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Western Organization of Resource Councils

Exporting Powder River Basin Coal: Risks and Costs

Updated September 2011

Summary

U.S. domestic coal production has encountered major uncertainties in recent years with proposals to regulate or abolish the destructive practice of mountain top removal and efforts to control greenhouse gas pollution. Proposals for new coal power plants have been put on hold or shelved. The economic downturn of 2008-2009 reduced demand for coal and electricity. New regulations and concerns about global warming have led to calls to retrofit or retire the oldest and dirtiest coal plants, and utilities are increasingly replacing coal-fired power plants with power from natural gas, wind and other sources. Meanwhile, demand for coal in other parts of the world is growing. The world's two most populous countries, China and India, are the world's fastest growing economies and major consumers of coal.

This combination of factors has the U.S. coal industry looking overseas at a more robust global export market, specifically in Asian-Pacific markets. Much of this export market would be met by opening new mines and expanding existing operations and infrastructure in the Powder River Basin of Montana and Wyoming, and exporting coal through Northwest ports.

For that to happen, the coal must be mined, railroads and ports must be upgraded or built new, and the communities along the way must face disruption from these changes. Coal mining already hurts the health and productivity of agricultural land in the West. Coal mining displaces farmers and ranchers who depend on the land to make a living by eliminating land used for crops or grazing. Coal seams also serve as aquifers in most of the West, and mining disrupts and degrades the water resources of the area, further damaging the long-term productivity of the land. Increasing coal mining would compound these problems.

The jury is still out on whether coal companies will meet reclamation standards for final bond release on most of the land disturbed by coal mining. Final bond release for coal mined land is the best measure of reclamation success, and only a tiny percentage of strip mined land has passed that test over 30 years after passage of the Surface Mining Control and Reclamation Act.

Expanded coal mining for export would have other impacts on western communities and the environment. New and expanded railroads would need to be built to accommodate increased coal shipments to the West Coast. New railroad lines would be built in pristine river valleys, across farms and ranches and prime hunting grounds, causing immeasurable harm to the beauty and economic value of this land.

Communities from Sheridan to Spokane and beyond would experience increased rail traffic. Up to 40 unit trains a day to and from the West Coast would be required to transport 110 million tons of coal a year, the amount in announced export plans of three major coal companies. In communities split by rail lines, this could significantly delay traffic and emergency vehicles, boost noise and air pollution and

220 S. 27th Street, Suite B, Billings, MT 59101
(406) 252-9672 FAX (406) 252-1092 billings@worc.org www.worc.org

increase the likelihood of train-auto collisions. Adverse impacts on residents and businesses and on restoration efforts in historic core neighborhoods of regional cities will be profound.

Increasing coal train traffic will also leave large amounts of coal dust in communities across the West. Each coal rail car could lose as much as 500 lbs of coal and coal dust per railcar–over 30 tons per unit train–during each trip. Coal dust can also have a detrimental effect on rail track beds, which could lead to an increased need for repair and more derailments. More coal train traffic will pollute air and water along the rail lines.

Exporting Powder River Basin coal from West Coast ports would mean rail and port capacity would not be available for other commodities. Coal export terminals would occupy valuable real estate at ports, limiting the choices coastal communities can make to use this real estate for their own economic prosperity. Increased coal trains could affect available capacity and quality of service for grain shipments and high value container traffic. Instead of addressing our trade deficit by promoting 21st century technology, such as wind and solar equipment manufacturing, we would be locking ourselves into exporting a dirty 19th century fuel.

Expanded coal mining and coal exports also subvert the goal of the United States and countries around the world to reduce global warming pollution. Whether coal is burned in the United States or abroad, it will have the same impact on global climate. While relatively low-sulfur coal from the Powder River Basin coal will produce less of some kinds of air pollution in China than burning high-sulfur Chinese coal, emissions of greenhouse gases are nearly identical from either Chinese or U.S. coal, and the global warming impacts of burning Powder River Basin coal will affect the U.S. no matter where the coal is burned.

Proposed coal exports from facilities in the Pacific Northwest shipping comparatively cheap Powder River Basin coal would undermine China's progress toward more efficient power generation and usage and renewable energy, thereby encouraging more coal burning in China and elsewhere in the Pacific Rim, according to an economic analysis released in July, 2011 by Dr. Thomas M. Power, past chair of the University of Montana Economics Department.

Powder River Basin Coal Resources

The Powder River Basin of Montana and Wyoming is the largest source of coal in the United States. Total production in the Powder River Basin was over 455 million short tons of coal in 2009.[1] Wyoming produces the most coal of any state in the nation, and Montana ranks fifth.[2] Both states would see an increase in production to meet export demands.

In addition to large levels of production, Montana and Wyoming lead the nation in estimated recoverable reserves of coal. Montana has over 74 billion tons of estimated recoverable reserves, the most in the U.S., and Wyoming has over 39 billion tons of estimated recoverable reserves, the second highest reserves in the U.S[3].

[1] Energy Information Administration- Coal Production and Number of Mines by State and Mine Type, 2009, 2008: http://www.eia.doe.gov/cneaf/coal/page/acr/table1.pdf

[2] Energy Information Administration, Coal Exports by Custom District: http://www.eia.doe.gov/cneaf/coal/quarterly/html/t13p01p1.pdf

[3] Montana has 74.81 billion tons of estimated recoverable reserves; Wyoming has 39.19 billion tons. The amount in each state that is economically recoverable is lower; how much lower depends on the current price of coal.

The 1990 amendments to the Clean Air Act drastically increased the domestic demand for low-sulfur Western coal. Western coal accounted for 54.5% of the total coal produced in the United States in 2009,[4] compared to just 32% in 1990.[5]

Over the past decade, coal production from the Powder River Basin has increased steadily, approaching record levels in 2008, followed by a drop in 2009, due to the economic downturn. In the 2nd quarter of 2011 severe flooding throughout the region and high water behind the dams resulted in disruptions to trains and to markets due to greater usage of hydroelectric power, both of which resulted in a reduction in coal usage compared to the 2nd quarter of 2010. Nevertheless, production in the Basin is on the rebound and in the 12 months prior to June 30, 2011, was up slightly from the previous 12 months.[6]

Current U.S. Exports from Powder River Basin

Today, close to 99% of the coal mined in the Powder River Basin is consumed in domestic U.S. coal markets.

However, a depressed domestic market and increased foreign demand, especially from the Pacific Rim, has piqued the interest of the largest U.S. coal producers in potential export markets. Chris Ruppel, an energy analyst at Execution, a brokerage and research firm, recently predicted, "As U.S. coal demand is constrained because of increasing environmental regulation, coal production in the United States will increasingly go toward overseas buyers."[7]

According to the U.S. Energy Information Administration, total U.S. exports of coal to Asia grew 176% from 2009 to 2010 to 17.9 million short tons, 4.9 of which was steam coal as global supplies of thermal coal tightened.[8]
Unless strict limits on greenhouse gas emissions are put in place, growth in Asian coal demand is expected to increase world coal consumption by 2030. The U.S. Energy Information Administration predicts that nearly 90% of that increased consumption will be attributed to China.[9]

Investors are aware that China relies on coal for most of its energy needs, but is burning more than it can produce. According to the Beijing-based General Administration of Customs, China's 2009 coal imports more than tripled from the previous year's to 125.8 million tons.

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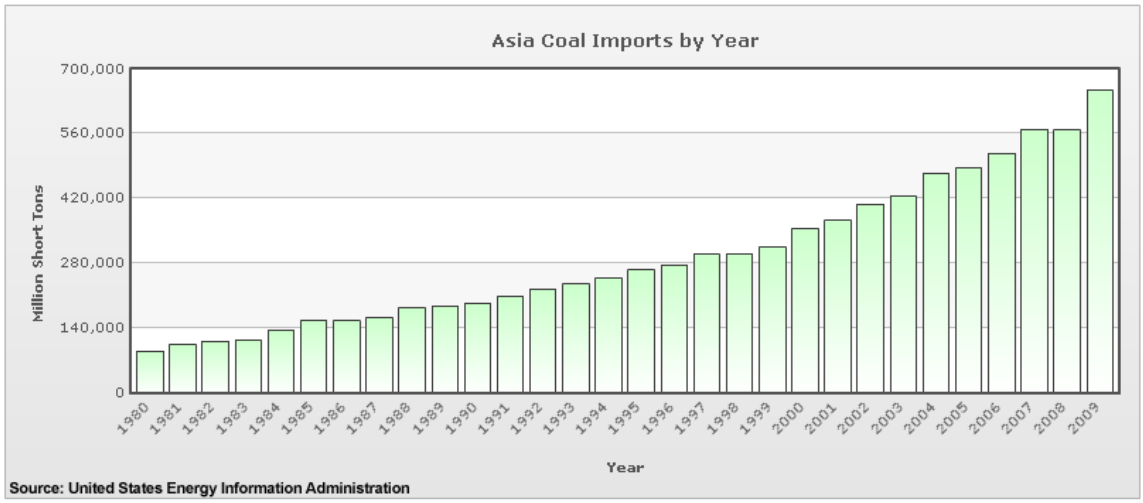
[4] Energy Information Administration- Coal Production and Number of Mines by State and Mine Type: http://eia.gov/cneaf/coal/page/acr/table1.html
[5] Coal Industry Annual 1994, Energy Information Administration, accessed electronically 9/9/2010
[6] SNL Daily Coal Report, Sept. 6, 2011, "Top producing Powder River Basin mines in Q2'11" Dan Lowrey and Ashley Pipkin Jones
[7] Krauss, Clifford. "An Export is Solid Supply". *The New York Times.* March 19, 2008: http://www.nytimes.com/2008/03/19/business/19coal.html?pagewanted=2
[8] U.S. Energy Information Administration, "U.S. Coal Supply and Demand: 2010 Year in Review", William Watson, Nicholas Paduano, Tejasvi Raghuveer and Sundar Thapa, April 2011.
[9] Mining Companies Aim To Export to China Through Northwest Ports, *The Oregonian*, Wednesday, September 8, 2010. Scott Learn

Figure 1: Asia Coal Imports by Year



U.S. Coal Companies Signal Plans to Increase Exports

Western coal production and exports increased between 2009 and 2010,[10] despite the global recession, and the country's biggest coal companies have announced their intentions of continuing to expand the export market to their stakeholders and the public at large.

"The markets (for Powder River Basin coal) nationally are questionable, but it's unquestionable the demand that exists overseas – a wide variety of countries and into the foreseeable future," Bud Clinch, executive director of the Montana Coal Council, noted recently.[11]

Peabody Energy, the largest coal producer in the United States, and others in the coal industry are relying on this demand to continue.

In a presentation at an analyst and investor forum in early 2010, Rick Navarre, Peabody president and Chief Commercial Officer, estimated current Asia-Pacific market demand for imported coal to reach 140 million metric tons per year, and that annual demand in that region could increase to 220-260 million metric tons, by 2015.[12] Peabody plans to expand production throughout the world in order to bring coal to China, India, Japan and South Korea.

Mining Companies Move to Expand

Arch Coal has significantly consolidated and expanded its western operations over the past two years. In 2009, Arch acquired the Jacobs Ranch Mine in the southern Powder River Basin in Wyoming which, when integrated with the nearby Black Thunder Mine, created the largest coal mining complex in the world. In 2009, production from Arch's Black Thunder, Jacobs Ranch and the nearby Coal Creek mines added up to 120.1 million tons.[13] Arch also acquired the rights to 1.2 billion tons of coal on Otter Creek

[10] http://tonto.eia.doe.gov/FTPROOT/coal/058494.pdf
[11] Connelly, Joel, "Ultra-long coal trains on Seattle waterfront? Time for a long critical look", Seattle Post Intelligencer, July 31, 2011.
[12] Navarre, Rick. Peabody Energy. June 17, 2010 Expanding Markets and Peabody Growth Opportunities. 2010 Analyst and Investor Forum, Slide 42
[13] 29.3 million tons at Jacobs Ranch, 81.1 million tons at Black Thunder and 9.7 million tons at Coal Creek

in the Northern Powder River Basin in Montana. These actions increased the coal reserves under Arch's control by 25%.[14]

In 2006, Peabody expanded into Australia, currently the world's largest coal exporter, by acquiring Excel Coal Ltd. Peabody is also part of a consortium partnering with the government to develop high quality coal in Mongolia not far from growing Asian markets. In 2008, Peabody began sending coal from Wyoming to Europe, first by rail to the Mississippi River, then by vessel through the Gulf of Mexico. Now the company is shipping coal to Japan from the California coast. Further demonstrating its desires to increase production, Peabody has indicated that it could open the leased and permitted School Creek Mine just north of its North Antelope Rochelle Mine in Wyoming.[15] This mine was scheduled to open in 2008, but has not yet started operations due to economic conditions.

Cloud Peak Energy shipped 3.3 million tons for export in 2010 and was expected to ship 4 million tons in 2011. Signal Peak Mine north of Billings, Montana, has also sent coal to the West coast for export.

Port Expansions

In order to meet the export goals of Arch, Peabody, and other companies with western reserves, current railroad and port infrastructure in the United States would need to be significantly expanded and upgraded, as well.

"The real goal here is to see if we can't get large volumes of Powder River Basin coal to Asia,"[16] said Peabody Coal CEO Gregory Boyce, "obviously it's a longer-term project. Our goal is to get large volumes of Powder River Basin [western U.S. Powder River Basin] coal to the Pacific Rim. We know we can sell it in China and Korea." The challenge, he said, was to get the needed volumes into the marketplace through a custom-built port, although there was no time frame for such a project.[17]

Steven Leer, Arch Coal Chairman and CEO, described his company's second move in a week to acquire export terminals in January 2011, in a media statement: "This transaction is another important step in accomplishing our strategic objective of expanding Powder River Basin coal sales into the Asia-Pacific region."[18]

Industry analysts say Peabody's planned export expansions alone could mean an investment of as much as $500 million in new terminals.[19] Peabody is active in the Gateway Pacific Terminal proposal near Cherry Point, Washington, with plans to build first 24 million tons of coal capacity, and longer term plans to double that.

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[14] Arch Coal 2009 Annual Investor Report, *The Power Within* accessed 8/29/2010 available online at http://investor.archcoal.com/phoenix.zhtml?c=107109&p=irol-irlhome
[15] http://gillettenewsrecord.com/articles/2010/08/02/news/yesterday/news08.txt
[16] http://www.bloomberg.com/news/2010-06-24/peabody-energy-sees-global-demand-at-the-beginning-of-a-super-cycle.html
[17] "Peabody Energy Still Looking At Australian, Mongolian Opportunities," Steve James, *Reuters,* Friday June 25, 2010
[18] http://news.archcoal.com/phoenix.zhtml?c=107109&p=irol-newsArticle&ID=1517028&highlight=
[19] Mining Companies Aim To Export to China Through Northwest Ports, *The Oregonian*, Wednesday, September 8, 2010. Scott Learn

Arch is moving aggressively to position itself to pursue exports of its PRB holdings. In 2011, Arch purchased a one-third share of the Tongue River Railroad which would connect its Otter Creek Montana holdings to the BNSF mainline and West Coast ports.

In 2010, Arch became a minority partner in the Millennium Bulk Terminal near Longview, Washington.[20] In November of 2010, Millennium received initial approval for the first U.S.-based West Coast terminal for coal exports with capacity to ship 5.7 million tons of coal per year. After being challenged by Earthjustice on behalf of Climate Solutions, Sierra Club, Washington Environmental Council and Columbia Riverkeeper, the application for a shoreline development permit for the facility was withdrawn.[21] The discovery of internal memoranda disclosing plans to expand the port to 60 million tons per year coal exports bolstered the case of port opponents who alleged that the Cowlitz County Commissioners did not fully consider the environmental impacts of the project before approving the permit. Apparently, hedging its port bets, in January, 2011, Arch announced an agreement to secure 2.5 million tons annual export capacity at Ridley Terminal in Prince Rupert, British Columbia[22] through 2015.

One hundred and ten million tons represents a conservative estimate of the Pacific Rim annual export market for Montana and Wyoming coal.

Rail Expansions

These moves and statements have not gone unnoticed in the railroad sector, which also sees opportunities for expansion.

In 2008, Matt Rose, CEO of Burlington Northern Santa Fe Corp (BNSF) said the company is talking to potential customers abroad about exporting Powder River Basin coal and looking at the logistical challenges of exporting large quantities. The mining companies are also talking to customers abroad, and both parties say they have enough capacity to handle increased demand.[23]

In the first six months of 2010, 3.5 million tons of coal was shipped from Powder River Basin Coal mines to Oregon and Washington for use in electrical generation and combined heat and power applications.[24] BNSF hauled 6 million short tons of Wyoming and Montana coal through Westshore terminal in British Columbia in 2010, compared with about 2 million in 2009 [25]

An export market of 110 million tons a year[26] would require about 40 unit trains[27] traveling to or from the West Coast and the Powder River Basin every day. For comparison, current volume

[20] Black, George. "Coal On A Roll: Plundering America to Power the Asian Boom", OnEarth, Fall 2011 p. 37. -
[21] Learn, Scott. "Environmental groups appeal approval of Columbia River coal export terminal", The Oregonian, Monday, - December 13, 2010: http://www.oregonlive.com/environment/index.ssf/2010/12/environmental_groups_appeal_ap.html -
[22] Arch Coal, Inc. "Arch Coal Announces Agreement With Canada's Ridley Terminal For Pacific Coast Exports," January 18, 2011, - http://news.archcoal.com/phoenix.zhtml?c=107109&p=irol-newsArticle&ID=1517028&highlight. -
[23] http://www.mineweb.com/view/mineweb/en/page38?oid=54526&sn=Detail -
[24] Energy Information Association- Monthly Nonutility Fuel Receipts and Fuel Quality Data, 2002-2007 - http://www.eia.doe.gov/cneaf/electricity/page/eia423.html
[25] "Tripling of BNSF export coal volumes plays role in new US port moves" 12-3-10 Platts. -
[26] This number is an estimate that combines the 60 million tons of capacity planned for Millennium Bulk Terminal at Longview, - Washington with the 48 million tons of capacity planned for Gateway Pacific Terminal at Cherry Point near Bellingham, - Washington with existing Powder River Basin exports of 2-6 million tons. -
[27] Based on average of 15,000 tons per train, with approximately 130 car trains. -

of traffic is no more than 5 unit trains[28] per day. Nearly all of the rail lines from the Powder River Basin to the West Coast would eventually need upgrades to carry additional weight or add additional tracks to accommodate an export market of this size.

Western Railroads

Union Pacific (UP) and BNSF are the two major Class I railways that operate in the Powder River Basin. Union Pacific is the largest railroad network in the U.S., with revenues at more than $13 billion, and employs 50,000 people. BNSF is owned by Berkshire Hathaway and has one of the largest freight railroad networks in North America, second only to UP, with revenues totaling more than $14 billion and employing nearly 40,000 people. UP ranks 153 on the 2011 Fortune 500 list, up from 164 in 2010. BNSF was ranked 167 in 2010 when it was acquired by Berkshire Hathaway, currently ranked number 7 on the Fortune list. The acquisition helped lift BH from number 11 in 2010.

Montana Rail Link is a Class II railroad that operates over 900 miles of line from just east of Billings, Montana to Sandpoint, Idaho. The black section of rail line on Figure 2 is owned by Montana Rail Link, an important section of rail to any export market.

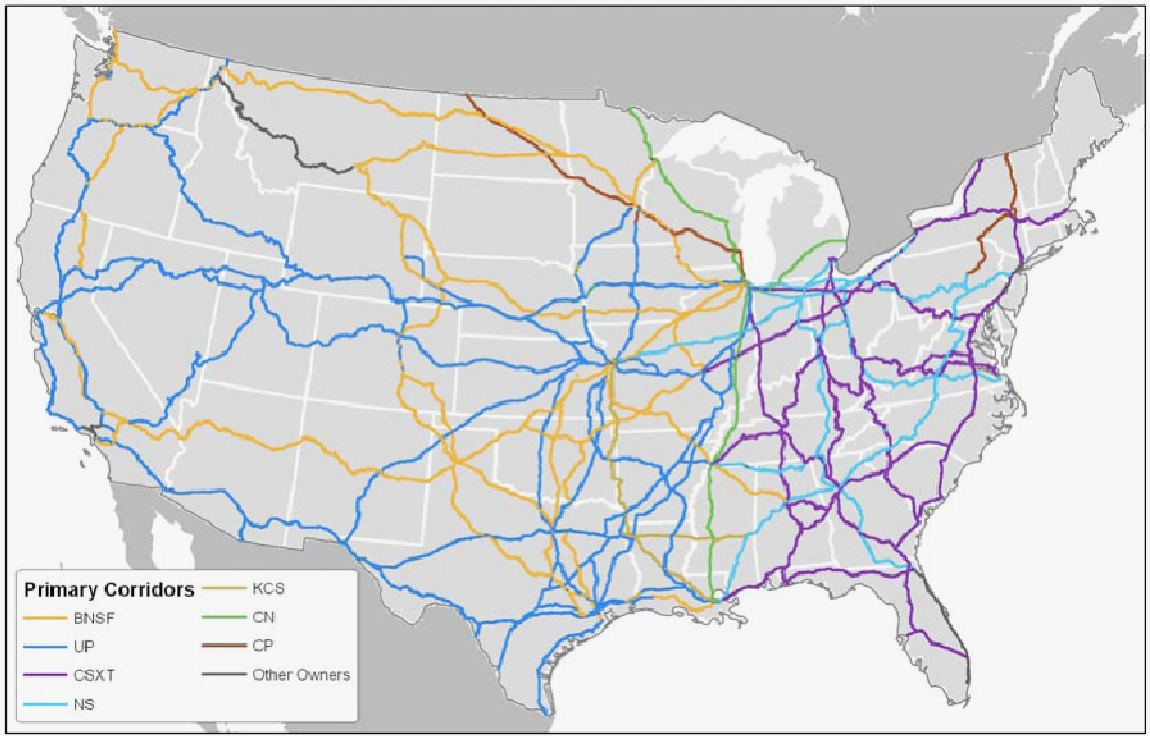
Only two railroads – the BNSF and Union Pacific – transport Powder River Basin coal westward. Coal trains vary from 100-150 cars to haul Powder River Basin coal to electric utilities, the vast majority of which are east and southeast out of the region. The rail cars haul coal only, and must return to the mines empty.

A relatively small amount of westbound coal from Powder River Basin mines in Wyoming and Montana today goes through Billings, Bozeman, Helena, and Missoula on Class I track, a portion of which is owned by Burlington Northern Santa Fe Railroad but leased and operated by Montana Rail Link.

The coal continues on through Sandpoint, Idaho and Spokane, Washington, where it heads south to follow the Columbia Gorge, avoiding the steep grades of coastal mountain ranges. The trains turn north through the heavily populated coastal communities of Washington, and proceed into Canada where coal is shipped from the Westshore Terminal in Vancouver, British Columbia. Coal shipments from Vancouver in 2009-2010 went primarily to South Korea and China.

[28] Based on 3.5 million tons for Oregon and Washington coal plants and 6 million tons exported in 2010.

Figure 2: Primary Rail Freight Corridors



Source: Cambridge Systematics, Inc.

Rail Capacity

Rail capacity is measured in the number of trains a segment of rail can handle in one day. The freight rail industry can suffer from capacity constraints that affect the entire system, and an increase in demand would worsen these constraints. According to the Congressional Budget Office, the "capacity" of a transportation sector describes a level of service and how it can be handled effectively by a facility or network in a given amount of time. Capacity can be constrained by a shortage of infrastructure somewhere along the route; because transportation industries are networks, capacity constraints at one corridor or junction can cause delays throughout the system.[29]

According to a study by Cambridge Systematics, Inc, determining capacity is "as much art as it is science."[30] Among the factors considered when determining capacity are the number of tracks, the frequency and length of sidings, the capacity of the yards and terminals along a corridor to receive the traffic, the type of control system, the terrain, the mix of train types, the power of the locomotives, track speed, and individual railroad operating practices.

As a result, measurements of railroad capacity are less often a solid number and more often a range. Even in capacity studies, the terminology is not completely consistent. Most often capacity is referred to as "practical capacity" or "theoretical capacity." On rail lines operating at practical capacity, minor disruptions can be absorbed with only temporary deterioration in performance. The system can

[29] Congressional Budget Office, Freight Rail Transportation: A Review of the 2004 Experience http://www.cbo.gov/doc.cfm?index=6350&type=0#pt1

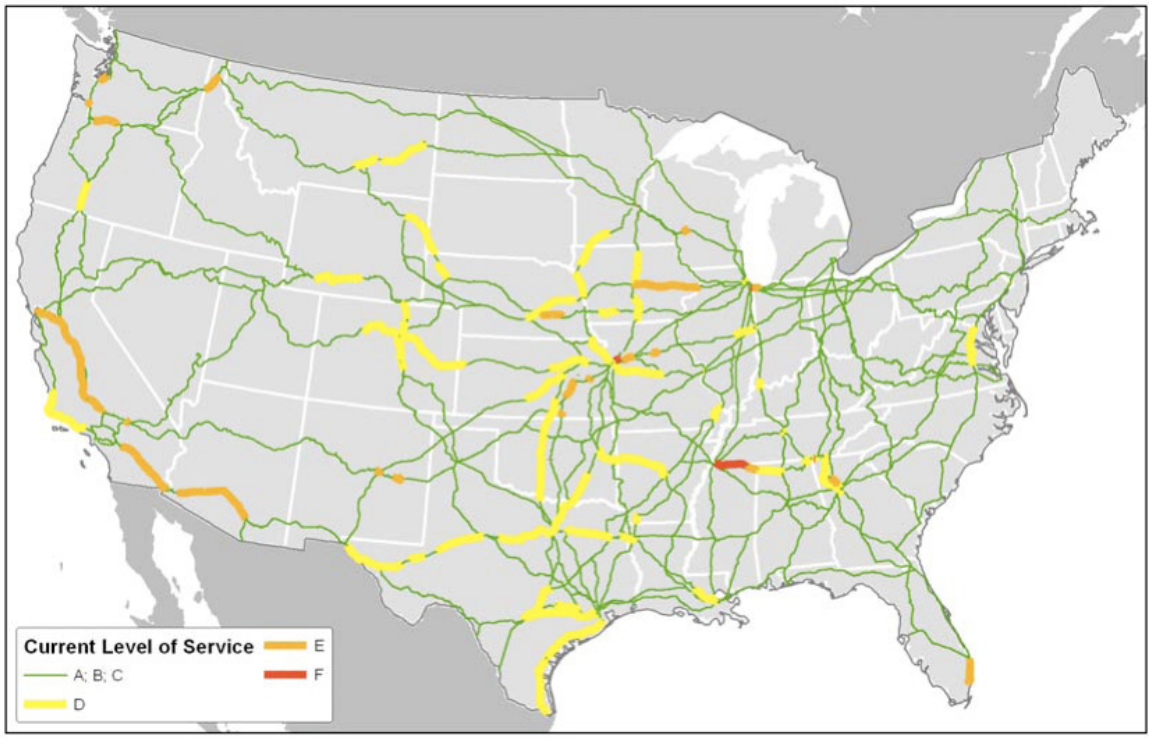
[30] HDR, Inc. Transit Safety Management. July, 2006. Statewide Capacity and System Needs Study. Prepared for Washington State Transportation Commission.

continue to operate at levels up to 80% of theoretical capacity, but any minor disruptions will result in severe disruptions system wide.

Through national aggregation, Cambridge Systematics determined the average capacity of a single track rail to be between 16 trains per day and 30 trains per day for multiple train types.[31] Each additional track does not add capacity in a linear fashion. For example, depending on the type of signaling, adding a track to go from one to two tracks could increase capacity from 16 trains per day to 28 trains per day or from 30 trains per day to 75 trains per day.

It is also important to note that railroads can operate for a short period above 100% of their theoretical capacity. Most studies say a rail is at capacity when it runs between 80 and 100% of theoretical capacity. As of 2007, less than 4% of the rail in the country is operating at or above capacity, and only an additional 9% is operating near capacity.[32] However, there are key segments of track between the Powder River Basin and West Coast ports that *are* operating at or near capacity.

Figure 3: Current Train Volumes Compared to Current Train Capacity



Source: Cambridge Systematics, Inc.

Key: Lines in green represent service with a volume less than 70% of capacity. Lines in yellow represent rail segments with volumes between 70% and 80% of capacity. Lines in orange represent rail segments with volumes between 80% and 100% of capacity. Lines in red represent rail segments with volumes over 100% of capacity.[33]

[31] National Rail Freight Infrastructure Capacity and Investment Study, September 2007, Prepared for Association of American Railroads by Cambridge Systematics, Inc. http://www.aar.org/~/media/aar/Files/natl_freight_capacity_study.ashx

[32] National Rail Freight Infrastructure Capacity and Investment Study, September 2007, Prepared for Association of American Railroads by Cambridge Systematics, Inc. http://www.aar.org/~/media/aar/Files/natl_freight_capacity_study.ashx

[33] National Rail Freight Infrastructure Capacity and Investment Study, September 2007, Prepared for Association of American Railroads by Cambridge Systematics, Inc.

Figure 3 shows the current level of service on the major rail lines in the United States.

Railroads are aware of the capacity constraints and are working to resolve them. Together, BNSF and UP invested more than $4 billion to increase capacity in recent years.[34] BNSF laid nearly 3,000 miles of track from 2007 to 2009. UP has been less aggressive with its expansion, adding less than 100 miles of track in 2009, but it did replace or surface nearly 16,000 miles of track.

To meet the coal industry's projected coal export demand of 110 million tons per year from Powder River Basin mines, railroads would need to build significant amounts of new rail in the coming years in the northwest.

Railroads Capacity Expansion Options

Railroads have several options for increasing capacity including: running more trains, running trains faster, running trains closer together, running trains with more cars and installing new and upgrading existing track. Track can be upgraded by adding double-track, straightening curves to allow for increased speed, replacing light-duty rail with heavier track, and expanding or building new rail yards and terminals.

Upgrading tracks would require approvals from various levels of government. The federal Surface Transportation Board has broad regulatory oversight over railroads.

Other regulations for upgrading capacity vary by state. State authority on rail permitting is most often housed in the state Departments of Transportation, which have varying construction requirements and rules for establishing right-of-ways to build rail lines. Rail impacts related to noise, pollution and public safety are regulated at various levels within states, often with a Public Service or Utilities Commission and local governments.

Since the passage of the Staggers Act in 1980 and subsequent laws deregulating railroads, the cost of much of the infrastructure needed to protect public safety has been borne by the federal government, with some matching funds coming from state and local taxpayers.[35] Through the Highway Safety Improvement Program, federal funds for grade crossing protection devices have been a feature of federal highway funding programs for decades, and distributed to states on a formula basis.

In an era of fiscal constraint and austerity inaugurated by sweeping recent and ongoing federal budget cuts, the cost of mitigating impacts from dramatic increases in coal train traffic would fall primarily on cities and towns, businesses, individual commuters and public safety agencies. Attempts to alleviate those impacts with major infrastructure investments in things like grade separated crossings and re-routed rail corridors could cost tens of millions of dollars that hard pressed state and local governments are unlikely to come up with.

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[34] Four billion in investments was taken from the total capital expenditures that did not relate specifically to the acquisition of equipment such as freight cars or locomotives. Sourced from 2010 SEC-10K filings, page 20 BNSF http://bnsf.com/about-bnsf/financial-information/sec-filings/10-k-filings/, page 39 Union Pacific http://www.up.com/investors/secfiling/index.shtml.

[35] For example, the City of Billings, Montana, used tax increment financing of approximately $1.5 million to implement a new quiet zone and install the necessary safety equipment in the central core city rail corridor.

A recent ruling in the District of Columbia Court of Appeals provides some hope for local governments confronted with a wall of coal trains dividing their communities and disrupting traffic, established businesses, and threatening public safety. The Court ruled in support of the Village of Barrington, IL and the Surface Transportation Board, which required Canadian National Railroad to pick up most of the cost of two separated grade crossings outside Chicago[36] after the company re-routed the main volume of its long haul traffic out of the central city and through Barrington and other suburbs, vastly increasing traffic on an existing line.

Impacts of Increasing Coal Exports

Coal is the second largest producer of energy-related CO2 emissions in the country.[37] and the impacts of mining, processing, and transporting coal on the country's health, landscapes, and water are enormous. Ramping up exports of coal would subvert the nation's efforts to reduce reliance on coal, its impacts on global warming, and damages done by mining. Construction of new railroad lines and increased traffic on existing lines would have negative effects on the environment and communities along the route.

Greenhouse Gas Emissions

Combustion of coal from the Powder River Basin was the source of nearly 900 million tons of carbon dioxide (CO2) emissions in the United States in 2007, 13% of all U.S. emissions.

Exporting coal overseas subverts domestic efforts to reduce greenhouse gas emissions and weakens international efforts to combat global warming. A coal export facility with the capacity to ship 20-30 million tons per year of Peabody Powder River Basin coal would result in the export of 35-53 million tons of CO2 per year.[38] With each ton of coal contributing about two tons of CO2 to the atmosphere, a 110 million ton production increase in overseas exports to Asia would contribute an additional 220 million tons of CO2 annually.

Proposed coal export facilities in the Northwest will result in more coal consumption in Asia and undermine China's progress towards more efficient power generation and usage according to an economic analysis by Thomas Power released in July 2011 by Sightline[39]. Power found that lower coal prices afforded in Asia by using coal from the Powder River Basin would encourage greater investment in new coal burning facilities, which in turn would create a 30- to 50-year demand for coal. Lowering coal costs to China would undermine valuable energy efficiency efforts in an economy where energy usage per unit of Gross Domestic Product is almost four times that in the United States and eight times that in Japan, Power found.

Coal Mining

Exporting coal would require expanding existing mines and opening new mines in the Powder River Basin. Coal mining has many detrimental impacts on the people and environment where it is developed.

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[36] Village of Barrington Illinois v. Surface Transportation Board, U.S. Court of Appeals, District of Columbia Circuit, March 15, 2011

[37] http://www.eia.doe.gov/oiaf/1605/ggrpt/index.html

[38] *Science Daily,* Carbon Dioxide Emissions From Power Plants Rated Worldwide. Nov. 15, 2007 http://www.sciencedaily.com/releases/2007/11/071114163448.htm

[39] Power, Thomas M. "The Greenhouse Gas Impact of Exporting Coal from the West Coast: An Economic Analysis", July, 2011, published on-line by Sightline at: http://sightline.org/research/energy/coal/Coal-Power-White-Paper.pdf

Air Quality

Coal mining causes significant air pollution, mainly from fugitive emissions of particulate matter and gases including methane, sulfur dioxide and nitrogen oxides.[40] These emissions are largely created when blasting, drilling, collecting, hauling and moving heavy machinery.

These air pollutants can contribute to serious health problems. Of particular concern is the pollution of particulate matter, or dust, less than 2.5 microns in diameter (PM2.5). Respiratory problems including asthma and bronchitis have been linked to PM2.5. These respiratory problems, as well as increased likelihood of heart attacks and strokes caused by particulate inhalation, can lead to premature death.[41]

Additional mining will increase these air pollutants in the coal fields. New mines will put more communities at risk and expanded mines will make problems worse for those already experiencing air pollution caused by mining.

Several large coal mines in the Powder River Basin have already experienced air quality violations. In the summer of 2011, the Wyoming Department of Environmental Quality issued two notices of violation (NOV's) to two separate mines for air quality problems related to blasting which resulted in a noxious orange cloud that drifted miles off the mine site impacting livestock and residences. New mines and mine expansions will be in areas with more overburden per ton of coal mined. This will make the coal more difficult to mine, producing more particulates and emissions from mining equipment, and may result in more air pollution and air quality violations.

Land & Water Use

Exporting coal will mean the expansion of existing mines and development of new mines, requiring the industrialization of thousands of acres of agricultural land and wildlife habitat.

Coal mining can devastate farms, ranches and prime hunting grounds. Ranchers whose families have been grazing cattle on Bureau of Land Management (BLM) and state land for generations can lose pasture land, sometimes requiring them to ship cattle to non-contiguous pastures or reduce the size of their operations. This can have a serious impact on the ability of ranches to prosper. Loss of wildlife habitat will mean increased hunting and fishing pressure and reduced quality of hunting and other outdoor recreation in the West.

Coal mining also affects water. Coal seams in the Powder River Basin contain shallow aquifers; when the coal is strip mined, so is the water. These destroyed aquifers are not reconstructed by typical mine reclamation practices. Coal mining is already depleting and degrading the water in this region; more mines will compound this damage.

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[40] Sharma, Partha Das, "Coal Mining Pollution and its control measures" http://www.docstoc.com/docs/6608086/Coal-Mining-Pollution

[41] California Environmental Protection Agency, Air Resources Board Facts about Particulate Matter Mortality: http://www.arb.ca.gov/research/health/pm-mort/pm-mort_fs.pdf

Table 1: Status of Bond Release by State in Acres [42]

The Surface Mining Control and Reclamation Act created a regulatory program to ensure that mining operations are reclaimed in an environmentally sound manner. The table summarizes the status of bond release in four of the WORC states, and contains data from the 2010 Evaluation Year reports for July 1, 2009, through June 30, 2010. The acreages in each column to the right of Phase I are subsets of the previous column.

State	Disturbed Acres	Phase I	Phase II	Phase III
Colorado	26,115	15,398 (59%)	11,966 (45%)	8,623 (32%)
Montana	37,484	15,218 (41%)	11,175 (30%)	3,181 (8%)[43]
North Dakota	66,075	16,163 (24%)	11,807 (18%)	11,742 (18%)
Wyoming	162,249	38,657 (24%)	5,791 (3.5%)	5,617 (3.5%)

When a coal company opens a mine, it is required to post a bond equivalent to the estimated cost of reclaiming the disturbed land. If the company goes out of business, the bond defaults to the state, which then has the means to reclaim the site. However, before the bond amount can finally be released, the mined area must be restored to its approximate original contours. Vegetation, wildlife habitat and water resources must all be in healthy condition. Reclamation is also supposed to be "as contemporaneous as possible"—an acre healed for an acre disturbed. However, the reclamation record for coal companies in the West is deplorable.

Using the best measure for reclamation success, final bond release, companies in the Powder River Basin have not been successful. According to the federal Office of Surface Mining, coal mining has disturbed more than 162,000 acres of land in Wyoming but only 4% of this land has gained final reclamation status. Montana mines have had even less success, reclaiming just 50 of the over 37,000 disturbed acres–0.1%–disturbed by coal mining sufficiently to attain final bond release.

New Rail Lines

Exporting coal would require construction of new rail lines that will sever prime farm or ranch land or take it out of production completely. Severing farm and ranch land with a rail line reduces productivity and property values. Ranching operations need to be able to move livestock from one side of the tracks to another, and even with proper construction of the rail this can be difficult. Access problems caused by severing ranches can also be a major problem when dealing with natural or train-caused fires.

New rail lines can also split wildlife habitats and interrupt migratory patterns. This disruption not only affects the species but also hunting in the region.

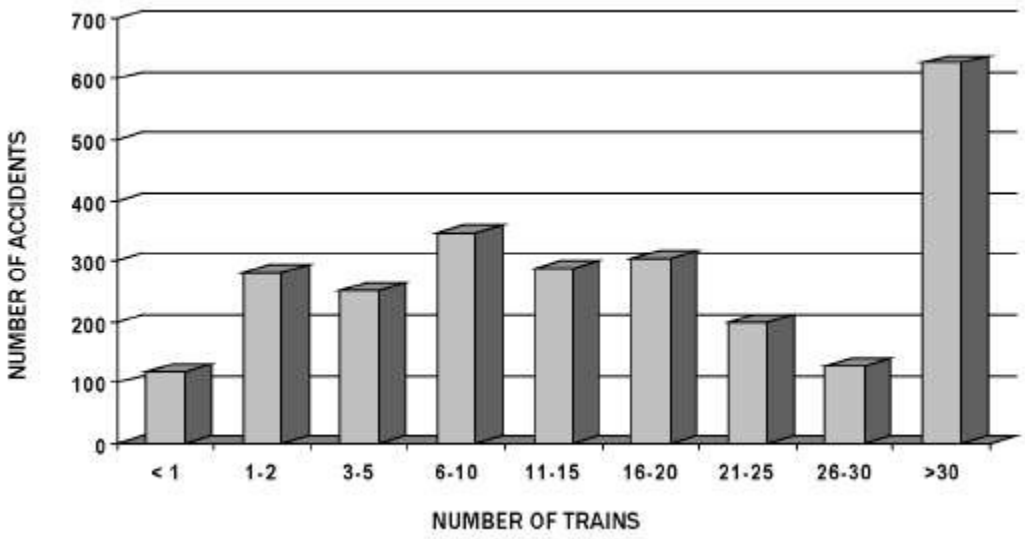
[42] All data from Office of Surface Mining regulatory reports EY 2010, http://www.osmre.gov/Reports/EvalInfo/EvalInfo.shtm.
[43] Montana adds a fourth phase of reclamation. Just 50 acres have achieved Phase IV, (final) bond release in Montana.

The spreading of noxious weeds is another impact of new rail lines. Railroads that cover great distances also can spread noxious weeds onto adjacent land. These weeds can harm farming or ranching operations in the area.

Public Safety

Almost 60 percent of coal in the United States is transported at least in part by train, with coal transportation accounting for 44 percent of rail freight ton-miles. Coal trains, some of which reach more than two miles in length, cause railroad-crossing collisions and pedestrian accidents. There are approximately 3,000 such collisions and 900 pedestrian accidents every year. Crossings with over 30 trains per day result in significant increases in collisions (see figure 4, below). Long coal trains interrupt traffic flow including disruption to emergency responders such as police, ambulance services, and fire departments.[44]

Figure 4: Number of Collisions by Number of Trains per Day per Crossing, 2004



Source: U.S. Department of Transportation Federal Highway Administration- Railroad-Highway Grade Crossing Handbook, revised second edition August 2007. http://safety.fhwa.dot.gov/xings/com_roaduser/07010/sec02.htm

Diesel Pollution

Transporting coal produces significant quantities of air pollution and other environmental problems. Diesel trucks, trains, and barges which transport coal all emit toxic chemicals, such as nitrogen oxide and particulates, which pose serious public health risks. According to a National Resources Defense Council study, railroad engines and trucks hauling coal together release more than 600,000 tons of nitrogen oxide and 50,000 tons of particulate matter into the air every year, mostly in diesel exhaust.[45]

Though small compared with the emissions from burning the coal itself, burning diesel to move coal also emits global warming pollution. According to an analysis by Earthworks, approximately 700,000 tons of

[44] Natural Resources Defense Council Issue Paper Coal in a Changing Climate, February 2007. http://www.nrdc.org/globalwarming/coal/coalclimate.pdf
[45] Natural Resources Defense Council Issue Paper Coal in a Changing Climate, February 2007. http://www.nrdc.org/globalwarming/coal/coalclimate.pdf

CO2 could be emitted every year if 20 or 30 million tons of coal was shipped to China from the Powder River Basin. A shorter trip to Japan would still result in emissions of up to 500,000 tons of CO2.

Coal Dust

Increasing coal shipments would increase the amount of coal dust lost from coal trains. BNSF estimates that a single loaded rail car can lose 500 pounds of coal, primarily from blowing off the top of the car[46]. Coal dust pollutes the communities that coal trains pass through. Coal dust can blow into rivers and streams. Coal dust has even caused fires in areas where coal dust blown from trains has built up near the tracks. [47]

Coal dust can also degrade track conditions. The dust can cause a weakened track structure leading to more derailments, inconveniencing all rail customers.

BNSF recently prevailed in a challenge by shippers against its attempts to establish a tariff and standards to reduce the dissemination of coal dust. If measures are taken to significantly control the dust from coal hoppers as they travel cross country, it will be an example of internalizing the true costs of coal shipping into the final price to the end user.

Impacts to Electricity Consumers

Increasing coal exports will require coal companies to mine coal that is increasingly dirty, dangerous, difficult and expensive to mine and reclaim. These increased costs will drive up domestic utility rates more quickly, decreasing the benefit of coal as a relatively cheap fuel source.

Impacts on other industries that ship commodities by rail

Rail carried 38 percent of the total freight shipped in the United States in 2005. Many commodities depend heavily on rail for transportation; among the most dependent are coal, domestically produced automobiles and grain.[48] An increased volume of coal shipping by rail would adversely affect these industries. For example, 110 million tons of coal shipped through Montana would double the volume of freight carried in and through the state in 2006.[49]

Grain growers are dependent on efficient, reliable, affordable service to get grain to market, and have fought to win fair service for smaller train service to grain elevators. Historically, grain growers have complained about the timeliness and reliability of service to elevators, and about rail rates for grain shipping. Greater rail traffic, and dominance of coal among major commodities served by the railroad, could lead to more problems for grain shippers and complaints about service.

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[46] Eric DePlace, Sightline, "At Least the Website Is Clean" August 10, 2011 with a link to the BNSF FAQ preserved webpage on coal dust. http://daily.sightline.org/2011/08/10/at-least-the-website-is-clean/

[47] Burlington Northern Sante Fe website: http://www.bnsf.com/customers/what-can-i-ship/coal/coal-dust.html

[48] http://www.lrca.com/railroadstudy/Volume_1.pdf

[49] 2010 Montana State Rail Plan, Prepared for Montana Department of Transportation by Cambridge Systematics, December, 2010, p. ES-5

Conclusion

As the United States transitions away from dirty fuels, such as coal, to meet its electricity demand, the coal industry has begun to develop substitute markets by exporting coal, especially to China, India, and other countries on the Pacific Rim.

Coal extraction in the Powder River Basin harms the land, water, air and public health in the communities and people that live in and near coal production areas, and leaves behind a legacy of reduced productivity and waste.

Increasing coal exports would require significant additions and upgrades to rail lines in the West. These lines would cut through pristine areas, severing farms and ranches, reducing productivity and property values. Communities split by rail would face serious delays caused by over 40 trains a day needed to transport coal from the Powder River Basin to West Coast terminals and back.

These efforts to export coal coincide with the idea that the world is near "peak coal" – that is, the period of all-time high coal production, after which some geologists and economists predict that production will begin an irreversible decline. In a study published in the peer-reviewed journal *Energy, The International Journal*, two researchers say the world will hit peak coal production in 2011, or shortly thereafter[50].

Hitting "peak coal" production does not mean we are about to run out of coal entirely; instead, it means that we have mined all the coal that is easiest and cheapest to produce. Remaining deposits of coal are lower quality and becoming increasingly difficult, dangerous, environmentally destructive, and expensive to mine. Exporting coal will make domestic coal mining more dangerous, dirtier, more difficult, and increasingly more expensive to mine at a faster pace. Increasing coal exports will, among other things, accelerate the rate at which the cost of electricity produced from coal increases.

Exporting Powder River Basin coal to the Pacific Rim is fraught with unpaid costs. Powder River Basin coal cannot be economically exported to the Pacific Rim without imposing uncompensated costs on communities, businesses and individuals near the mines, along the railroad corridors, and at the ports. Local citizens, businesses and communities and the global climate must not be left to absorb the damages of coal exports while a handful of coal companies and railroads pockets the profits.

[50] Patzek, Tadeusz and Gregory D. Croft "A Global coal production forecast with multi-Hubbert cycle analysis", Energy, Volume 35, Issue 8, August 2010, Pages 3109-3122