montana and Wyoming. 2013 [statistics from the EIA<sup>20</sup>](#) show that 2.6 million metric tons are shipped by rail from Montana per year, and 1 million metric tons from Wyoming, to total 3.6 million metric tons shipped into Washington to be used for electric power generation each year. Washington State is also used as a throughway for coal on it's way to Asia. In the near past, coal was shipped out of Seattle. Currently, coal is carried by rail through Washington to export terminals in British Columbia, however, several export terminals have been proposed in Washington State. There has been a great deal of

**Table 3. Coal train traffic in Washington (trains per day)** *Source: Heavy Traffic Ahead<sup>19</sup>*

	Current activity	Possible Future activity (2023)
<b>Centralia Power Plant</b>	3.6	0
<b>Exports to BC</b>	5.2	18.7
<b>Exports from WA</b>	0	43.2

<sup>19</sup> "Rail Impacts of Powder River Basin Coal to Asia By Way of Pacific Northwest Terminals." Heavy Traffic Ahead. 1 July 2012. Web. 28 Apr. 2015.

<sup>20</sup> "By Coal Origin State." U.S. Energy Information Administration. 2013. Web. 7 May 2015.

speculation as to how much coal might transit through Washington if one or some of these terminals are built. Table 3 summarizes results of a 2012 study (updated in 2014) by a pair of transportation consultants from Montana. They found that coal passage through Washington State could increase dramatically by 2023.

## Washington State Greenhouse Gas Emission Goals and Laws

Washington has passed several important requirements in past years that set standards for emissions within the state and goals for future reductions. Written into the State Legislature's Revised Codes of Washington (RCWs) are requirements and goals relevant to the Centralia Power Plant. [RCW 70.235.020](#)<sup>21</sup> outlines the State's general goals for Greenhouse Gas emissions reductions, and [RCW 80.80.040](#)<sup>22</sup> sets specific requirements for reductions that target coal-burning facilities.

## Statewide Greenhouse Gas requirements

Revised Code of Washington (RCW) 70.235.020, added in 2008, requires Washington State to achieve the same levels of greenhouse gas emissions as 1990 levels by 2020, to

reduce emissions to 25% below 1990 levels by 2035, and reduce emissions to 50% below 1990 levels by 2050. These codes also set requirements for reporting of greenhouse gases.

RCW 80.80.040 laid out standards for greenhouse gas emissions that went into effect in July 2008. It basically set a standard of 100 pounds of greenhouse gases per MWh produced, which is about half of what a coal fired power plant produces. At the time it was passed, the bill did not include special provisions for the Centralia coal plant.

## Statewide Requirements: Effect on the Centralia Power Plant

In response to the goals laid out by the greenhouse gas targets of RCW 70.235.020 and the greenhouse gas performance standards of RCW 80.80.040, in 2009, Governor Christine Gregoire directed some state agencies to take action to reduce Greenhouse Gas emissions; this directive was [executive order 09-05](#)<sup>23</sup>. The order outlined a number of ways to reduce emissions and directed the Department of Ecology to work with specific companies that require emissions reductions. One of the targets of Executive Order 09-05 was the Centralia power plant. The order specifically stated that state agencies must work with TransAlta to reduce

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<sup>21</sup> "RCW 70.235.020." Washington State Legislature. 2009. Web. 11 Apr. 2015.

<sup>22</sup> "RCW 80.80.040." Washington State Legislature. 2011. Web. 11 Apr. 2015.

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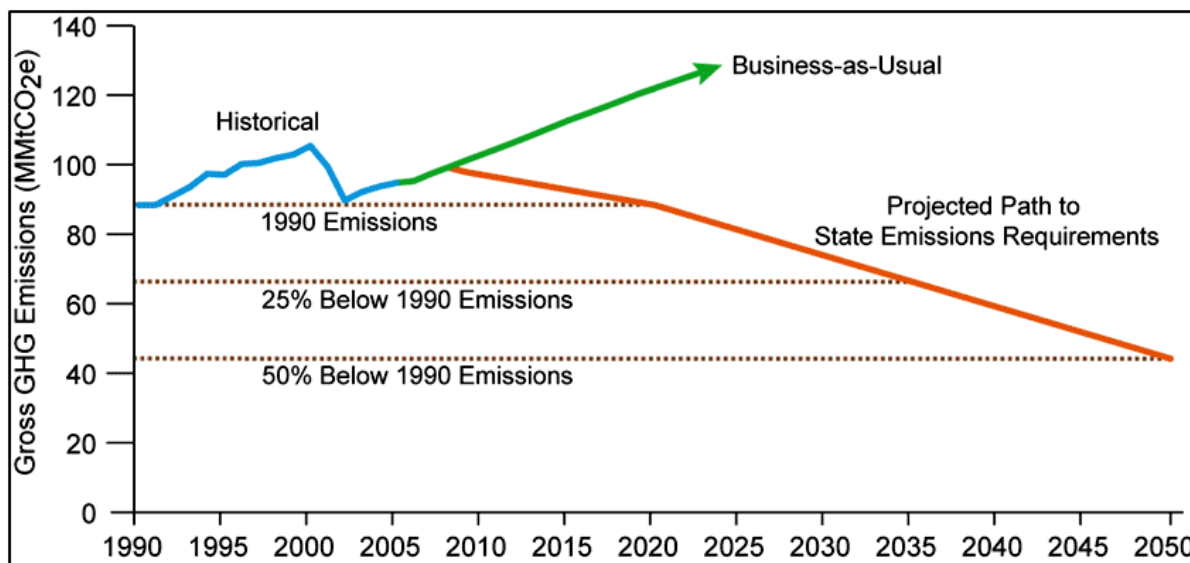
<sup>23</sup> "2009 Executive Order." Washington State Department of Ecology. Web. 3 June 2015.

emissions from the plant by more than one half. Since Centralia is the State's only coal-fired facility, reduction was crucial to meeting the greenhouse gas emission reduction goals of Washington State.

In 2011, the State Legislature revised the greenhouse gas performance standard rules (RCW 80.80.040) by adding a section specific to Centralia. Section (c)(i) of these codes states that "A coal-fired baseload electric generation facility in Washington that emitted more than one million tons of greenhouse gases in any calendar year prior to 2008 must comply with the lower of the following

in compliance by December 31, 2025". The performance standards were basically defined to be that equivalent to a combined cycle natural gas fueled burner. This section was added when [Senate Bill 5769](#)<sup>24</sup> was passed in 2011 on the same day that Governor Christine Gregoire announced that the Centralia power plant would be phased out.

The most recent statistics on total Greenhouse Gas emissions from [the Washington State Greenhouse Gas Inventory 2010-2011](#)<sup>25</sup>, a report put out by the Department of Ecology, put 2011 statewide emissions at 91.7 Million Metric tons carbon dioxide equivalent (MMtCO<sub>2e</sub>). This is still several million



*Washington's historical GHGs and statutory emissions reductions for 2020, 2035, & 2050*

Figure 4 indicates the Washington State GHG emissions in relation to statutory emissions reductions. (Source: [Washington State Department of Ecology\(2009\)](#)<sup>1</sup>)

greenhouse gas emissions performance standard such that one generating boiler is in compliance by December 31, 2020, and any other generating boiler is

<sup>24</sup> "Engrossed Second Substitute Senate Bill 5769." 2011. Web. 1 June 2015.

<sup>25</sup> "Washington State Greenhouse Gas Emissions Inventory 2010 – 2011." Washington State Department of Ecology. 1 Dec. 2014. Web. 5 June 2015.

metric tons above 1990 levels, which were at 88.4 MMtCO<sub>2</sub>e. Figure 4 gives an idea of where we are at with meeting those emissions standards by 2020, 2030, and 2050, and how historical and possible future emissions compare to those goals. Washington State emits GHG levels that exceed the statutory emissions reductions set for 2020, and “business-as-usual” will put the state on a trajectory for non-compliance with the future GHG reductions targets.

According to 2013 statistics from the Environmental Protection Agency, the Centralia Power Plant alone emits [7.5 MMtCO<sub>2</sub>e](#)<sup>26</sup>. However, it is hard to tell how much emissions will actually be reduced when the plant stops burning coal. The plant will likely be replaced with natural gas facility, which has fewer emissions associated with it, but will still add to the total greenhouse gas emissions in Washington State. 2.15 lb of CO<sub>2</sub> are produced per kWh from sub-bituminous coal, and 1.21 lb are produced from natural gas<sup>27</sup>. Given these emissions factors, and assuming the plant runs at same capacity factor to produce the same amount of electricity as it currently does, emissions would be about equal to 4.23MMtCO<sub>2</sub>e, this would be a 45% reduction.

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<sup>26</sup> "2013 Greenhouse Gas Emissions from Large Facilities." Environmental Protection Agency. Web. 17 May 2015.

<sup>27</sup> "How Much Carbon Dioxide Is Produced per Kilowatt Hour When Generating Electricity with Fossil Fuels?" U.S. Energy Information Administration. 1 Mar. 2015. Web. 29 May 2015.

## Centralia Power Plant: Ownership

From the time the plant opened in 1972 until 2000, the plant was owned by eight separate utilities. In 2000, PacifiCorp, Avista Energy, Seattle City Light, Snohomish County PUD, Tacoma Power, Puget Sound Energy, and Grays Harbor County PUD sold their shares to TransAlta Corporation. Shortly after Portland General Electric sold its shares to Avista Energy. The total cost of the purchase by TransAlta was \$453 million for the plant itself and \$101 million for the mine<sup>28</sup>.

## Source of Coal

The Centralia Power plant originally sourced most of its coal from the Centralia Coal mine. The mine was shut down in 2006, but while it was operational it supplied all its coal to the Centralia plant and produced an average of 4.3 million tons per year.<sup>29</sup> Most of the fuel from the Centralia plant came from the locally mined coal, but it was supplemented with Powder River Basin coal. The Centralia Power Plant has been burning some amount of Powder River Basin Coal [since 1989](#). By 1992, they were burning 30% Powder River Basin coal, after the initial test burns.<sup>30</sup> When the mine shut down, the fuel was completely

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<sup>28</sup> Van Eyck, Zack. "Power Plant, Mine Are Sold." Desert News 6 May 2000. Web. 25 May 2015.

<sup>29</sup> "Washington Geology." Department of Natural Resources. 1 July 2002. Web. 12 Apr. 2015.

<sup>30</sup> "TransAlta's Centralia Plant Earns PRBCUG Award." Power Magazine. 2014. Web. 15 May 2015.

replaced with coal from the Powder River Basin by 2008 because of the rising costs of mining in Centralia. To keep mining at Centralia, new permits for undisturbed areas would have to be issued, which would have raised costs to a point that would no longer be competitive with Powder River Basin coal shipped from Montana and Wyoming. This shut down meant that 550 union jobs associated with the mine were lost, and only 225 positions kept for continued operations<sup>31</sup>.

## Tax Breaks

The Centralia Power Plant benefits from [a tax break](#), enacted in 1997 that was meant to aid with pollution control investments. The tax break is about \$4 million per year and was contingent on the plant investing in sulfur dioxide and nitrous oxide reduction equipment and continuing to burn at least 70% locally mined coal. In 1999, coal companies from Montana and Wyoming challenged the 70% locally mined coal rule, saying that it violated the interstate commerce clause of the US constitution<sup>32</sup>. The interstate commerce clause ensures that free flow of commerce shall not be unduly impeded as the result of a state-specific action or statute. In this case, the commerce was coal, and Montana and Wyoming companies had an issue with it because it allowed them to sell less

coal across state lines. In 2000, the 70% locally mined coal clause was eliminated by the Washington State Legislature, but the rest of the tax break remained.

As of July 9, 2015, there is another bill under consideration in the State Legislature that is aimed at preserving jobs at the Centralia Power Plant as it transitions to natural gas. [Senate Bill 5575](#) would provide sales tax exemptions to TransAlta. This bill passed in the Senate but still had not passed in the House (as of the third special session in July), but if passed, it would make the construction and renovation associated with the conversion into a natural gas fired power plant exempt from state sales and use taxes. This exemption would include the labor, and anything needed for construction, such as machinery and equipment<sup>33</sup>.

In addition to the tax breaks, TransAlta also received an expedited permit for the transition. When the TransAlta Energy Transition bill ([Engrossed Second Substitute Senate Bill 5769](#)) passed in 2011, the legislation granted the company an expedited permit and removed the need for an Environmental Impact Assessment (EIA) under RCW 80.50.075-expedited processing of applications<sup>34</sup>.

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<sup>31</sup> "State's Last Coal Mine Shuts; Centralia Hit Hard." *The Seattle Times*. 1 Dec. 2006. Web. 8 Apr. 2015.

<sup>32</sup> Dodge, John. "Senate Budget Drops Sales Tax Break on Coal for Centralia Power Plant" *The Olympian* 24 Feb. 2010. Web. 28 Mar. 2015.

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<sup>33</sup> "SB 5575 - 2015-16." Washington State Legislature. Web. 30 Apr. 2015.

<sup>34</sup> "SB 5769 - 2011-12." *Washington State Legislature*. 2011. Web. 5 Mar. 2015.

## Emissions Reductions

Throughout the lifetime of the Centralia power plant, many emissions reductions have been both required and voluntarily adopted. These requirements and changes to the plant have led to a complex timeline of events, beginning right after the plant opened and ending in 2025 when the plant will be shut down completely.

## Timeline of Emissions Reductions

**1970:** [Clean Air Act](#) written into Federal law with procedures under which the EPA can set standards for air quality<sup>35</sup>

*\*Establishes National Ambient Air Quality Standards*

**1972:** Department of Ecology submits Washington's [State Implementation Plan](#) (SIP) to the EPA<sup>36</sup>

**1977:** Clean Air Act amendments<sup>37</sup>

**1990:** Clean Air Act amendments<sup>38</sup>

**1995:** EPA ordered by Congress to cut 70,000 tons of SO<sub>2</sub> emissions 90% by 2003

**1998:** RACT (reasonably available control technology) order [97-2057R1](#): requires the Centralia Power Plant to establish RACT emission limits for NO<sub>x</sub>, SO<sub>2</sub>, CO, and PM<sup>39</sup>

*\*RACT is required under the Washington Clean Air Act ([RCW 70.94.154](#))<sup>40</sup>*

*\* Groups involved: Centralia Power Plant's owners, National Park Service, EPA, the U.S. Forest Service, Ecology, the Southwest Clean Air Agency (SWCAA), and the Puget Sound Clean Air Agency*  
*\*Utilities start trying to sell the plant to avoid costs of scrubbers*

**2000-2002:** The Centralia Power Plant is bought by TransAlta. The company then installs SO<sub>2</sub> scrubbers at a capital cost of [\\$200 million](#)<sup>41</sup>.

**2005:** EPA revises BART because new technologies are available

**2005:** Clean Air Mercury rule (CAMR) - (EPA) mercury allowances for each state<sup>42</sup>

*\*2006: Centralia coal-mine shuts down*

**2007:** TransAlta argues that new 2005 BART standards do not apply for them. 2009 [Settlement agreement](#) reached instead because they were unable to come to a legal conclusion on if the

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<sup>35</sup> "Summary of the Clean Air Act." Environmental Protection Agency. Web. 30 Apr. 2015.

<sup>36</sup> "State Implementation Plan." Washington State Department of Ecology. Web. 4 May 2015.

<sup>37</sup> "History of Clean Air Act." Environmental Protection Agency. Web. 6 Apr. 2015.

<sup>38</sup> "History of Clean Air Act." Environmental Protection Agency. Web. 6 Apr. 2015.

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<sup>39</sup> "TransAlta Centralia RACT Order." SW Clean Air. 1998. Web. 7 May 2015.

<sup>40</sup> "RACT Requirements." Washington State Legislature. Web. 23 May 2015.

<sup>41</sup> "Centralia Power Plant New CCGT Unit, WA, United States of America." Power Technology. Web. 13 Apr. 2015.

<sup>42</sup> "EPA Announces First-Ever Rule to Reduce Mercury Emissions from Power Plants." Environmental Protection Agency. 15 Mar. 2005. Web. 18 May 2015.

standards apply (between Ecology and TransAlta). Same BART criteria ended up applying.

**2008:** [New Jersey v. EPA](#)- held that CAMR was invalid but TransAlta continued their commitment to reduce mercury emissions<sup>43</sup>

**2009:** [Settlement agreement](#) between TransAlta and Washington State Department of Ecology<sup>44</sup>

- 20% reduction in NOx emission limits and monitoring of limits-lower than BART limits
- Centralia will not be considered for additional NOx reductions for the 2018 Regional Haze State Implementation Plan.
- Halogenated sorbent injection technology (or comparable) must be implemented to reduce mercury emissions-10-14 million implementation costs-possible 3 million in yearly O&M costs or show overall 50% reduction

**2011:** TransAlta Energy Transition Bill passes representing an agreement to shut one coal-fired boiler by 2020 and the other by 2025 then replace the facility with a natural gas power plant.

## Coal Transition Power

The agreement in 2011 to transition the Centralia Power plant to a natural gas facility, the Engrossed Second Substitute Senate Bill 5769, also resulted in the [power purchase agreement for acquisition of coal transition power](#) signed between Puget Sound Energy (PSE), and TransAlta. In January of 2013, the Washington Utility and Transportation Commission (UTC) approved the contract that allows PSE to purchase coal transition power from the Centralia power plant until the second boiler shuts down. The agreement is for an average of 346 MW, and is effective from December 1, 2014 through December 31, 2025.<sup>45</sup>

As defined by the Washington State Legislature in [RCW 80.80.010 \(5\)](#)<sup>46</sup>, coal transition power is, “the output of a coal-fired electric generation facility that is subject to an obligation to meet the standards contained in [RCW 80.80.040\(3\)\(c\)](#)<sup>47</sup>.” RCW 80.80.040(3)(c) is the code that refers to both boilers of a coal fired baseload generation facility being in compliance of greenhouse gas emissions standards by 2020, and 2025. PSE’s power purchase agreement with TransAlta specifies that if any new standards, requirements, or limitations

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<sup>43</sup> "New Jersey V. Environmental Protection Agency." Findlaw. 2008. Web. 13 Apr. 2015.

<sup>44</sup> "Settlement Agreement Reached Between State of Washington Department of Ecology and TransAlta Centralia Generation LLC of Air Quality Matters." Washington State Department of Ecology. 2010. Web. 10 May 2015.

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<sup>45</sup> "Power Purchase Agreement for Acquisition of Coal Transition Power." Washington State Legislature. 2011. Web. 2 Apr. 2015.

<sup>46</sup> "RCW 80.80.010 Definitions." Washington State Legislature. 2011. Web. 2 Apr. 2015.

<sup>47</sup> "Greenhouse Gas Emissions Performance Standards - Rules - Sequestration." Washington State Legislature. Web. 2 Apr. 2015.

are imposed to address greenhouse gas emissions that will modify the agreement, these changes must be reviewed, and either party can terminate the agreement if they are negatively affected by the change. This type of agreement provides assurance to the electric utility that they will continue to earn their allowed rate of return on power sold, and continue to be able to provide a baseload source of power to customers.

## Coal from Colstrip: The Future of Coal in Washington State?

In addition to the coal powering Washington State’s electric grid from the Centralia power plant, coal-powered electricity flows to Washington from Montana’s Colstrip Steam Electric Station. Colstrip is a four-unit coal fired generation station with a combined capacity of 2094MW, located in southeastern Montana. The power plant in Colstrip is owned by six separate utilities with different shares, but Puget Sound Energy (PSE) owns the largest share with 50% ownership of units 1 and 2, and 25% ownership of units 3 and 4. In total, PSE, which serves nine counties in Washington State with electricity, owns 677 MW of power-generating capacity from the Colstrip power plant.<sup>48</sup> PSE currently has [3,000 MW](#) of generating-capacity, thus Colstrip makes up more than one

<sup>48</sup> "Colstrip Generating Station." Puget Sound Energy. Web. 5 May 2015.

fifth of its total capacity.<sup>49</sup> Table 4 gives an overview of the mix of different energy sources imported and purchased by PSE in 2013 to produce electric power. Coal made up 24% of PSE’s electricity fuel mix, and most of that coal is burned to power Colstrip.

**Table 4:** The Electricity Fuel Mix of Puget Sound Energy (PSE) in 2013.

*Source:* [PSE](#)<sup>50</sup>

Fuel	Percentage
Coal	24%
Hydroelectric	41%
Natural Gas	25%
Nuclear	2%
Other	1%
Wind	7%
<b>Total</b>	<b>100%</b>

## The Future of Colstrip

There are currently plans in the works to shut down the Colstrip plant. Because the plant is owned by six separate utilities, this could be a complicated process, but PSE, as the largest owner, does have a certain amount of power. PSE is currently in a position where it could acquire additional shares in the plant, with the goal of shutting it down completely. [Senate Bill 5874](#) currently being considered (as of the third special session on July 9, 2015) would set up the conditions necessary to retire coal-fired electric generation facilities. The

<sup>49</sup> "Electric Supply." Puget Sound Energy. Web. 5 May 2015.

<sup>50</sup> "Electric Supply." Puget Sound Energy. Web. 5 May 2015.



bill promotes the retirement of the Colstrip plant by setting up favorable conditions for utilities to sell all their shares to one utility, giving the purchasing utility the authority to shut down the plant.<sup>51</sup> Opposition to this bill includes concerns over the lengthy timeline given to utilities to end coal use, and what would replace the generation capacity. The measure gives the utilities 30 years to end their use of coal, but does not include provisions regarding what that energy source would be replaced with.

Opponents of the bill, including the Sierra Club, argue that this timeline is too long, and that there needs to be some assurance that the coal will be replaced with a form of cleaner energy.<sup>52</sup> Supporters favor the bill because it gives PSE the necessary tools needed to end their connection with Colstrip. The bill further encourages utilities to divest from coal use by allowing them to recover mitigation costs of closing the plant from their customers.

## Opposition to Discontinuing Colstrip

There is another bill currently progressing in the Montana senate to keep the closure of Colstrip from occurring. MT [Senate bill 402](#) would discourage PSE from purchasing Colstrip to shut it down by imposing

huge fees on the utility annually. Under the bill, any energy or utility company that purchases a coal plant with the intent of closing it would be charged a fee of five times the taxable value of the facility annually for 20 years. Of the total revenue collected, 50% would go to the county where the facility is located.<sup>53</sup>

Much of the reason for this bill is to oppose WA Senate Bill 5874 and to keep Colstrip from being controlled by Washington utilities. Montana politicians are concerned that the bill would threaten the Montana economy, and that Washington has no right to control that outcome.

MT [House bill 224](#), sponsored by Montana Republicans, seems also to play into this battle. HB 224, if passed, would add \$1 million to the attorney general's budget to be used for litigation to protect the state's international and domestic markets.<sup>54</sup> Essentially a war chest meant to intimidate PSE, this money could be used for litigation against companies that attempt to impede the movement of goods from Montana, such as coal-fired electricity. Both these bills essentially make it more difficult for PSE to consider ending coal use from Montana.

The connection between these bills and Washington's SB 5874 is further made clear by a statement from Senator Doug Ericksen, chair of the Senate Energy, Environmental, and Telecommunications Committee and

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<sup>51</sup> "SB 5874 - 2015-16." Washington State Legislature. Web. 10 May 2015.

<sup>52</sup> "Utility Proposal for Transition From Coal Electricity Is Too Slow." Sierra Club. 6 Feb. 2015. Web. 10 May 2015.

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<sup>53</sup> "Montana SB402." LegiScan. Web. 11 May 2015.

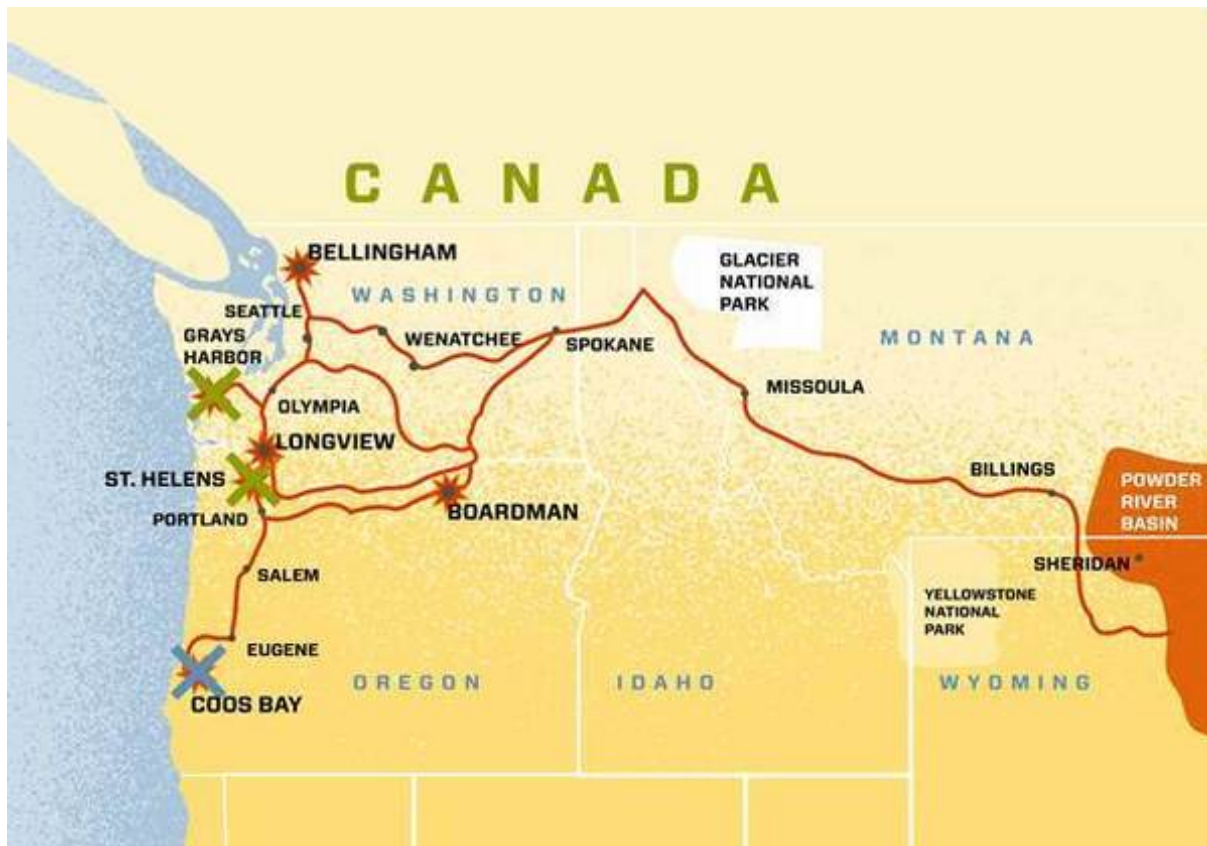
<sup>54</sup> "Montana HB0244." Montana Legislature. 2015. Web. 11 May 2015.

co-sponsor of SB 5874. He stated, "I heard from lots of people in Montana and Washington concerned about rushing into a decision that doesn't need to be made today."<sup>55</sup> If these Montana bills do pass, a huge cost may be incurred on PSE and it would be an upward battle to transition away from coal fired power in Washington State. Depending on which of these bills pass, SB 402 and HB 224 in Montana, or SB 5874 in Washington, or both, the future of coal in Washington State could look very different.

## Coal Exports

If Washington State were to wean itself completely off of coal use, there would still be the issue of exports and coal trains passing through the state for export. Currently, coal trains pass through Washington State on their way to Canada, but the amount could increase substantially if a coal export terminal is built in the state (See Table 3).

Since 2011, terminals have been proposed in the Pacific Northwest to transport coal from the Powder River



**Figure 5:** Proposed and scrapped coal-export facilities in the Pacific Northwest. *Source: ClimateProgress*  
 "Another Coal Export Terminal Is Terminated As Chinese Developments Could End Business Case For Remaining Three." ThinkProgress. 9 May 2013. Web. 17 May 2015.

<sup>55</sup> "Washington Coal Bill Gets Deeper Look." *Great Falls Tribune*. 12 Mar. 2015. Web. 29 Apr. 2015.

Basin to Asia, to meet growing demand. As of June 2015, only two proposals

remain in consideration, the Millennium Bulk Terminals in Longview, WA, and the Gateway Pacific Terminal near Bellingham, WA at Cherry Point (Figure 5). The map in Figure 5 shows the three export facilities still under consideration in the Pacific Northwest, one in Oregon, two in Washington, as well as the shelved and scrapped proposals. The Cherry point facility would have the capacity to ship 54 million metric tons of coal per year,<sup>56</sup> and the Longview facility would have the capacity to ship 44 million metric tons.<sup>57</sup> If both these facilities are built, the amount of trains going through Washington State could go up by 36 loaded and unloaded trains per day.<sup>58</sup> As of 2015, both facilities are working on their Environmental Impact Assessments, and neither has begun construction.

The movement of coal across the state has impacts, even if it is not burned within state lines. Opponents to coal export facilities argue that there are too many harmful effects associated with the construction of the facilities in fragile ecosystems and the transportation of coal, which results in lost coal particulates and noise pollution. There is also the consideration that an export facility would encourage the consumption of

more coal in the areas to which it is exported, resulting in more greenhouse gas emissions worldwide. Few studies have been completed on the effects of coal particulates on human health during train passage, but coal particulates can contain arsenic, mercury, fluorine, and selenium, all of which can have very harmful impacts on human health.<sup>59</sup> According to the Burlington Northern and Santa Fe railway (BNSF), 645 pounds of coal dust can be lost from a single car during a 400-mile journey.<sup>60</sup> With the average coal train having 125 cars, the effects of this particulate matter can be significant.

Proponents believe that an export facility would create enough jobs to offset negative effects and would be beneficial to the communities in which it is built. The Gateway Pacific Terminal at Cherry Point proposal argues that the facility will meet the demand in the growing Asian market and, create negligible harmful environmental impacts within the state, while providing good paying jobs to Whatcom County residents.

Another aspect of these export terminals is how Washington's relationship with both Montana and Wyoming would change based on their completion. With the coal for these export facilities coming from the Powder River Basin area, Montana and Wyoming stand to benefit from

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<sup>56</sup> "Gateway Pacific Terminal at Cherry Point Proposal." Washington State Department of Ecology. Web. 16 May 2015.

<sup>57</sup> "Millennium Bulk Terminals Longview (MBTL) Proposal." Washington State Department of Ecology. Web. 16 May 2015.

<sup>58</sup> "Heavy Traffic Still Ahead." 1 Feb. 2014. Web. 17 May 2015.

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<sup>59</sup> "Health Impacts of Coal and Coal Use: Possible Solutions." International Journal of Coal Geology, 2002. Web. 17 May 2015.

<sup>60</sup> "Pacific Northwest Weighs Environmental Risks of Cashing in on Coal Export Market." PBS. 2 Aug. 2013. Web. 19 May 2015.

Washington's construction of either or both of the export terminals. In May 2015, Wyoming Governor Matt Mead was in Washington State, visiting with Washington Governor Jay Inslee, trying to gather more support for coal export terminals in Washington.<sup>61</sup> Interstate relations is just another element to the decision, proving how complicated the relationship with coal and other fossil fuels has become.

There is little certainty regarding the fate of the two proposed export terminals. There is a strong opposition to both terminals from environmental groups, community members, and tribes. There is also strong pressure from public officials who support the projects and the industries themselves that promise economic gains and the creation of jobs.

## Conclusion

A picture of the future role of coal in Washington State is hazy at best. It seems certain that Washington's one and only coal-fired power station at Centralia will transition to natural gas within ten years. However, the future of imported coal-fired electricity is much less certain. Montana appears willing to put considerable financial resources into preventing PSE's exodus from Colstrip. It remains to be seen what incentive PSE may have to initiate actions to shed itself of Colstrip. Most uncertain is the future for coal

transiting through Washington on the way to Asia. Even if the export terminals at Cherry Point and on the Columbia River are not built, we may still have trains traveling across the state en route to the port of Vancouver. The number and frequency of these trains is especially difficult to predict given the recent economic downturn in China and that country's initiatives to reduce coal consumption. It is further complicated by recent increased efforts on the part of Australia to export its coal to energy hungry markets.

Washington State has made huge strides in reducing its fossil fuel dependency. Renewable energy portfolios, clean power plans, working groups for climate change, and the phasing out of Washington State's only coal fired power plant all illustrate that change is underway.<sup>62</sup> Washington has never been a prominent coal consumer or producer in the country, but it does import, export, and use coal for energy. This means that a statewide transition away from coal will have impacts beyond Washington State. Reduced consumption at Centralia and Colstrip and restricted access to markets Asia means significant foregone sales for coal mines in Montana and Wyoming. Domestically, the onset of EPA's Clean Power Plan, should it survive court challenges, foreshadows a dimming future for coal, domestically. Predictably, this will ratchet up the concern of Montana and Wyoming for access to Chinese customers.

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<sup>61</sup> "Wyoming Governor Pushes Coal Ports on NW Trip." The Seattle Times 18 May 2015. Web. 31 May 2015.

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<sup>62</sup> "Energy Climate Change and Our Environment." The Whitehouse. Web. 8 May 2015.

With so many aspects to this complicated relationship Washington state and the world has formed with coal, the phasing out of the Centralia coal fired power plant is only one small step. It is doubtful that Centralia alone will have effects beyond state lines. The closing of Colstrip, on the other hand, could be devastating to communities in southeastern Montana.

A conversation is playing out at the present, a conversation that will determine the future of coal in the Pacific Northwest. Transitioning away from fossil fuels, which have driven the growth and development of our modern industrial economy, is daunting. Yet it is clearly difficult. The political influence of the fossil fuel industry is legendary, however, innovations in renewable energy have

demonstrated that clean power can compete in an open marketplace with some fossil fuels, particularly when the external effects of those fuels is accounted for.

The structure of the energy system in Washington State is changing. It is being rebuilt. And it is transforming the meaning of energy in a modern world. Coal today plays a considerable role in the electric power sector. Yet it is here that renewable energy such as solar, wind, tidal, and hydropower can substitute for coal directly. For Washington, the days when industrial processes relied on coal are long gone. From Washington's perspective, there is little need for coal as an energy source in coming decades.

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The Washington State Department of Ecology (Ecology) determined that BART for NO<sub>x</sub> emissions is the current combustion controls combined with the completion of the Flex Fuels project and the use of a sub-bituminous coal from the Powder River Basin (PRB) or other coal that will achieve similar emission rates. This change results in a 20% reduction of NO<sub>x</sub> emissions from the baseline period emission rate. The use of low sulfur PRB coal also reduces SO<sub>2</sub> emission by about 60% from the same period. The NO<sub>x</sub> reduction from the BART controls selected by Ecology will result in a visibility improvement from the baseline impacts at Mt. Rainier National Park of approximately 1.13 dv, with improvements of 0.67 to 1.45 dv at other affected Class I areas. The controls have been installed and have met the emission limitation since October 1, 2009.

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