NATIONAL COAL COUNCIL

ADVANCING U.S. COAL EXPORTS

An Assessment of Opportunities to Enhance Exports of U.S. Coal

Advancing U.S. Coal Exports

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David Lawson, Norfolk Southern Corporation

Report Chapter Leads

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Justin Burk, Peabody
Hans Daniels & Andrew Blumenfeld, Doyle Trading Consultants
David Lawson, Norfolk Southern Corporation
Emily Medine, Energy Ventures Analysis
Andy Roberts, Wood Mackenzie

Principal Contributing Authors

Roger Bezdek, MISI
Dan Byers, Global Energy Institute, U.S. Chamber of Commerce
Justin Burk, Peabody
Andrew Blumenfeld, Doyle Trading Consultants
Daniel Connell, Consol Energy, Inc.
Hans Daniels, Doyle Trading Consultants
George Duggan, BNSF Railway
James (Leggett) Kitchins, Norfolk Southern Corporation
David Lawson, Norfolk Southern Corporation
Heath Lovell, Alliance Coal
Emily Medine, Energy Ventures Analysis
Andy Roberts, Wood Mackenzie
Garrett Urban, Norfolk Southern Corporation

Principal Editors

Janet Gellici, National Coal Council
Emily Medine, Energy Ventures Analysis

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Report Subcommittee Members

Barbara Altizer, Virginia Coal & Energy Association
Duane Ankney, Montana State Senator
Roger Bezdek, MISI
Andy Blumenfeld, Doyle Trading Consultants
Justin Burk, Peabody
Dan Byers, Global Energy Institute, U.S. Chamber of Commerce
Daniel Connell, Consol Energy, Inc.
Hans Daniels, Doyle Trading Consultants
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Andy Roberts, Wood Mackenzie
Jennifer Sackson, BNSF Railway
Todd Savage, Savage Services
Veronika Shime, National Mining Association
Deck Slone, Arch Coal
CJ Stewart, National Tribal Energy Association
Kemal Williamson, Peabody
Xiaoliang Yang, World Resources Institute

Reviewers

Rick Boyd, Dominion Energy
Lisa Bradley, Haley & Aldrich
Mike Durham, Soap Creek Energy

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NCC Overview - 1984|2018

In the fall of 1984, Secretary of Energy Don Hodel announced the establishment of the National Coal Council (NCC). In creating the NCC, Secretary Hodel noted that "The Reagan Administration believes the time has come to give coal – our most abundant fossil fuel – the same voice within the federal government that has existed for petroleum for nearly four decades."

The Council was tasked to assist government and industry in determining ways to improve cooperation in areas of coal research, production, transportation, marketing and use. On that day in 1984, the Secretary named 23 individuals to serve on the Council, noting that these initial appointments indicate that "the Department intends to have a diverse spectrum of the highest caliber of individuals who are committed to improving the role coal can lay in both our Nation's and the world's energy future."

Throughout its nearly 35-year history, the NCC has maintained its focus on providing guidance to the Secretary of Energy on various aspects of the coal industry. NCC has retained its original charge to represent a diversity of perspectives through its varied membership and continues to welcome members with extensive experience and expertise related to coal.

In 1985, the NCC was incorporated as a 501c6 non-profit organization in the State of Virginia. Serving as an umbrella organization, NCC, Inc. manages the business aspects of running the Council. The leadership of the NCC serves as officers of NCC Inc. and members of the Council serve as NCC Inc. shareholders. The Executive Director of the Council is NCC Inc.'s Executive Vice President and Chief Operating Officer.

Today, the NCC continues to serve as an advisory group to the Secretary of Energy, chartered under the Federal Advisory Committee Act (FACA). The NCC provides advice and recommendations to the Secretary of Energy on general policy matters relating to coal and the coal industry.

The Council activities include providing the Secretary with advice on:

- Federal policy that directly or indirectly affects the production, marketing and use of coal;
- Plans, priorities and strategies to address more effectively the technological, regulatory and social impact of issues relating to coal production and use;
- The appropriate balance between various elements of Federal coal-related programs;
- Scientific and engineering aspects of coal technologies, including emerging coal conversion, utilization or environmental control concepts; and
- The progress of coal research and development.

The principal activity of the NCC is to prepare reports for the Secretary of Energy. The NCC's Coal Policy Committee develops prospective topics for the Secretary's consideration as potential subjects for NCC studies. During its nearly 35-year history, the NCC has prepared more than 35 studies for the Secretary, at no cost to the Department of Energy. All NCC studies are publicly available on the NCC website.

The NCC is a totally self-sustaining organization; it receives no funds from the Federal government. The activities and operations of the NCC are funded solely from member contributions, the investment of Council reserves and generous sponsors.

October 22, 2018

The Honorable Rick Perry
U.S. Secretary of Energy
U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585

Dear Mr. Secretary:

On behalf of the members of the National Coal Council (NCC), I am pleased to submit to you, pursuant to your letter dated January 7th, 2018, the report "Advancing U.S. Coal Exports: An Assessment of Opportunities to Enhance Exports of U.S. Coal." Consistent with your request, the report is focused on assessing and prioritizing market, infrastructure and policy measures that can be undertaken to increase export opportunities for U.S. coal. Additionally, the report provides a competitive assessment of U.S. coal export opportunities relative to other supplier nations, as well as an analysis of prospective international markets for U.S. coal.

As domestic demand for coal has softened, coal exports are an increasingly important market sector for U.S. coal producers. U.S. coal exports have been very volatile over the years, ranging from a peak in 2012 of 125 million tons to a low of 39 million tons in 2002. This volatility is attributable to many factors, including fluctuations in market demand, competition from global suppliers and various importing nation constraints, such as policies limiting coal imports and infrastructure restrictions. While many of these variables are outside the control of the U.S. government and industry, there are numerous factors which can be addressed by policymakers and commercial interests to enhance U.S. coal exports.

The competitiveness and growth of U.S. coal exports depends primarily on the ability of U.S. producers to mine and ship coal to end-use markets at an overall delivered cost that is economically competitive with other global coal suppliers and other energy resources. The NCC report highlights opportunities and barriers to coal exports in the areas of U.S. coal production, transportation/shipping, international coal plant financing and trade.

Coal Production. Development and deployment of advanced coal mining and processing technologies to reduce production costs would enhance the competitiveness of U.S. coals in international markets. Federal and state support mechanisms would facilitate continued operation in traditional supply regions and the development of infrastructure projects in non-traditional coal-producing regions in the U.S.

River Transport. Streamlining of funding for the nation's inland waterway system of locks and dam infrastructure would facilitate the cost-efficient flow of U.S. coals to international markets via East and Gulf Coast ports.

Ports & Terminals. Dredging and channel deepening at East and Gulf Coast ports would allow for the accommodation of larger ships, thereby lowering shipping costs and enhancing the delivered economics of U.S. coals in international markets. The development of West Coast export terminals would be enhanced with improved planning and cooperation between federal and state authorities responsible for environmental review/permitting and through reforms to NEPA and related permitting processes. NCC encourages the further study of opportunities to reduce export constraints through development of export terminals on federal properties.

International Coal Plant Financing. Financing of coal facilities overseas is hampered by domestic and international policy barriers at the Export-Import Bank of the U.S. (EXIM), the Overseas Private Investment Corporation (OPIC) and Multilateral Development Banks (MDB) administered by the U.S. Treasury Department.

To facilitate these and other recommendations to enhance U.S. coal exports detailed in the NCC report, we advocate for the establishment of a DOE-led, government-wide Coal Exports Task Force (or Energy Exports Task Force) to monitor and coordinate policy developments relevant to advancing U.S. energy exports. Participants should include all agencies engaged in energy development and international relations, including the U.S. Departments of Energy, Interior, State and Treasury, as well as the U.S. Trade and Development Agency (USTDA), OPIC and the EXIM Bank, among others.

Advancing U.S. exports is a critical component of the nation's efforts to achieve U.S. energy dominance, enhance international energy security and support our allies in eliminating global energy poverty. Thank you for the opportunity to prepare this report. The Council stands ready to address any questions you may have regarding its findings and recommendations.

Sincerely,

Deck Slone
National Coal Council Chair 2018-2019

NCC REPORT ACCEPTANCE LETTER

April 10, 2018

The Honorable Rick Perry, U.S. Secretary of Energy
U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585

Dear Mr. Secretary:

Thank you for your letter of January 7th, 2018 requesting that the National Coal Council (NCC) prepare a report on U.S. coal exports. While the delay in officially appointing members to serve on the Council has precluded us from responding to your request earlier, we are now able and eager to undertake the assignment.

On behalf of the members of the NCC, I am pleased to accept your request that the NCC develop a white paper assessing opportunities to advance U.S. coal exports. Activity has already begun on preparing the report which will address the following questions:

- What market, infrastructure and policy measures could be undertaken to increase export opportunities for U.S. coal?
- What global market dynamics present opportunities for increased U.S. coal exports?
- How can U.S. coal capitalize on its advantages and become more competitive in international markets?
- What institutional and regulatory constraints are limiting the advancement of U.S. coal exports?

Justin Burk, Commercial Director for Peabody and David Lawson, Vice President Coal for Norfolk Southern Railroad will serve as co-chairs for this white paper. We will have the report completed by September 13th, 2018.

Thank you for your support of the National Coal Council. We welcome the opportunity to support your and President Trump's vision for our nation's energy future.

Sincerely,

Greg Workman
National Coal Council Chair 2017-2018

Report Request from Energy Secretary Rick Perry

The Secretary of Energy
Washington, DC 20585

January 07, 2018

Mr. Greg Workman
Chair, National Coal Council
1101 Pennsylvania Avenue, NW, Suite 300
Washington, DC 20004

Dear Mr. Workman:

I am writing today to request that the National Coal Council (NCC) develop a white paper assessing opportunities to advance U.S. coal exports.

The white paper should focus on current market, policy, and infrastructure challenges and opportunities that are relevant to advancing U.S. coal resources in international power and industrial markets. The white paper should examine international market opportunities for both metallurgical and thermal coals from the Eastern, Central, and Western coal-producing regions of the U.S. The white paper should also provide a competitive assessment of the coal market supply chain and associated infrastructure, and offer recommendations that address key barriers impeding the export of U.S. coal.

The key questions to be addressed include:

- What market, infrastructure, and policy measures could be undertaken to increase export opportunities for U.S. coal?
- What global market dynamics present opportunities for increased U.S. coal exports?
- How can U.S. coal capitalize on its advantages and become more competitive in international markets?
- What institutional and regulatory constraints are limiting the advancement of U.S. coal exports?

The white paper should be managed under the auspices of the Executive Advisory Board within the NCC. I ask that the white paper be completed no later than March 30, 2018.

Upon receiving this request and establishing your internal working groups, please advise me of your schedule for completing the white paper. The Department looks forward to working with you on this effort.

Sincerely,

Rick Perry

Rick Perry

Advancing U.S. Coal Exports

An Assessment of Opportunities to Enhance Exports of U.S. Coal

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ACRONYMS

The U.S. ton is a short ton - 2000 pounds; the metric tonne is approximately 2,204.6 pounds. In this report, tonnages are not standardized. “Tons” refer to short tons and “tonnes” refers to metric tonnes.

ACCCE	American Coalition of Clean Coal Electricity
ADB	Asian Development Bank
ASC	Advanced Super Critical
AUSC	Advanced Ultra-Super Critical
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe Railway
CAPP	Central Appalachia
CEQ	White House Council on Environmental Quality
CIF	Costs, Insurance & Freight
CSX	CSX Transportation
DOE	U.S. Department of Energy
DWT	Dead Weight Ton
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EVA	Energy Ventures Analysis
EXIM	Export-Import Bank
FLPMA	Federal Land Policy Management Act
FMV	Fair Market Value
FOB/FOBT	Free on Board/Free on Board Trimmed
GHG	Greenhouse Gas
HELE	High Efficiency Low Emissions
HMT	Harbor Maintenance Tax
IEA	International Energy Agency
ILB	Illinois Basin
JUSEP	Japan-U.S. Strategic Energy Partnership
LBA	Lease by Application
MDB	Multilateral Development Bank
MLA	Mineral Leasing Act
MSHA	Mine Safety & Health Administration
NAPP	Northern Appalachia
NCC	National Coal Council
NEPA	National Environmental Policy Act
NMA	National Mining Association
NS	Norfolk Southern Corporation
OBOT	Oakland Bulk Oversized Terminal
OECD	Organization of Economic Cooperation & Development
OPIC	Overseas Private Investment Corporation
PRB	Powder River Basin
SAPP	Southern Appalachia
UNFCCC	United Nations Framework Convention on Climate Change
UP	Union Pacific Railroad
USAID	U.S. Agency for International Development
USTDA	U.S. Trade Development Agency

Advancing U.S. Coal Exports

An Assessment of Opportunities to Enhance Exports of U.S. Coal

Co-Chairs:

Justin Burk, Commercial Director, Peabody

David Lawson, Vice President Coal, Norfolk Southern Corporation

Executive Summary

Coal is ubiquitous and can be found in nearly every corner of the globe. Recoverable amounts of coal are found and commercially mined in over 50 countries and consumed in more than 70 countries. While significant commercial amounts of coal are exported by many countries, just 10 countries, including the U.S., accounted for over 95% of exports in 2017.

Coal trade is a large and growing business as developing economies electrify and industrialize using the lowest cost fuels available to them. The global market for coal is widespread but currently driven by the large demand in Asia – most notably by China and India.

Key suppliers to the global coal trade have been Australia, Indonesia, Russia, Colombia, South Africa and the U.S. While the U.S. is a major exporter of metallurgical coal, it is generally considered a "swing" supplier with respect to thermal coal. The level of U.S. participation in the global coal trade is a function of its competitiveness with other global suppliers, periodic shortages in the market, fluctuations in demand and macroeconomic factors such as currency exchange rates. There is reason to believe that market demand and plateauing supplies from other sources hold promise for continued growth of U.S. coal exports.

Value of Coal Exports

The U.S. exceeds all other nations in proven coal reserves. Our nation's abundant, affordable and diverse domestic energy resources underpin our economic prosperity, providing both domestic and export opportunities. Low-cost electricity in the U.S., driven in large part by coal generation, has fueled our commercial and manufacturing sectors, providing us with a competitive advantage in global markets. Our energy abundance has also provided the U.S. with the opportunity to export energy resources, supporting trading partners and emerging nations in efforts to modernize their economies and combat energy poverty, while fostering U.S. economic growth.

Coal exports are an increasingly important market sector for U.S. coal producers. In 2017, coal exports accounted for 12.5% of total U.S. production – the highest level since the early 1980s. These exports contributed $13 billion to the U.S. Gross Domestic Product (GDP) and created, directly and indirectly, 100,000 jobs in the U.S.

Coal Export Landscape

Coal exports are driven by international thermal and metallurgical coal supply and demand. Thermal coal, also known as steam coal, is used in generating steam to create electricity as well as to provide energy for industrial processes such as cement production. Metallurgical coal, often referred to as coking coal, is used in steel making.

In 2017, U.S. coal exports increased 61% year-over-year to 97 million tons, which was the highest export total since 2014. Non-western ports shipped 87 million tons of coal (89% of total U.S. exports) in 2017.

Europe and Asia account for the vast majority of all U.S. coal exports. The U.S. has historically been a key coal supplier to Europe due to the proximity of U.S. East Coast and Gulf Coast terminals to Europe, longstanding business relationships between the U.S. and Europe, and desirable coal qualities that are readily consumed in Europe. Asia's growing demand for coal represents a significant growth opportunity for U.S. coal exports.

Major direct competitors to U.S. metallurgical coal exporters are Australia, Russia and Canada. These countries compete with the U.S. for the metallurgical coal trade market, calculated to be between approximately 300 and 325 million tonnes in 2017. Over time, Mozambique may develop as a major source. The supply into the export market is fungible and can shift between sources.

The major competitors for U.S. thermal coal exporters are market-dependent. In Europe, the primary U.S. competitors are Russia and Colombia. Australia is a major competitor in the Asian market. South Africa, because of its location, is a swing supplier between the European and Asian markets. The U.S. would be a major competitor to Indonesia if additional exports of Powder River Basin coal to Asia were realized given that many customers desire supply diversity, heightening the U.S.'s position as a stable export supplier.

U.S. coal exports have been very volatile over the years, ranging from a peak in 2012 of 125 million tons to a low of 39 million tons in 2002. This volatility is attributable to many factors, including fluctuations in market demand, competition from global suppliers and various importing nation constraints, such as coal-import limiting policies and infrastructure. While many of these variables are outside the control of the U.S. government and industry, there are numerous factors which can be addressed by policymakers and commercial interests to enhance U.S. coal exports.

Supply Considerations

There are ample reserves of U.S. coal to allow for an increase in exports. Regional supply/demand considerations may limit what is immediately available to export versus what can be developed for long-term export markets. The barriers to the development of U.S. coal reserves for the export market are generally regional in nature. The most significant are related to federal mineral ownership, mining regulations, support for traditional coal supply regions and the development of non-traditional coal supplies.

Another important consideration on the supply side is ensuring that the industry is keeping up with the potential technological improvements in mining and preparation that would allow U.S. producers to better compete with other producing countries. The industry has identified areas where it can potentially reduce operating costs with capital investments, including a move to driverless vehicles, extending advanced technology to continuous miners, state-of-the-art digital technology, real-time analytics and optimization, advanced control systems, artificial intelligence and machine learning, and predictive maintenance.

Coal washing and upgrading technologies are designed to reduce the amount of mineral matter and/or moisture in coal, which can be particularly important for coal slated for export. Transporting coal with a higher heat content could reduce transportation costs on a quality adjusted evaluated basis – improving the value proposition for some U.S. coal compared to the international market.

Some international markets for U.S. coals are restricted or could become restricted due to coal quality constraints or lack of environmental technologies/controls at end-user facilities. It would be beneficial to continue U.S. efforts to research, develop and deploy advanced coal technologies that could be retrofit to existing plants and/or adopted in new plant construction that would enable other nations to make use of a wider range of U.S. coals.

Transportation & Shipping Considerations

While generally robust, the nation's coal transportation and shipping network would benefit from various infrastructure improvements.

On the East Coast, channel deepening would improve navigational efficiencies, allow safe passage of vessels in and out of the harbor, and improve accommodation of the existing fleet. Dredging and maintaining key shipping channels to accommodate larger, more cost-effective vessels and maximize navigational efficiencies would help to enhance the competitiveness of U.S. coal exports.

On the Gulf Coast, the inland waterways system of locks and dams requires constant maintenance. The lack of regular dredging has significantly restricted movements on the inland waterways, especially during periods of low water.

On the West Coast, the limited capacity of export terminals has greatly limited the ability to export western U.S. coals. The environmental review and permitting process to approve the development of coal export facilities is unnecessarily slow and cumbersome. Because objections to export facilities are often driven by fundamental and philosophical opposition to the production and use of coal, as well as the divergent approaches between the Federal government and state/local entities, policy reforms recommended within this report may not be sufficient to reduce uncertainties in a manner that enables projects to move forward. Further study is warranted into the long-term potential to reduce export constraints through the development of export terminals on Federal properties that would benefit from a streamlined and simplified review and permitting process.

Institutional and Regulatory Considerations

With more than 900 gigawatts (GW) of coal capacity placed into service worldwide since 2000, and over 600 GW planned or under construction, the potential for U.S. thermal coal exports to supply steadily growing international demand is significant. However, the inability for the U.S. and Multilateral Development Banks (MDB) to support these projects may prevent this potential from being realized.

In response to the void created by U.S. and MDB funding prohibitions, China, Japan, Korea and other countries have stepped in to provide financial support for – and outsized influence over – continued coal development. These circumstances not only place the U.S. at a disadvantage by limiting the potential for U.S. coals and plant technologies to supply international markets, in many cases they result in inferior environmental controls.

A number of domestic entities also have a potential role in supporting continued development of coal-fired power plants overseas. The Export-Import Bank of the United States (EXIM Bank) is the official export credit agency of the U.S. government. In 2013, the EXIM Bank adopted guidelines prohibiting support for projects associated with coal mining or electricity generation except in rare circumstances. The Bank followed this policy by leading a coalition of international export credit agencies to sign an agreement under the OECD committing to the same prohibitions.

The Overseas Private Investment Corporation (OPIC) is charged with mobilizing private capital to help foster economic development in emerging economies, and in doing so, advance U.S. foreign policy objectives. While OPIC's mission and focus makes it well-suited for supporting foreign policy objectives by enhancing opportunities for U.S. coal exports, in 2009, a legal settlement with non-governmental organizations committed OPIC to a cap on greenhouse gas emissions from its portfolio of investments that was then codified by Congress in appropriations legislation later that year. As a practical matter, these restrictions have effectively barred OPIC from supporting coal-related projects.

Trade Barriers

Increasing coal exports has the potential to improve the U.S. balance of trade while also providing a boost to coal producers facing uncertainty in domestic markets. Escalating trade tensions are a serious concern that could result in significantly restricted markets for U.S. coal. In addition to China, a number of other countries have initiated retaliation measures to U.S.-imposed tariffs on steel and aluminum imports, and at least one – Turkey – has included coal among the list of targeted U.S. products. Beyond specific barriers such as tariffs, the general ongoing friction on trade issues threatens to reduce the willingness of U.S. trade partners to enter into agreements to buy U.S. energy resources.

Meanwhile, a number of key markets have long imposed unfair tariffs on U.S. coal imports. These artificial costs exacerbate the geographical disadvantage of U.S. coal exports to Asia and impact the competitiveness of deliveries to the region. U.S. government efforts to reduce or eliminate these tariffs would facilitate increased coal export opportunities.

Ultimately, while the potential for current tensions to negatively impact U.S. coal is high, heightened attention to global trade issues also presents an opportunity for U.S. negotiators to expand market access for U.S. coal. Efforts by the DOE, U.S. trade negotiators and diplomatic officials to actively encourage such purchases and undertake dedicated steps to identify and pursue bilateral and multilateral opportunities throughout the world would also facilitate opportunities for expanded U.S. coal exports.

National Coal Council Recommendations

The competitiveness and growth of U.S. coal exports depends primarily on the ability of U.S. producers to mine and ship coal to end-use markets at an overall evaluated delivered cost that is economically competitive vis-à-vis other global coal suppliers and vis-à-vis other energy sources. Numerous opportunities exist to enhance the competitiveness of U.S. coal exports at every link in the coal supply chain and by addressing various trade and regulatory barriers.

NCC's primary strategic recommendations are as follows; tactics for achieving these objectives are detailed in Chapter 4 of the report.

- **Coal Production.** Deploy advanced coal mining and processing technologies to reduce production costs, thus making U.S. coals more competitive in international markets. Enhance U.S. coal mining operations with the greatest export potential in both traditional and non-traditional coal supply regions.
- **River Transport.** Streamline the funding to the nation's inland waterways system of locks and dam infrastructure to facilitate the cost-efficient flow of U.S. coals to international markets via U.S. East and Gulf Coast ports.
- **Ports & Terminals.** Enhance coal export port and terminal capacity on the U.S. Atlantic, Gulf and West coasts.
- **Trade and International Relations.** Eliminate policy and technology barriers to the deployment of advanced coal facilities in international markets. Additionally, capitalize on trade opportunities, assessing policies and approaches that inhibit or promote U.S. trade and U.S. coal exports.
- **Economic Development in International Markets.** Support efforts to advance economic growth in international markets and the global development of advanced coal technologies, as well as the elimination of regulatory and institutional barriers to the deployment of coal-fired facilities worldwide.

Finally, to facilitate execution of the recommendations in this report, NCC recommends establishing a DOE-led, government-wide Coal Exports Task Force (or Energy Exports Coordination Task Force) to monitor and coordinate policy developments relevant to advancing coal exports. Participants should include all agencies engaged in energy development and international relations, including the U.S. Departments of Energy, Interior, State and Treasury, as well as USTDA, OPIC and the EXIM Bank, among others.

Introduction

Coal is ubiquitous and can be found in nearly every corner of the globe. Recoverable amounts of coal are found and commercially mined in over 50 countries and consumed in more than 70 countries.[i] Global coal production totaled 7.73 billion tonnes[1] in 2017.[ii] Coal's low cost creates significant demand for its use in both manufacturing and electricity production.

A vibrant global export/import trade flow has developed reaching over 1.3 billion tonnes in 2017 according to the International Energy Agency (IEA).[iii] While significant commercial amounts of coal are exported by many countries, just 10 countries, including the U.S., accounted for over 95% of exports in 2017.[iv]

Thus, the geopolitics of coal is born – the geography of coal sources and consumption centers, married by the trade flow that enables a coal market to flourish, and influenced by the complimentary and sometimes competing regulatory and policy impacts of individual governments. Logistics, coal quality, economics and government policy define that coal trade flow, the large majority of which is accomplished using seaborne methods.

Coal trade is a large and growing business as developing economies electrify and industrialize using the lowest cost fuels available to them. The global market for coal is widespread but currently driven by the large demand in Asia – most notably by China and India which in recent years have experienced a major coal supply crunch. Both countries have used imports to bridge the gap between domestic supply and demand, a phenomenon that is likely to continue.

Key suppliers to the global coal trade have been Australia, Indonesia, Russia, Colombia, South Africa and the U.S. While the U.S. is a major exporter of metallurgical coal, it is generally considered a "swing" supplier with respect to thermal coal[2]. The level of U.S. participation in the global coal trade is a function of its competitiveness with other global suppliers, periodic shortages in the market, fluctuations in demand and macroeconomic factors such as currency exchange rates. There is reason to believe that market demand and plateauing supplies from other sources hold promise for continued growth of U.S. coal exports.

The National Coal Council's (NCC) *Advancing U.S. Coal Exports* report has been undertaken at Secretary Perry's request to assess opportunities to advance exports of U.S. coal. This report examines international markets for both thermal and metallurgical coal, provides a competitive assessment of U.S. coal export potential vis-à-vis global suppliers, and addresses key barriers impeding the export of U.S. coal.

[1] The U.S. ton is a short ton which is 2000 pounds; the metric tonne is approximately 2,204.6 pounds. In this report, tonnages are not standardized. "Tons" refer to short tons and "tonnes" refers to metric tonnes.
[2] Thermal coal, also called steam coal, is used for electricity production. Metallurgical coal is used for coking in steel production.

Table 1. Global Coal Trade[v]

Major Coal Exporters (Million Tonnes)

	2015	2016	2017p
Indonesia	368.0	372.9	390.6
Australia	392.3	389.3	378.9
Russian Federation	155.2	171.1	189.7
U.S.	67.1	54.7	88.0
Colombia	72.8	83.3	86.1
South Africa	75.8	69.9	71.0
Mongolia	14.7	24.1	33.4
Canada	30.5	30.3	31.1
Kazakhstan	31.2	26.0	27.1
Netherlands	36.6	34.6	24.4
Other	60.8	70.7	50.0
OECD Americas	**98.4**	**85.9**	**119.9**
OECD Asia Oceania	**393.7**	**390.5**	**380.1**
OECD Europe	**54.9**	**50.7**	**36.4**
OECD Total	**547.0**	**527.1**	**536.4**
Africa + Middle East	81.5	80.0	83.5
Other Asia Oceania	414.4	437.4	445.3
Other Europe + Eura	188.2	198.4	218.3
Other Americas	73.7	84.1	86.7
Non- OECD Total	**757.8**	**799.9**	**833.8**
World	**1,304.8**	**1,327.0**	**1,370.2**

Major Coal Importers (Million Tonnes)

	2015	2016	2017p
PR of China	204.1	255.6	271.1
India	212.1	193.6	208.3
Japan	189.3	186.0	187.5
Korea	134.0	134.5	148.2
Chinese Taipei	64.8	65.6	67.6
Germany	54.5	27.8	48.0
Netherlands	57.1	49.5	40.3
Turkey	34.0	36.2	38.3
Malaysia	25.5	27.2	31.5
Russian Federation	24.1	24.0	29.0
Other	305.9	288.3	317.1
OECD Americas	**35.4**	**35.1**	**36.1**
OECD Asia Oceania	**334.8**	**329.7**	**344.8**
OECD Europe	**263.6**	**237.8**	**234.0**
OECD Total	**633.8**	**602.6**	**614.9**
Africa + Middle East	14.4	15.2	14.2
Other Asia Oceania	583.7	628.4	674.9
Other Europe + Eurasia	47.3	46.7	56.4
Other Americas	26.2	25.3	26.6
Non- OECD Total	**671.6**	**715.6**	**772.1**
World	**1,305.4**	**1,318.2**	**1,387.0**

Source: IEA, 2018 Coal Information Overview

Chapter 1. United States Coal Export Landscape

Key Findings – Chapter 1

- **U.S. coal exports provide significant economic benefits to the nation in terms of direct and indirect jobs, as well as associated economic activity that enhances the U.S. economy.**
- **U.S. reserves of both thermal and metallurgical coal are vast and can support both U.S. domestic needs and the expanding international market demand.**
- **While robust in many aspects (rail network, East and Gulf Coast port capacity), U.S. coal export infrastructure would be enhanced with improvements such as deepening of U.S. East and Gulf Coast ports to accommodate larger, more economical vessels, regular dredging and maintenance of inland waterways channels, and the addition of export port capacity on the U.S. West Coast.**

Coal in the United States

The United States exceeds all other nations in proven coal reserves. Recoverable reserves of coal in the U.S. exceed 250 billion tonnes and are estimated to last more than 300 years at current usage rates.[vi]

Figure 1. Global Coal Reserves

Country	Million Tonnes	Share
U.S	258,709	25.0%
Russia	160,364	15.5%
Australia	144,918	14.0%
China	139,919	13.5%
India	97,728	9.4%
Germany	36,100	3.5%
Ukraine	34,375	3.3%
Poland	25,811	2.5%
Kazakhstan	25,605	2.5%
Indonesia	22,598	2.2%
Other	88,885	8.6%
Total	**1,035,012**	**100.0%**

Source: BP Statistical Review of World Energy, June 2017

In 2017, 1,200 mines in the U.S. produced 774 million tons of coal, more than 86% of which was used for domestic power generation.[vii] In 2017, U.S. coal was mined in 25 states; 60% west of the Mississippi River and 40% in the east.[viii] (See Appendix A for an overview of coal production, reserves, consumption, exports, imports and price indicators.)

Economic Benefits of U.S. Coal Exports

Our nation's abundant, affordable and diverse domestic energy resources underpin our economic prosperity, providing both domestic and export opportunities in support of the Trump Administration's American Energy Dominance objectives.[ix] Low-cost electricity in the U.S., driven in large part by coal generation, has fueled our commercial and manufacturing sectors, providing us with a competitive advantage in global markets. Our energy abundance has also provided the U.S. with the opportunity to export energy resources, supporting trading partners and emerging nations in efforts to modernize their economies and combat energy poverty, while fostering U.S. economic growth.

As domestic demand for coal has softened, coal exports are an increasingly important market sector for U.S. coal producers. In 2017, coal exports accounted for 12.5% of total U.S. production – the highest level since the early 1980s. These exports contributed $13 billion to the U.S. Gross Domestic Product (GDP) and created, directly and indirectly, 100,000 jobs in the U.S.[x] The economic contribution of coal exports extends well beyond the activities conducted at mine sites and includes employment related to downstream transportation that moves coal from mines to ports, as well as the port services that prepare and load the coal for shipment abroad, and other businesses throughout the economy that are supported by coal export activity.

In 2017, workers employed in coal-export related businesses (coal mining, transportation, ports and shipping) earned an annual average of $101,800 in wages and benefits, compared to the U.S. average of $68,400. In coal-dependent regions, coal mining jobs are among the best paying. For example, in Belmont County, Ohio the average weekly wage of a service job is about $600, whereas coal miners in Belmont County make an average of nearly $1,700 per week – nearly three times as much.[xi]

The jobs created by coal exports are highly concentrated in several states, including West Virginia – 16,730 jobs, Virginia – 13,480 jobs, Pennsylvania – 8,740 jobs, and Alabama – 8,630 jobs.[xii] While the economic impacts of coal exports in the U.S. are relatively small, for certain regions they are very significant. For example, in 2017 in West Virginia coal exports accounted for 3% of state GDP and 2.5% of total employment, and for much higher percentages in specific West Virginia counties. The 2017 West Virginia unemployment rate was 5.3%. Absent the jobs created by coal exports, the unemployment rate would have been 7.5% – nearly 50% higher.[xiii]

In 2017, Ukraine began purchasing U.S. thermal coal mined in Pennsylvania. This partnership was formed in response to Ukraine's desire to diversify its energy supply; the U.S. is providing Ukraine with a secure and competitive energy source.[xiv] Pennsylvania coal exports to Ukraine created 455 coal-related jobs in the state and over 600 jobs in U.S. as a whole.

While these jobs are not significant at the state or national level, they are important for the counties of Luzerne, Northumberland and Schuylkill. For example, the 216 jobs created in Schuylkill County reduce the number of unemployed in the county by 5.5%, from 3,900 to 3,684, and reduce the unemployment rate from 5.8% to 5.5%. There are 2,377 total coal-related jobs in Schuylkill County, which represents about 4% of total county employment. Absent these coal-related jobs, the county unemployment rate would be 9.3% instead of 5.8%.[xv]

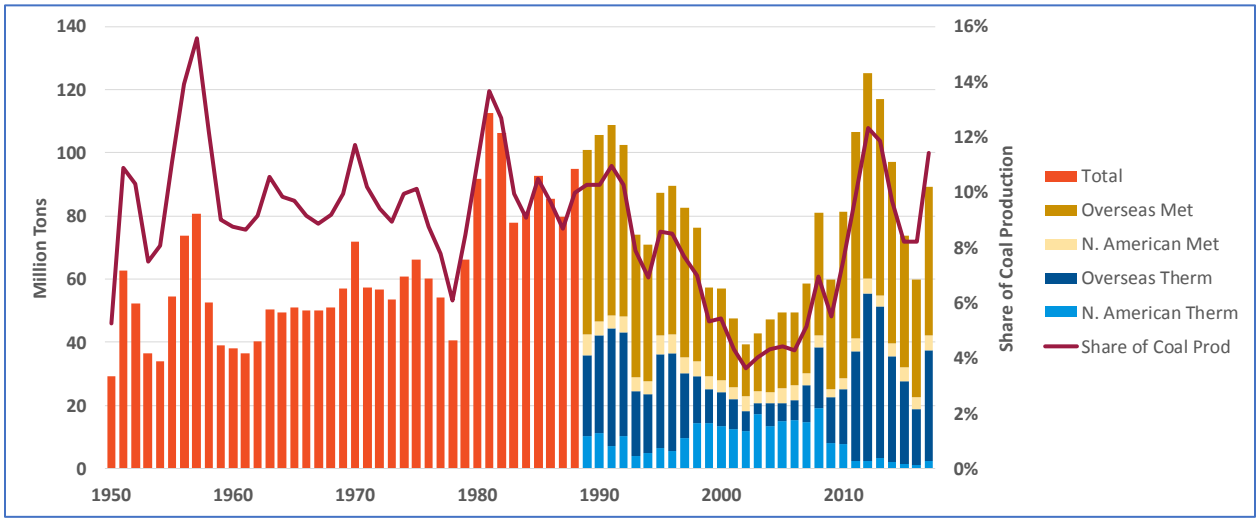
Coal and coal exports are disproportionately significant to specific sectors. For example, in 2017 coal accounted for 33% of originated tonnage for U.S. Class I railroads, far more than any other commodity, and comprised 15% of rail revenues.[xvi] Railroads transport over 70% of U.S. coal and derive more revenues from coal than from almost any other commodity – more than 10% of revenues transporting 523 million tons in 2017.[xvii] Coal exports are also very important to U.S. railroads, and a large portion of U.S. coal exports travels by rail. In 2017, coal exports accounted for about $1 billion in railroad revenues.

U.S. Coal Exports Overview

Coal exports are driven by international thermal and metallurgical coal supply and demand. Thermal coal, also known as steam coal, is used in generating steam to create electricity as well as to provide energy for industrial processes such as cement production. Metallurgical coal, often referred to as coking coal, is used in steel making.[xviii]

In 2017, U.S. coal exports increased 61% year-over-year to 97 million tons, which was the highest export total since 2014. Non-western ports shipped 87 million tons of coal (89% of total U.S. exports) in 2017. Of these, 64% were metallurgical exports and 36% were thermal.[xix]

Figure 2. Global Coal Trade



Source: EIA, U.S. Census Bureau, Doyle Trading Consultants

U.S. Coal Export Regions

Coal exports vary by state of origin. In 2017, for example West Virginia had the most coal exports with 34 million tons. There were six states with at least five million tons of coal exports in 2016. (See Appendix B for a list of U.S. coal exports by state and the top U.S. coal exporting companies.)

There are three primary coal regions recognized in the U.S. – Eastern, Interior and Western. For the purposes of this report, the Interior is grouped into the Eastern region.[xx] (See Appendix A for map of U.S. coal production regions.)

Eastern Region. Eastern basin mines are typically characterized by smaller mining complexes. While a majority of the 940 mines are surface mines, on a volume basis, 67% of production comes from underground mining. In 2017, 72% of export coal originates from Appalachian basins, while 13% of export coal originates from the Interior.

The Eastern/Interior basins are comprised of Northern Appalachia (NAPP), Central Appalachia (CAPP), Southern Appalachia (SAPP), and the Illinois Basin (ILB). Each basin differs in geography, coal quality, and operating characteristics.

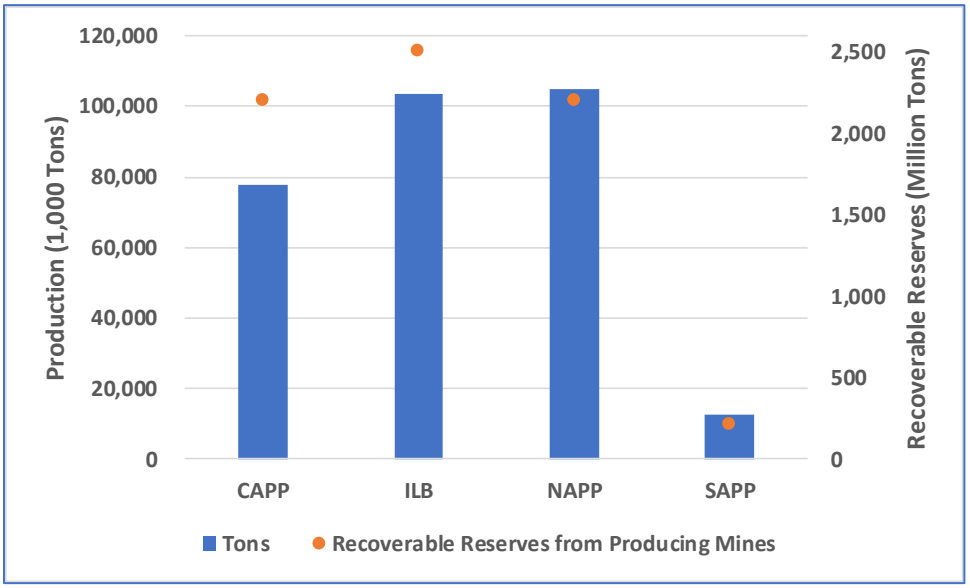
Table 2: U.S. Eastern & Interior Coal Basin Exports

Basin	2017 Production (million tons)	Active Mines (Dec 2017)	Export Tons %	States	Primary Export Markets
NAPP	107.2	318	24%	PA, OH, N-WV	Both Thermal and Met
CAPP	78.5	431	38%	S-WV, TN, E-KY, VA	Primarily Met, with Some Thermal
SAPP	12.9	47	10%	AL	Met
ILB	103.2	124	13%	IL, IN, W-KY	Thermal

Source: U.S. Mine Safety & Health Administration (MSHA)

Production volume and capacity differs within each of the Eastern/Interior basins. Access to total reserves in each basin is limited by property rights and are subject to obtaining mining permits. NAPP and ILB have the highest current production, as well as the greatest amount of reserves.

Figure 3: 2017 Eastern Basin Production and Reserves



Source: MSHA (Production), Energy Information Administration (Reserves)

Eastern/Interior Export Corridors

The primary export corridors from eastern basins are as follows:

- **Northern Appalachia to Baltimore (21% of 2017 export volumes) –** Primarily thermal coals from western PA, OH and Northern WV are transported to Baltimore by rail. Metallurgical coal is also produced in and shipped from this region as well as in central PA. Some Central App coal may make its way to this outlet as well along with anthracite from northeast PA, which sometimes finds an outlet in Philadelphia ports.
- **Central Appalachia to Hampton Roads (36% of 2017 export volumes) –** CAPP coals primarily move east by rail to the export terminals in the Port of Hampton Roads. The bulk of the coal exports in 2017 (84%) were metallurgical, which is not surprising because the strong metallurgical coal pricing in 2017 resulted in all parties in the supply chain giving preference to metallurgical coals.
- **Illinois Basin to New Orleans (13% of 2017 export volumes) –** ILB origins can ship coals through the U.S. Gulf directly by rail or by barge due to close proximity to the inland waterway system, The availability of in-stream loading provides an attractive alternative for barge movements. Coals from other regions are also exported through the U.S. Gulf when there is congestion at the U.S. East Coast terminals.
- **Southern Appalachia to Mobile (10% of 2017 export volumes) –** Southern Appalachian basins typically produce very high-quality metallurgical coals that are primarily transported by rail to Mobile for export, but there are some river alternatives.
- **Central Appalachia and Northern Appalachia to Great Lakes Terminals (5% of 2017 export volumes) –** Primarily metallurgical coals from both CAPP and NAPP origination move by rail to Great Lake terminals for use in Canadian coke/steel manufacturing.

Western Region. There are 65 coal mines in the western basins producing thermal coal. While this is less than 10% of the total mines in the U.S., they represent 60% of tons produced because of the large mines in the Powder River Basin (PRB).[xxi] The two primary basins in the western U.S. include the PRB, with its large surface mines, and the Rockies, which is a somewhat diverse set of mines operating in Colorado, Utah and Montana, with a combination of surface and underground mines.

Table 3. U.S. Western Coal Basins Exports

Basin	Export Tons	States	Primary Export Markets
PRB	5.1 million	MT, WY	Thermal
Rocky Mountain	12.8 million	CO, UT, MT	Thermal

Source: EVA Coal Trade Report, U.S. Department of Commerce

At one time, Alaska exported considerable tonnage from the Usibelli mine to Korea and elsewhere. The coal moved through the Seward Terminal which was closed in 2016. In 2015, production started from the Eagle Pass mine in Texas which was developed to supply the Carbon I and II plants in Mexico. The coal is delivered by rail to the plants which are located just south of the U.S.-Mexico border. In 2017, the mine produced 2.4 million tons.

Western Export Corridors

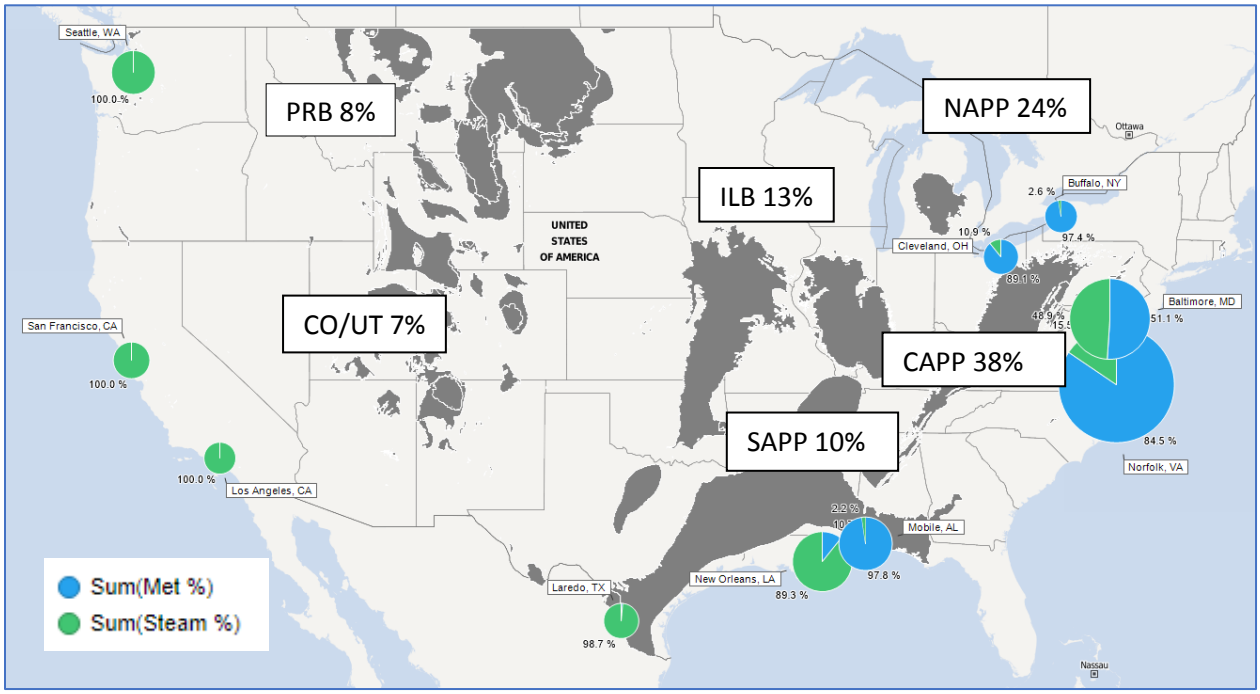
The primary export corridors from western basins are as follows:

- **Powder River Basin and Montana to British Columbia, Canada (Westshore Terminal) –** Thermal coal from the PRB and Montana are transported via rail to Westshore and other terminal in British Colombia.
- **Rocky Mountain Basin to California (Richmond, Stockton and Long Beach) –** Thermal coal from mines in Colorado and Utah are transported to U.S. West Coast terminals by rail.
- **Rocky Mountain Basin to Sonora, Mexico (Guaymas) –** Thermal coal from mines in Utah have recently begun moving to a terminal facility at Guaymas.

Transportation of U.S. Coal for Export

The primary shipping considerations for U.S. export coal are the availability of rail and barge transport to move coal to the appropriate export terminals and the availability of terminal capacity to load vessels of the appropriate size. Rail transports primarily to eastern, western and Great Lakes ports, while barge utilizes inland waterways to U.S. Gulf Coast terminals. Ten (10) ports account for 98% of U.S. coal export traffic. Additionally, the type of coal (metallurgical or thermal) exported from specific terminals is dictated by the type of coal produced in nearby basins.

Figure 4: 2017 U.S. Coal Exports Departing from the 10 Largest Outlets (Bubble Size Represents Tonnage & % of Coal Exported)



Source: U.S. Energy Information Administration, Quarterly Coal Report (Oct.-Dec. 2017)
Seattle, WA and Laredo, TX outlets are port and rail transfer points.

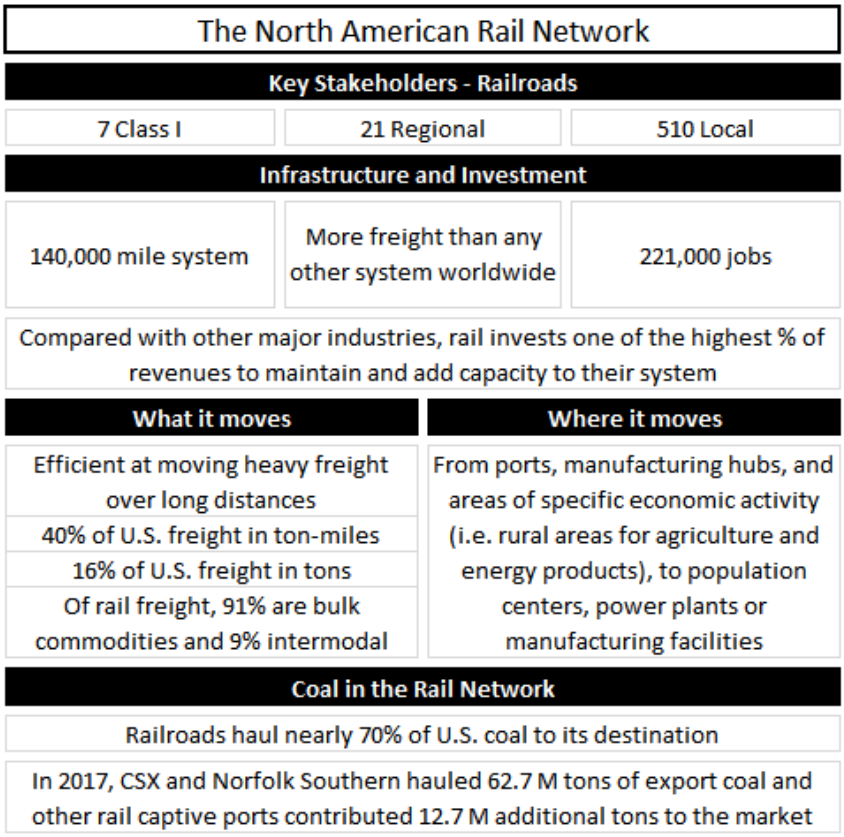
Railroads

Coal and railways have been interlinked since the 1800s, and many of the first U.S. railways were built specifically for coal. Coal traffic increased and evolved into the primary source of revenue for railroads, and routes serving the mines became some of the heaviest built and busiest lines in the country.[xxii] While rail coal volumes have declined in recent years, coal remains a crucial commodity for the U.S. rail network.[xxiii]

Various factors come into play regarding rail capacity and performance as it relates to handling the variable export market. These include:

- Matching railroad owned assets (locomotives, cars, staffing, etc.) with demand, and accommodating fluctuating coal export market demand with that of rail resources needed for other industry supply chains,
- Physical infrastructure, which affects routing, line capacity and length of haul, and requires significant investment/maintenance,
- Geography and terrain, which determines accessibility, train speed and size, and the power necessary to move trains that increases naturally with grade, and
- Corridor and shared asset restrictions, which may place constraints on train length, weight and the number of trains that may move over a defined timeframe.

Figure 5. Overview of North American Rail Network[3]

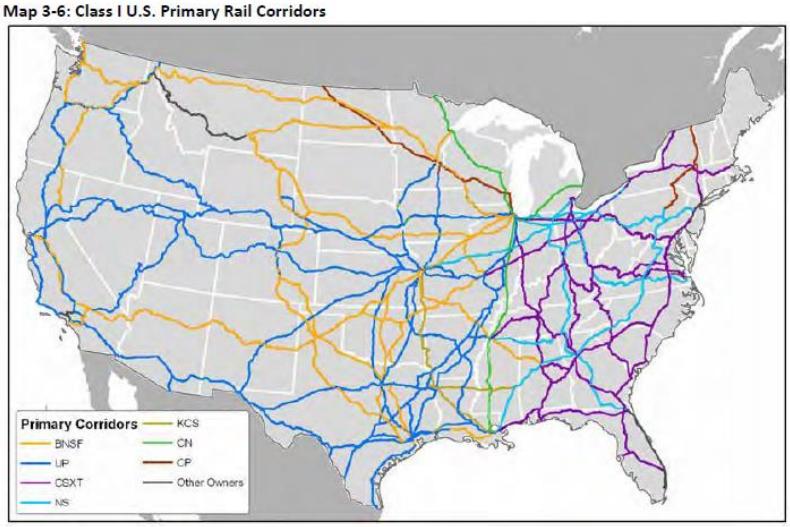


Sources: CSX[xxiv] and Norfolk Southern[xxv]

Eastern coals move to ports in established rail corridors that have a history of following export volumes. The primary rail operators in the east are the CSX Corporation (CSX) and Norfolk Southern Railroad (NS). These two carriers service all of the Appalachian basins, providing the primary outlet to export markets for eastern coals. The primary rail operators in the west are Burlington Northern Santa Fe (BNSF) and Union Pacific (UP). The PRB mines as well as the large Signal Peak mine in Montana that are the predominant sources of western coal exports move via the BNSF to the Westshore Terminal and other Canadian terminals in British Columbia. UP transports coal from mines in Colorado and Utah to export facilities in California and Mexico.

[3] Class 1 railroads are designated as such by size criteria as defined by the Surface Transportation Board. There are seven Class I railroads including BNSF, Canadian National, Canadian Pacific, CSX, Kansas City Southern, NS and UP.

Figure 6. Primary Class I Railroad Corridors

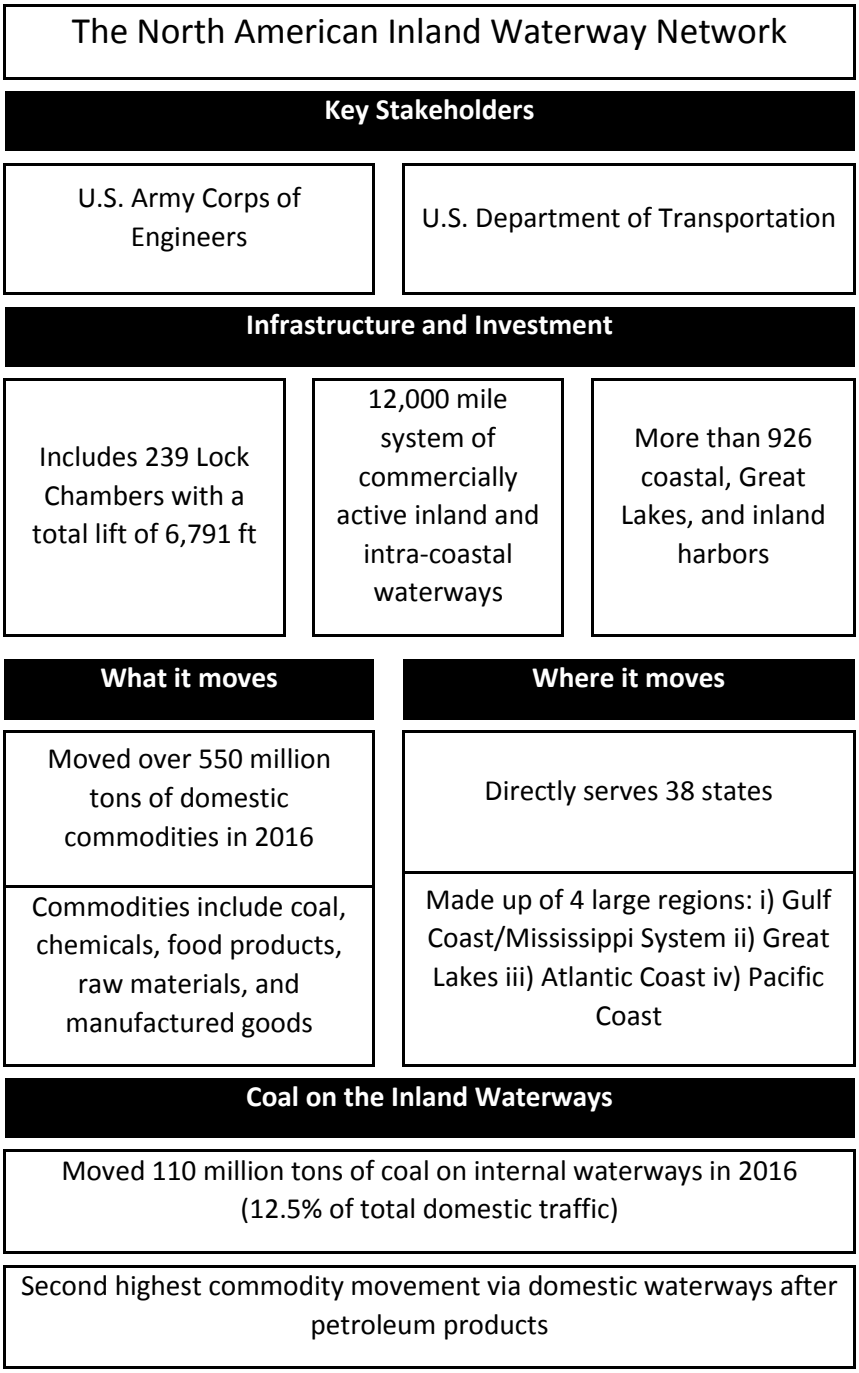


Inland Waterways

The U.S. has a large system of interconnected waterways that the U.S. Army Corps of Engineers is responsible for maintaining and operating. This system, which consists of 12,000 miles of commercially navigable channels through 38 states, transports a multitude of commodities to inland or port offloading locations. The waterways system is serviced by more than 31,000 barges that move more than 880 million tons of domestic cargo on the nation's rivers, coasts, Great Lakes and harbors. In 2016, more than 550 million tons of waterborne cargo transited the inland waterways, valued at $300 billion. Twenty percent (20%) of the nation's coal is moved on the water.[xxvi]

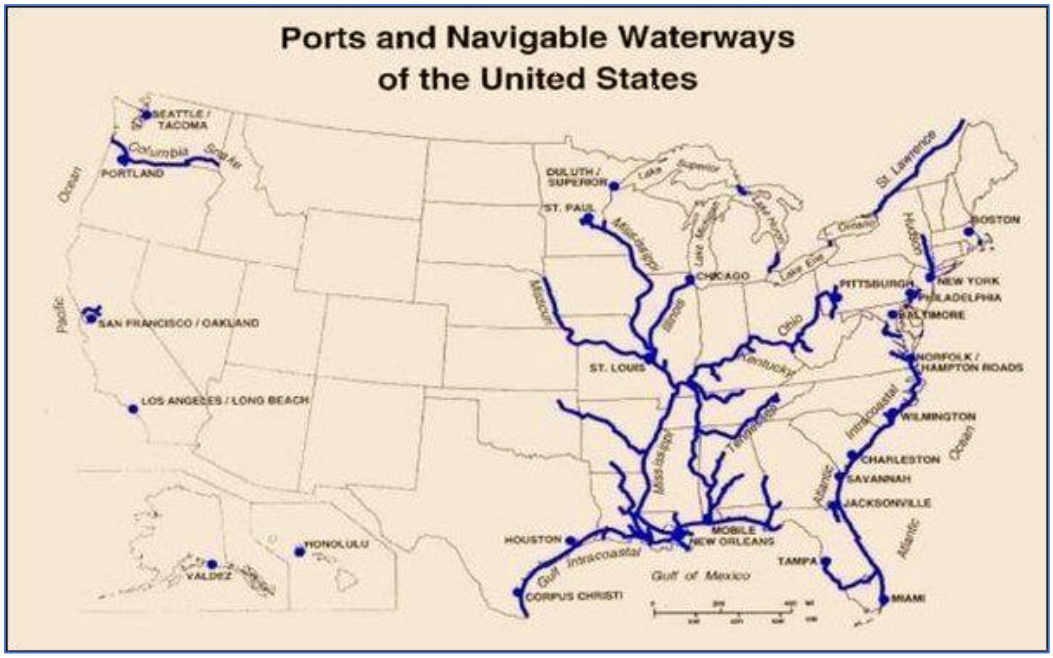
Several factors affect the capacity and effectiveness of the inland waterway network. These include seasonal river level cycles that can vary by up to 30 feet and shifting currents and navigational channels. Additional challenges are posed by the vast number and location of navigation lock chambers – 239 chambers at 193 sites – and the age of the locks which average about 60 years. Nearly 140 of the chambers in operation are over 50 years old and 58% of the locks are past their design life expectancy.

Figure 7. Overview of North American Inland Waterways Network



Sources: American Society of Civil Engineers and U.S. Army Corps of Engineers[xxvii]

Figure 8: Major U.S. Ports and Waterways



Source: Armor Freight Services

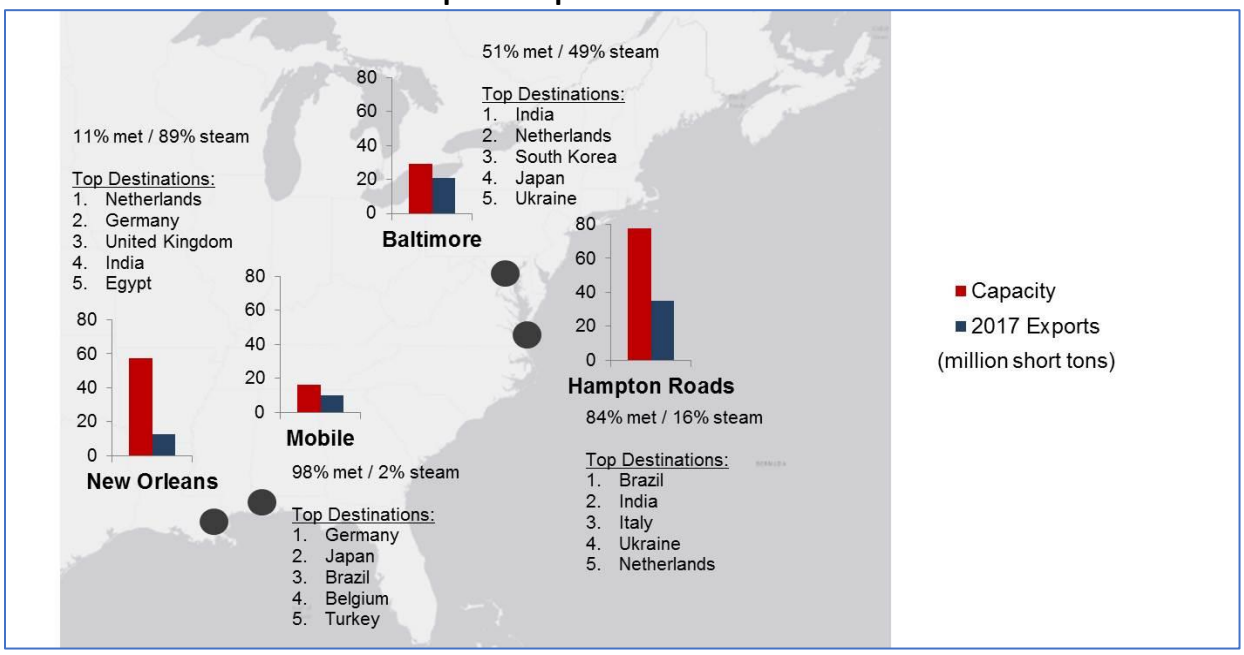
Ports

Eastern producers typically export coals through the terminals on the U.S. East and Gulf Coasts. U.S. West Coast ports provide better access for western producers by virtue of the location of western coal basins and the proximity of the West Coast ports to the Pacific markets. The shortage of terminals on the U.S. West Coast has limited the tonnage of U.S. western coal that can be exported. While there are alternative outlets for western coals, namely the terminals in British Columbia (e.g., Westshore and Ridley), in Mexico (e.g., Guaymas), on the Great Lakes (e.g., Duluth or Chicago with transloading into ocean vessels in Quebec), and the U.S. Gulf Coast (e.g., direct rail to Houston and/or rail to barge to New Orleans), the alternative routes are longer and hence more expensive.[4]

Eastern Ports. Most of the coal that is exported from producing regions of the eastern U.S. (including Northern Appalachia, Central Appalachia, Southern Appalachia and the Illinois Basin) is transloaded onto oceangoing vessels at terminals located on the U.S. East and Gulf Coasts. The largest of these coal export terminals are located in four primary ports: Baltimore, MD; Hampton Roads, VA; Mobile, AL; and New Orleans, LA. (Smaller volumes of eastern U.S. coal are also exported through terminals located on the Great Lakes – primarily to Canada – and through several additional terminals on the U.S. East and Gulf coasts). Figure 9 shows the locations of these four major ports, along with their primary export destinations, reported nameplate capacity and 2017 actual coal export volumes. Combined, these ports exported a total of 78 million tons of coal in 2017, representing approximately 80% of the total U.S. coal exported that year.

[4] See Appendix C for summary of key statistics for major coal export ports and terminals handling U.S. export coals.

Figure 9. Major Export Ports for Eastern U.S. Coal
Includes breakdown of metallurgical vs. steam coal shipments
and top five export destinations in 2017



Source: Host, EIA & USA Trade Online[xxviii]

This throughput volume equated to approximately 43% capacity utilization, based on reported capacities, with Baltimore having the greatest capacity utilization (72%) and New Orleans the lowest (22%). In fact, the data indicate that there is sufficient terminal capacity available at these four ports to export ~181 million tons of coal, or nearly 60% of the total coal produced east of the Mississippi River in 2017. However, experience during Q1 2018 suggests that the actual working capacity of these terminals is hampered by various logistical and draft depth constraints, as detailed below. These constraints can result in significant underutilization of capacity. For example, the three major coal export terminals in the Port of Hampton Roads have a reported capacity of ~6.5 million tons per month, or ~19.5 tons per quarter, but these terminals exported only a combined volume of 4.7 million tons in April 2018 and 9.6 million tons in Q1 2018 with vessels waiting in queue. Constraints on the transportation systems serving these facilities, such as the availability of equipment and crews, have the potential to constrain terminal capacity.

Several factors impact the accessibility, economics and effective capacity of each terminal, including:

- Inbound transportation options, that determine which mines can ship directly to the terminal without having to switch transport modes/carriers, thus reducing the potential for congestion and delayed shipments,
- Unloading and loading rates, which affect the maximum rate at which coal can be received and loaded onto ships,

- Draft, which determines the maximum vessel size (weight) that the terminal can accommodate (with implications for economics and throughput capacity),
- Ground storage capacity and reclaim system design, which affects the extent to which the terminal can accommodate imbalances between inbound and outbound shipment volumes and the effectiveness with which it can blend multiple coals to meet the quality specifications required by certain export customers, and
- Pier design and number of berths, which again affect the maximum vessel size and throughput capacity that can be accommodated.

In addition to the logistical constraints that contributed to below-capacity terminal operation in early 2018, U.S. East and Gulf Coast coal export terminals are generally all constrained by draft, which prevent them from fully loading the largest cape-size vessels available for dry bulk transport. This affects the competitiveness of U.S. coals as higher freight adds to the delivered cost per ton of U.S. coals. A project to dredge the main channel of the Port of Hampton Roads from 50 ft to 55 ft of water depth has been budgeted by the Virginia General Assembly and is pending final approval; if completed, this would allow higher-capacity loading of cape-size vessels and improve the economic competitiveness of certain coal exports from Hampton Roads.

Western Ports. Western U.S. coal exports are severely constrained by a lack of terminal and terminal capacity on the U.S. West Coast**.** Most of western coal exports from the Powder River Basin are being shipped through Canadian ports (e.g., Westshore) as are coal exports from the Signal Peak mine in Montana. Coal exports from the Uinta Basin in Colorado and Utah are constrained by limited ports in California. Some Uinta Basin coals are currently being exported through Guaymas.

Westshore Terminals Inc. located in the Port of Vancouver, British Columbia (Canada) has a total throughput capacity of 33 million tonnes in 2018. Approximately 14 million tonnes are estimated to be under contract with U.S. thermal coal exports and the remaining 19 million tonnes is for Canadian metallurgical coal exports, although this could change. The terminal, with on-site storage for approximately 2 million tonnes, can be accessed by BNSF, Canadian Pacific and Canadian National railways. Primary destinations for U.S. thermal coal out of Westshore include Japan, South Korea, Chile and Taiwan. Capacity is expected to increase by approximately 3 million tonnes in 2019. The Ridley and Neptune terminals in British Columbia also handle coal but have a transportation disadvantage vis-à-vis U.S. coals due to their greater distance from western coal basins.

The Metropolitan Bulk Terminal located in Stockton, CA has the capacity to load one Panamax vessel per week at 50,000 tonnes, equating to an annual capacity of 2.6 million tonnes per year. The terminal has storage capacity of approximately 100,000 tonnes of coal.

The Port of Richmond, CA has the capacity to load one Panamax vessel per week at 50,000 tonnes, equating to an annual capacity of 2.6 million tonnes per year and storage capacity of approximately 80,000 tonnes. The primary coal exported through Richmond is bituminous coal mined in the Uinta Basin in Utah. The port can be accessed by BNSF and UP railroads. Maximum vessel size at berth is 55,000 tonnes.

The Oakland Bulk and Oversized Terminal (OBOT) in Oakland, CA is a redevelopment proposal for the former Oakland Army Base on San Francisco Bay. The project is a public/private partnership designed to revitalize the old site into a new bulk transloading facility. The primary advantage is the port has a 50-foot (15.25 meters) depth at low tide which allows it to take larger cape-sized vessels. This site is also served by both BNSF and UP railroads, but 104 railcar unit-trains will need to be processed in 26-car segments. The facility has capacity to top off two Panamax vessels per week (from Stockton/Richmond) to 85,000 tonnes equaling an annual capacity of 3.3 million tonnes per year.

The Port of Long Beach, CA is accessed by both the BNSF and UP, has storage capacity of approximately 175,000 tonnes and can accommodate a maximum vessel size of 130,000 deadweight tonnes (DWT).

The Port of Guaymas in the Mexican state of Sonora is being used to export U.S. coal. This is a multi-commodity port that is not explicitly designed for coal and it uses portable (mobile) equipment to unload trains and load ocean-going vessels. Coal exports in 2018 are estimated to be between 2.0 and 2.5 million tonnes. Coal is transported by the UP Railroad from Utah to Nogales, Mexico at the Arizona border. From there, Ferromex rail delivers the coal to Guaymas.

As detailed in Chapter 3 and Appendix D, numerous coal export terminals have been proposed for development in the Pacific Northwest. To date, none have successfully advanced and only one is still under consideration – the Millennium Bulk Terminals-Longview located on private property in Longview, Washington with a proposed capacity of 44 million tonnes.

Vessels & Shipping Considerations

Dry bulk cargo vessels have varying load carrying capacities based on their size; larger load carrying vessels are more cost-effective but require greater drafts and larger/longer piers. Cape-size vessels have a load carrying capacity of up to 199,000 DWT; Panamax vessels up to 80,000 DWT; Handymax vessels up to 50,000 DWT. (See Appendix C for vessel categories.)

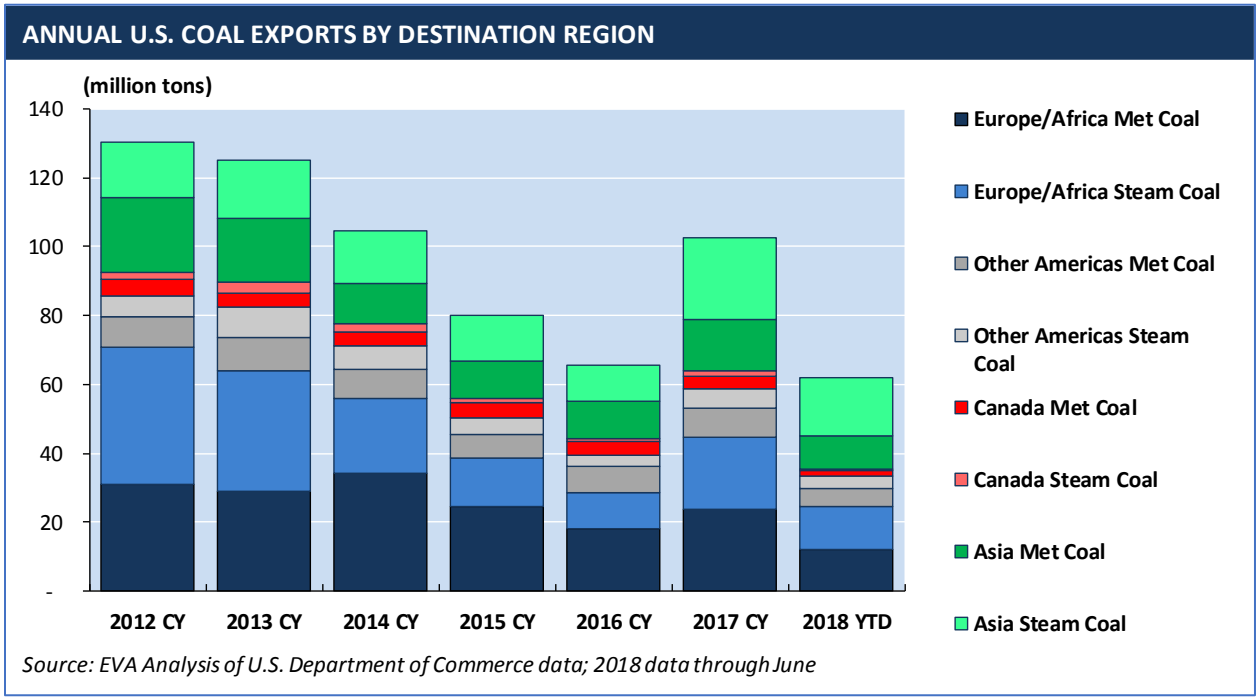
Sail times for eastern U.S. coal to reach northwest Europe (Amsterdam, Rotterdam and Antwerp – collectively ARA) are approximately 13 days from U.S. East Coast terminals, and 17 days from U.S. Gulf Coast terminals. Sail times to India (via the Cape of Good Hope) are approximately 42 days from the U.S. East Coast and 44 days from the U.S. Gulf Coast. Sail times to Japan are approximately 34 and 32 days from the East and Gulf coasts, respectively, if the coal is routed via the Panama Canal, and approximately 54 and 56 days, respectively, if the coal is routed via the Cape of Good Hope.

Sail times from the U.S. West Coast to Japan and India are approximately 20 and 27 days, respectively.

Prime Markets for U.S. Coals

Europe and Asia account for the vast majority of all U.S. coal exports. The U.S. has historically been a key coal supplier to Europe due to the proximity of U.S. East Coast and Gulf Coast terminals to Europe, longstanding business relationships between the U.S. and Europe, and desirable coal qualities that are readily consumed in Europe. Asia's growing demand for coal represents a significant growth opportunity for U.S. coal exports.

Table 4: U.S. Coal Exports by Destination (million tons)



Source: EVA Monthly Coal Trade Report, June 2018

Chapter 2. Competitive Assessment

Key Findings – Chapter 2

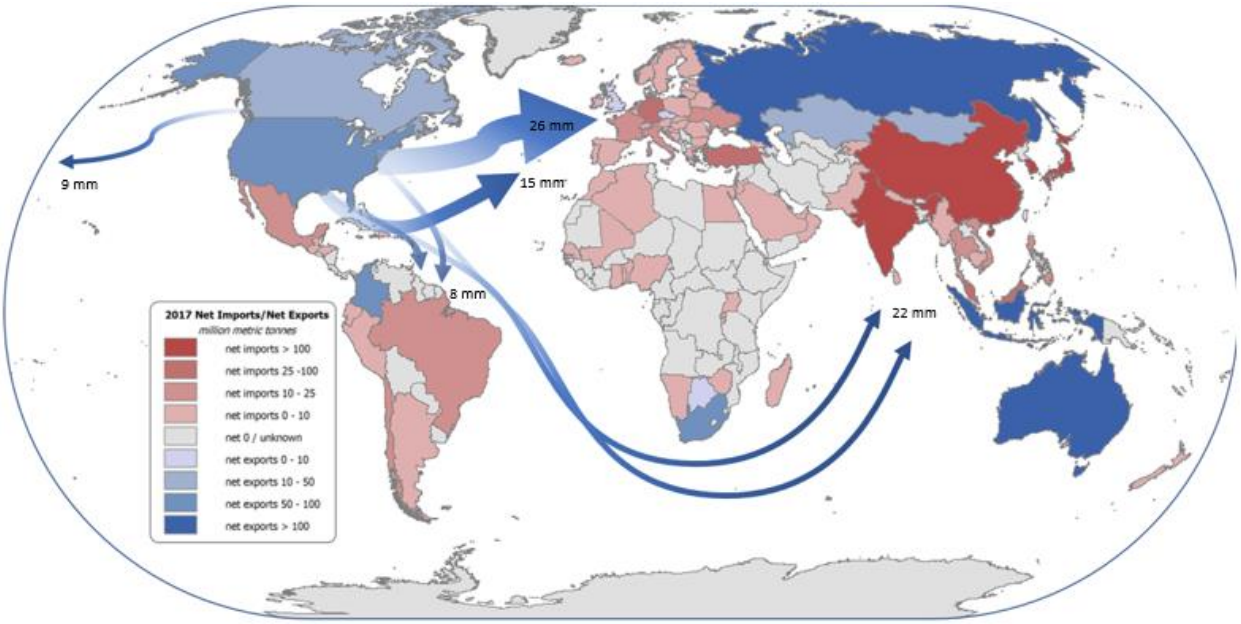
- **Global coal trade is a robust and growing market; worldwide coal trade has more than doubled since 2000.**
- **While Europe continues to be a principal market for U.S. eastern metallurgical coals, burgeoning demand in Asia represents a significant market opportunity for both eastern and western U.S. thermal coals.**
- **Global seaborne coal trade markets are volatile, influenced by such varied factors as economic growth/decline cycles, weather disruptions, currency exchange rates, nations' energy policies, trade regulations/agreements and geopolitics.**

Global Coal Market Supply and Demand

Coal trade is an increasingly important segment of the global coal market, accounting for nearly 20% of global coal consumption in 2017.[xxix] Global trade in 2017 grew by 3% from 2016 levels and is now more than twice the trade volume of 2000.[xxx] The increase in global coal trade has benefitted all participants, including producers and traders based in the U.S.

Global coal trade remains robust with total exports in 2017 approaching 1.4 billion tonnes.[xxxi] As shown in the figure below, the largest net importers of coal are concentrated primarily in Asia, while the largest exporters are distributed relatively evenly across the globe in Indonesia, Australia, Russia, the U.S., Canada, South Africa and Colombia.

Figure 10: Major U.S. Coal Trade Flows (2017)



Source: United Nations, U.S. Census Bureau

Asian coal imports have grown dramatically and now comprise nearly three-quarters of total global imports.[xxxii] Coal demand is expected to continue its shift toward Asia according to numerous international agencies, including the International Energy Agency (IEA), BP in its latest Energy Outlook and the U.S. Energy Information Administration (EIA). China was traditionally a net coal exporter (i.e., exports exceeded imports) but since 2007 the country has relied on seaborne markets both to fill voids left by domestic production shortfalls and to meet specific quality requirements. China's appetite for coal has grown as its economy has flourished. China is now one of the leading global economies and is shifting its emphasis from an industrial to a consumer-based economy. China imports coal primarily from Indonesia, Australia and Russia; the U.S. has exported relatively little volume to China.[5]

India has likewise moved to increase access to electricity across the country but societal and governmental mechanisms make this transition complex and slow. Seaborne coal is assuming an increasing role in the electric power, steel, and cement and brickmaking sectors, in part because of the poor domestic coal quality and in part because of the location of demand.

In addition to China and India, other Asian economies are moving toward coal to aid economic growth, including Indonesia, Vietnam and Malaysia among others. Coal is viewed as readily available and low-cost, thus ideal for reliable power generation. While South Africa has long had a significant coal industry, other parts of Africa are also embracing coal to provide stable low-cost power. Mozambique, in particular, has expanded its coal activities to include increased production, port facilities and exports.

While demand in Asia and Africa continues to develop, coal consumption in Europe and the Americas has peaked and is expected to decline because of the growing supply of low-cost natural gas and renewables. Regulations are limiting the ability of energy consumers to use coal in these regions, driven in large part by efforts to meet targets set by the United Nations Framework Convention on Climate Change (UNFCCC).[xxxiii] However, sovereign energy security concerns regarding an overreliance on natural gas have arisen in both the U.S. and Europe. If this trend continues, the remaining coal fleet in both regions could be viewed from a different lens. In Germany and Poland, for example, coal production and the power generated from this coal have become crucial to their economic health.

Given the increasing importance of coal in Asia, it is not surprising that coal production is also centered in Asia. China with its large coal reserves[6] accounted for 46% of global production in 2017.[xxxiv] Since China's coal production is largely absorbed by its domestic market, other exporters have stepped up to meet growing Asian coal demand. Producers in Australia and Indonesia are geographically advantaged to fill this need, but supply constraints from these countries, customer buying preferences and specific quality requirements

[5] See Appendix E for data on international coal markets.

[6] Coal reserves can be calculated in various ways as a fraction of the total coal resource. In this report, coal reserves sometimes reflect "total marketable reserves," that portion of the indicated or measured reserve that is expected to be mined in the future over the life of each identified operating mine and project. Marketable reserve values can change significantly over time as the economics of the coal market change.

sometimes require or even favor coal produced in more distant regions, principally in the Americas and South Africa. This is a trend that is expected to continue, and one for which competitive advantages can be nurtured and enhanced.

Metallurgical Coal Trade

Global metallurgical coal production has remained relatively stable in recent years with approximate 2017 production of over one billion tonnes.[xxxv] China is the world's largest metallurgical coal producer regularly accounting for about one-half of total global production.[xxxvi] Chinese production of metallurgical coal peaked in 2013 at over 650 million tonnes[xxxvii] but has been subsiding since then and is now less than 550 million tonnes as China seeks to reduce industrial overcapacity. Overall, metallurgical coal production is heavily concentrated. Metallurgical coal production from top producers, China, Australia, Russia and the U.S. consistently accounts for about 80-85% of total global metallurgical coal production.[xxxviii] The U.S. is consistently one of the top five global metallurgical coal producers and exporters.

Metallurgical coal is consumed in many countries around the world. Unsurprisingly, China is by far the largest global consumer, regularly accounting for two-thirds of global consumption in recent years.[xxxix] Other major consumers include India, Russia, Japan, South Korea and the U.S., the latter of which consumes just 2% of 2015 global metallurgical coal.

Despite their large domestic coal reserve bases, India and China remain large importers of metallurgical coal seeking quality not available from domestic sources. Japan, South Korea and Taiwan are large steel producers, but have no indigenous metallurgical coal for coke-making and therefore import all their needs. Other, non-Asian steel producers in the Americas and Europe are also significant metallurgical coal importers.

These importers seek defined metallurgical coal qualities at best available prices. The largest importers are Asian, providing Asian suppliers that can meet quality requirements with a competitive transportation advantage. Australia and Indonesia profit from this proximity advantage. From its east coast, Russian suppliers also serve Asian markets, just as they also serve markets in the European region. U.S. metallurgical coals also serve European and South American markets, where transportation economics are favorable, and their quality characteristics (i.e., high fluidity) make them attractive for use in certain metallurgical blends in Asia, despite its transportation disadvantage.

Australian supply dominates Asian metallurgical coal import markets with additional supply provided from Canada, Russia, Indonesia and the U.S. Australia and the U.S. share dominance in European import markets, with additional supply sourced from Russia. In the Americas, import supply is typically provided by Australia and the U.S., with Canada contributing lesser amounts. Finally, given the size of its domestic market and reserve base, domestic metallurgical coal in China must be considered a competitor to all exporters even though it exports very little metallurgical coal. The need for high-quality, low-ash and high-CSR[7]

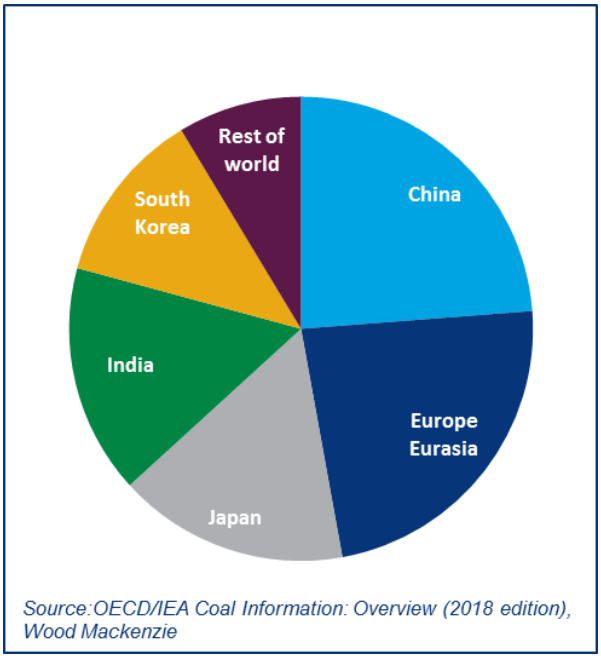
[7] CSR – coke strength after reaction – is a metallurgical coal quality.

imported coal in China, as well as the policy decisions the country takes, can significantly influence the import market and alter competitive market dynamics.

Thus, major direct competitors to U.S. metallurgical coal exporters are Australia, Russia and Canada. These countries compete with the U.S. for the metallurgical coal trade market, calculated to be between approximately 300 and 325 million tonnes in 2017[xl]. Over time, Mozambique may develop as a major source. The supply into the export market is fungible and can shift between sources. For example, to the extent Chinese import demand increases its imports of Australian metallurgical coal, the markets for other sources into other countries increase.

Figure 11: Metallurgical Coal Imports & Exports

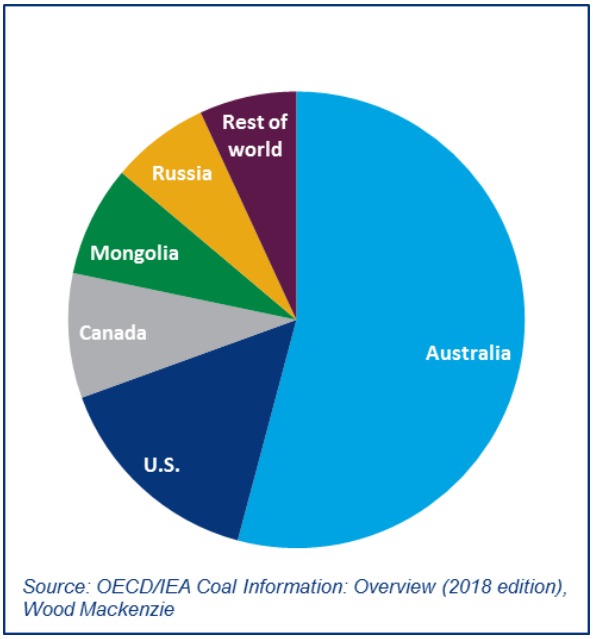
Share of 2017 global metallurgical coal imports by country/region, %



Source:OECD/IEA Coal Information: Overview (2018 edition), Wood Mackenzie

Note: The large majority of the approximately 300 to 325 million tonnes of imports are received via seaborne methods.

Share of 2017 global metallurgical coal exports by country/region, %



Source: OECD/IEA Coal Information: Overview (2018 edition), Wood Mackenzie

Note: The large majority of the approximately 300 to 325 million tonnes of exports are delivered via seaborne methods. Mongolian and some Russian exports are landborne.

Detailed descriptions of the metallurgical coal industry in countries that compete with U.S. exporters are provided in Appendix F, which includes a brief description of marketable reserves,[8] general production and export position, coal quality, general infrastructure, and brief notes on important fiscal and regulatory items for each country.

[8] For purposes of this report, "marketable reserves" refers to the sum of production expected from mines into the long-term future. Any reference to actual costs or specific ranges of costs has been purposefully left out of this report.

Thermal Coal Trade

Globally, thermal coal production reached a peak in 2013 and has plateaued ever since. Declining production and consumption in much of the western world is countered by growth in Southeast Asia and the Indian sub-continent. Today, over 50 countries produce thermal coal, many in small quantities, but the top seven thermal coal producers routinely account for about 85% of global production.

China is the world's largest thermal coal producer, and even though its production is declining somewhat, it still accounts for over 40% of 2017 global thermal coal production.[xli] The list of largest thermal coal producers always includes India, the U.S., Indonesia, Australia, Russia, South Africa and Germany. In 2017, the U.S. accounted for about 11%[xlii] of global thermal coal production but its global share is declining rapidly as it cedes domestic energy consumption market share to natural gas and renewables.

China is by far the largest global consumer of thermal coal, having accounted for well over one-half of global consumption in 2017.[xliii] The top seven consuming countries in 2017 accounted for about 80% of total consumption. After China, other top coal thermal coal consumers include India, the U.S., Germany, South Africa, Russia, Japan and Poland. The U.S. share of global thermal coal consumption was over 9% in 2017.[xliv]

Economics and quality considerations encourage a lively import/export market for thermal coal, which is three to four times the size of the metallurgical coal import/export market. As is the case with metallurgical coal, India and China remain large importers of thermal coal for quality and cost reasons. Having no domestic coal resource and being dependent on imports, Japan, South Korea and Taiwan are also large thermal coal importers. In 2017, Germany and Turkey were the largest importers of thermal coal in the European region. Combined, these seven countries regularly account for about three-quarters of all coal imported in the world. The U.S. is a very minor importer of coal.

Thermal coal is available from many global sources with widely varying quality characteristics. Indonesia (364 million tonnes in 2017)[xlv] and Australia (200 million tonnes in 2017)[xlvi] are the largest global thermal coal exporters. Given their proximity to the growing Asian markets, Australian and Indonesian producers profit from their ability to deliver coal at low cost. Russia is also a large thermal coal exporter and can deliver coal to Northeast Asia with very low ocean freight costs, although its landborne transportation costs to port are very high. Russian thermal coal is also delivered to multiple locations in the European region as well, by both land and sea.

Colombia and South Africa are also large exporters of thermal coal. While both serve global markets, Colombian coal is sold largely into Europe while South African coal is sold largely into Asia. The U.S. always occupies a position in the top ten of thermal coal exporting countries, although its shipment volumes can be quite variable given that it is often the a marginal supplier to the global market. U.S. thermal coal exports, which were approximately 37 million tonnes in 2017, principally serve European markets and, when economics warrant, markets in Asia. Lack of U.S. West Coast port capacity has hampered the ability of U.S. coals to

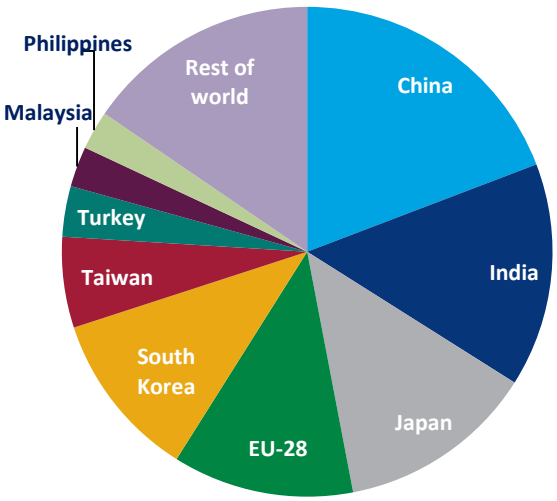
compete economically in Asia. Approximately 10 million tonnes of western U.S. thermal coal was exported via Canadian ports to Asia in 2017.

Australian, Indonesian and South African suppliers dominate Asian thermal import markets with additional supply from Russia and, when competitive economics are favorable, from the Americas. In the European region, the import market is dominated by Colombia, Russia, the U.S. and South Africa. In the Americas, import supply is typically provided by producers in the Americas, with small amounts from elsewhere.

The major competitors for U.S. thermal coal exporters are market-dependent. In Europe, the primary U.S. competitors are Russia and Colombia. Australia is a major competitor in the Asian market. South Africa, because of its location, is a swing supplier between the European and Asian markets. South Africa had been a major supplier to Europe until significant growth in the Asian market made exporting to that market more attractive. The U.S. would be a major competitor to Indonesia if additional exports of Powder River Basin coal to Asia were realized given that many customers desire supply diversity, heightening the U.S.'s position as a stable export supplier.

Figure 12: Thermal Coal Imports & Exports

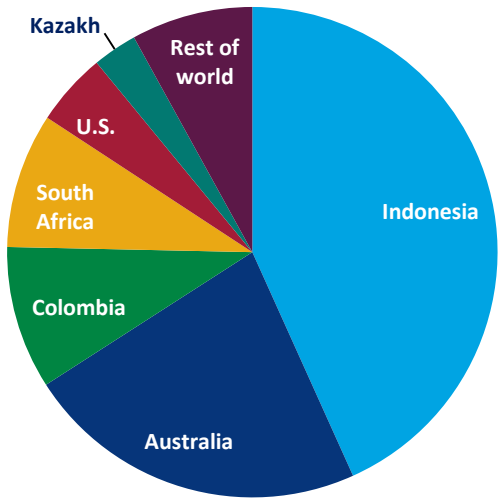
Share of 2017 global thermal coal imports by country/region, %



Source: sxcoal, Reuters, OECD/IEA Coal Information: Overview (2018 edition), Wood Mackenzie

Note: The large majority of imports are delivered via seaborne methods.

Share of 2017 global thermal coal exports by country/region, %



Source: OECD/IEA Coal Information: Overview (2018 edition), Wood Mackenzie

Note: Nearly all exports use seaborne methods. Kazakhstan exports are by land.

Descriptions of the thermal coal industry in countries that compete with U.S. exporters are provided in Appendix G, which includes a brief description of marketable reserves,[9] general production and export position, coal quality, general infrastructure, and brief notes on important fiscal and regulatory items for each country.

Competitiveness of U.S. Coal with Global Supply

Coal purchasing is universally made on an evaluated delivered cost basis. The relative economics of the alternative coal sources can and do change as a result of numerous factors such as relative strength of the U.S. dollar, oil prices, unexpected events, geopolitical events and freight markets. Using key factors, the advantages and challenges of U.S. metallurgical and thermal coals relative to its major global competitors is summarized in the tables below. (See Appendix H for a competitive assessment of U.S. coal exports vis-à-vis other coal supplier nations.)

[9] For purposes of this report, "marketable reserves" refers to the sum of production expected from mines into the long-term future. Note also that if general infrastructure and/or fiscal and regulatory items for Australia, Russia and the U.S. were already described in the metallurgical supplier section above. Any reference to actual costs or specific ranges of costs has been purposefully left out of this report.

Table 5: Advantages and Challenges of U.S. Metallurgical Coal versus Competitive Supply by Country

METALLURGICAL COAL	vs. Australia	vs. Russia	vs. Canada	vs. Mozambique
Mine cost	U.S. mine costs are higher	U.S. mine costs are higher	Mine costs are broadly similar	U.S. mine costs are lower
Quality	U.S. has limited premium low- & mid-vol	Russia has very low sulfur coal	U.S. has limited premium low- & mid-vol	U.S. has lower sulfur and ash
	U.S. has abundant high fluidity, high-vol & low ash	Low sulfur/high energy Russian PCI preferred in Europe	U.S. has abundant high fluidity, high-vol & low ash	
	U.S. has some expansion & CSR issues	U.S. coking coal quality is superior	U.S. has some expansion & CSR issues	
Infrastructure and logistics	U.S. rail costs are higher	U.S. rail costs are lower	Rail costs are broadly similar	U.S. rail costs are lower
	Government relations with rail companies are better in the U.S.	Russia has winter rail disruptions		
		Port costs are higher in Russia		
Ocean freight (OF)	U.S. OF is higher to Asia	U.S. OF is higher to Asia	U.S. OF is higher to Asia	U.S. OF is higher to Europe and Asia
	U.S. OF is lower in the Atlantic	U.S. OF is lower in the Atlantic		
	U.S. can't always load large vessels, although metallurgical coal consumers and producers usually favor Panamax vessels; dredging ports could be an equalizer, but at a cost			
Security and regularity of supply	U.S. seldom has labor strikes	Russian winter can interrupt coal delivery	Broadly similar - both high reputable suppliers	U.S. political structure and infrastructure dependable
	U.S. hurricanes seldom interrupt shipments	Russia in transition to market economy	U.S. has greater fiscal and regulatory stability	U.S. has greater fiscal and regulatory stability
	U.S. has greater fiscal and regulatory stability	U.S. has greater fiscal and regulatory stability		
Shipment uniformity	Broadly similar	U.S. has better quality control of shipments	Broadly similar - U.S. and Canada both careful shippers that carefully manage contracts	U.S. has better quality control of shipments

Note: Green shading indicates a U.S. advantage, red shading a U.S. disadvantage and blue shading a similarity.

Table 6: Advantages and Challenges of U.S. Thermal Coal versus Competitive Supply by Country

THERMAL COAL	vs. Australia	vs. Indonesia	vs. Russia	Colombia	South Africa
Mine cost	U.S. mine costs are higher	PRB mine costs are lower	U.S. mine costs are higher	U.S. mine costs are higher	U.S. mine costs are higher
Quality	U.S. sulfur levels are higher in the ILB and NAPP	Broadly similar characteristics (PRB) U.S. has occasionally high sodium content (PRB)	Russia has very low sulfur coal	U.S. has higher energy content Colombia has lower sulfur content, on average	U.S. has higher energy content
Infrastructure and logistics	U.S. rail costs are higher Government relations with rail companies are better in the U.S.	Inland rail costs are higher in the U.S. Port costs are higher in the U.S.	U.S. rail costs are lower Russia has winter rail disruptions Port costs are higher in Russia	U.S. rail costs are higher	S Africa has rail capacity constraints
Ocean freight (OF)	U.S. has higher OF costs to Asian markets U.S. has lower OF costs to Atlantic markets	U.S. has higher OF costs to Asian markets	U.S. OF is higher to Asia U.S. OF is lower in the Atlantic	U.S. usually has higher OF costs	U.S. has higher OF costs
	U.S. can't always load large vessels, although metallurgical coal consumers and producers usually favor Panamax vessels; dredging ports could be an equalizer, but at a cost				
Security and regularity of supply	U.S. seldom has labor strikes U.S. hurricanes seldom interrupt shipments U.S. has greater fiscal and regulatory stability	Indonesia has fiscal instability Indonesia has domestic market obligation Indonesia has checkered delivery history	Russian winter can interrupt coal delivery Russia in transition to market economy U.S. has greater fiscal and regulatory stability	The U.S. has greater fiscal and regulatory stability	The U.S. has greater fiscal and regulatory stability; there is a threat of domestic market obligation in South Africa
Shipment uniformity	Broadly similar characteristics	U.S. has better quality control of shipments	U.S. has better quality control of shipments	Broadly similar - U.S. and Colombia both careful shippers that carefully manage contracts	Broadly similar - U.S. and South Africa both careful shippers that carefully manage contracts

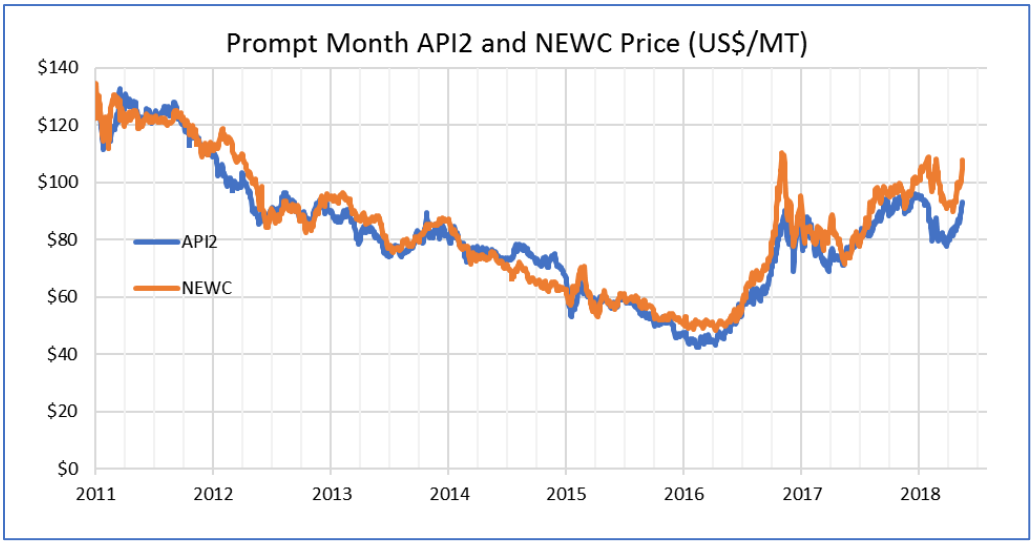
Note: Green shading indicates a U.S. advantage, red shading a U.S. disadvantage and blue shading a similarity.

Trends in Export Coal Pricing

Seaborne coal markets have experienced numerous cycles over the past 10 years as is typical for most commodities. The primary reason for the volatility has been the emergence of Asia as an economic power, especially China and India. Market cycles have taken a toll on prices and made long-term coal production planning difficult. Additionally, with global climate initiatives, access to capital for needed investments in coal infrastructure has also become more restricted.

Just before the Global Financial Crisis in 2008, thermal seaborne coal prices reached $180 dollars/tonne ($163/ton) FOB vessel but in 2009, prices collapsed to close to $60/tonne ($54/ton). Prices recovered through 2011 but collapsed again to even lower levels through the first half of 2016. At that time, the combined effects of China reducing production through some overt policy measures and a multi-year capital diet for coal producers lead to an increase in seaborne coal demand. Adding to the events were weather-related disruptions in Australia and regulatory changes in India limiting petcoke[10] supply. Prices have recently rebounded to approximately $100/tonne.

Figure 13: Prompt Month API2 Thermal Coal Price History (2010-2018)

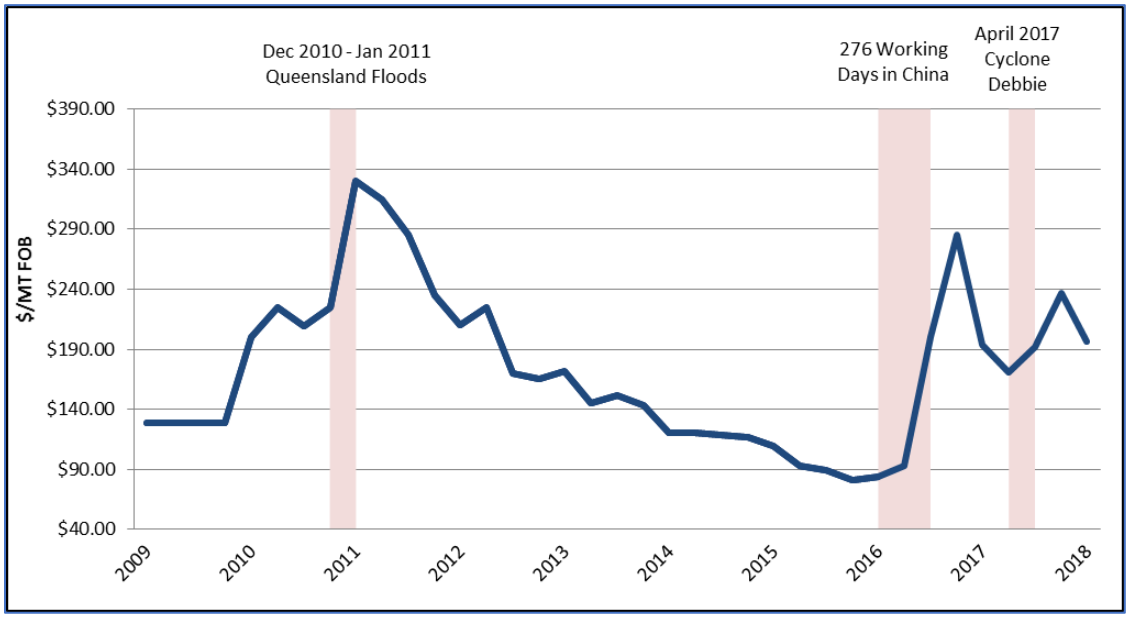


Source: Doyle Trading Consultants

Metallurgical coal has experienced similar market cycles for many of the same reasons, but the magnitude of the price change has been much more pronounced. Again, policy changes in China and India as well as less supply growth flexibility on the part of producers have resulted in metallurgical coal prices that are close to $200/ tonne ($179/ ton) on an FOB vessel Queensland, Australia basis.

[10] Petroleum coke, or coke or petcoke, is a material that derives from oil refining and is one type of the group of fuels referred to as cokes.

Figure 14: Metallurgical Coal Price History



Source: Doyle Trading Consultants

In addition to market factors, global seaborne trade is subject to unexpected disruptions caused by weather and changes in policy or economics. Australia provides a ready example of the potential impacts of weather. Over the past 10 years, three cyclone events have disrupted supply, especially for metallurgical coal. The most recent occurred at the end of March 2017 when Cyclone Debbie struck the Queensland coast. This event caused damage to numerous rail lines serving the ports and cut into Australia's exports by approximately 15 million tons compared to calendar year 2016. This event has raised once again the need for supply diversity, particularly for steel producers in Japan and South Korea.

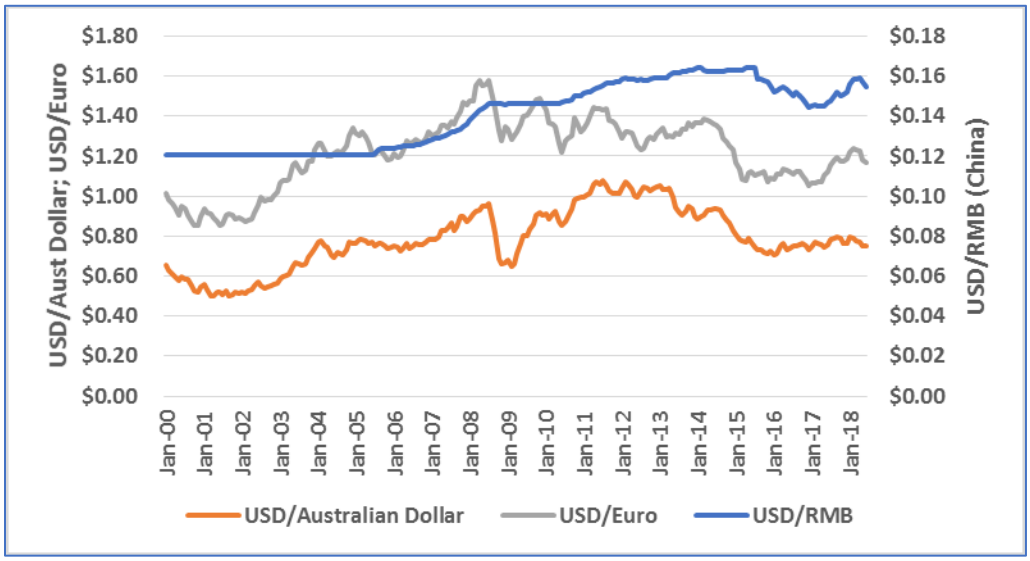
Other examples include the harsh winter in the U.S. at the beginning of 2018 which caused production, transportation and ship-loading delays. China has had weather-related disruptions as cold weather has challenged natural gas availability for residential and commercial heat which increased demand for coal-based power generation. Temperature extremes, which can rapidly create a shortage or surplus in demand, also supports the need for a robust seaborne market.

Exchange Rates & Price Indexes

Currency exchange is a significant contributing factor for global coal trade. Given that global coal trade is U.S. dollar-denominated, valuation differences can have a meaningful impact on both coal producers and coal consumers. The currency relationship of greatest importance is that between the U.S. dollar and the Australian dollar because of Australia's dominance in both the export metallurgical and steam coal markets. As a result, when the U.S. dollar is weak relative to the Australian dollar, global coal prices are higher and U.S. coal is more competitive. Conversely, when the U.S. dollar is strong relative to the Australian dollar, global prices are lower and U.S. coal becomes less competitive. Additionally, when the U.S. dollar is strong and the Euro and/or Chinese yuan (RMB) are weak, importing U.S. coal is more expensive versus domestic coal and power supply.

Also important to note is that exported coal is sold primarily based on U.S.-denominated indexes and market participants, including producers and traders. Coal is sold both at the point of origin (commonly known as FOBT, or FOB Terminal) where the customer arranges and pays for transportation to the destination or on a delivered basis (commonly known as CIF, or Costs, Insurance and Freight) where the seller arranges and pays for the transportation of coal to the destination.

Figure 15: Relationship of U.S. Dollar to Australian Dollar, Euro and Chinese RMB



Source: EVA Database[xlvii]

Effects of Policy on Global Coal Trade

Other factors affecting coal trade patterns include policy directives, trade regulations and trade agreements among nations. Policies include limitations or tariffs on certain types of coal, regional rules that require a portion of supply goes to meet domestic needs, rules that limit the transport of coal at certain hours of the day and rules that prevent development of new infrastructure that can be used to move coal. Trade agreements, incentives and even political posturing all influence coal trade.

Policy can be explicit, such as in China where directives from the Central Government have been used to support its domestic coal industry. Directives can include specific limitations regarding the number of days a miner can work, time of day and methods for coal transportation, safety directives, environmental regulations and limits on which ports can and cannot be used for transport of coal.

Similarly, in India, policies covering the mostly state-owned Coal India and its labor unions and environmental performance have at times influenced coal imports. Recent regulations to limit the use of high-sulfur petcoke have resulted in increased demand for imported coal, particularly demand for higher calorific value coals that are closer to the heating properties of petcoke. As high calorific value U.S. coals have increasingly gained acceptance in markets traditionally served by petcoke (such as the cement kiln market in India as well as cement kiln markets in other growing economies such as Africa), petcoke prices have also become more relevant as a key driver of pricing and demand for U.S. thermal coal exports.

Policies that regulate the price of domestic electric power have also influenced trade in India which has been advancing new policies to promote domestic supply with the intent to eliminate imports completely by 2020. However, problems with domestic production and transportation, and surging power demand have pushed demand for imports higher in 2018. This has occurred concurrently with China's increased purchasing and thus increased prices for thermal coal during the first half of 2018.

National policies in Japan, South Korea and Taiwan have driven decisions to include coal as part of a diversified energy portfolio. These countries are energy vulnerable, importing 96% of their energy needs. They are seeking diverse, stable suppliers for energy security purposes and plan to meet ~25%-30% of their electricity generation with coal.

Japan is investing in high efficiency coal technologies. Two new integrated gasification combined cycle (IGCC) plants are underway which can be well served by PRB coals that have chemical properties suited to IGCC technology. The trend for increasing reliance on thermal coal plants is supported by the Japan's Strategic Energy Plan[xlviii], which recognizes coal as "an important baseload power supply because it involves the lowest geopolitical risk and has the lowest price per unit of heat energy among fossil fuels."

Trade policies can also be at issue. On April 26, 2017 British Columbia Premier Christy Clark sent a letter to the Prime Minister of Canada, Justin Trudeau, requesting that the Canadian federal government's port regulator take steps to halt thermal coal exports through ports in British Columbia. The letter appeared to be initially motivated by an increase in U.S. tariffs on softwood lumber exports from British Columbia.

Finally, geopolitical influences also play a role. Trade embargos have shifted available supply and disrupted markets. China's embargo of coal from North Korea in 2017 is believed to have shifted imports from North Korea to other supply sources. Tariffs, if imposed, could have a similar effect.

Chapter 3. Barriers to U.S. Coal Exports

Key Findings – Chapter 3

- **The U.S. has abundant reserves of coal available to meet both domestic and international market demand. Some existing and prospective Federal mineral ownership and mining regulations may restrict development of U.S. coal reserves for export. Select government initiatives at the Federal and state levels could provide support for continued production in traditional U.S. coal supply regions and aid in expanding production in non-traditional U.S. regions for coals in high demand overseas.**
- **While U.S. East Coast terminal capacity is generally adequate, coal export economics would improve with channel deepening to accommodate larger bulk carrier vessels. U.S. Gulf Coast export terminals would benefit from improved dredging and maintenance of inland waterways' locks and dams. The limited capacity of export terminals on the U.S. West Coast has significantly hindered the ability to export western U.S. coals for which a market exists.**
- **U.S. and international proscriptions denying or limiting banking and financial community support for development of coal-fired facilities overseas restricts opportunities for U.S. coal exports.**
- **Increasing coal exports has the potential to improve the U.S. balance of trade and support U.S. coal producers facing uncertainty in domestic markets. Trade policies and agreements have the potential to either expand or restrict markets for U.S. coal exports.**

U.S. coal exports have been very volatile over the years, ranging from a peak in 2012 of 125 million tons to a low of 39 million tons in 2002.[xlix] This volatility is attributable to many factors, including fluctuations in market demand, competition from global suppliers and various importing nation constraints, such as coal-import limiting policies and infrastructure.[11] While many of these variables are outside the control of the U.S. government and industry, there are numerous other factors which can be addressed by policymakers and commercial interests to enhance U.S. coal exports.

Supply Considerations

There are ample reserves of U.S. coal to allow for higher exports. Regional supply/demand considerations may limit what is immediately available to export versus what can be developed for long-term export markets. The barriers to the development of U.S. coal reserves for the export market are generally regional in nature. The most significant are related to federal mineral ownership, mining regulations, support for traditional coal supply regions and the development of non-traditional coal supplies.

[11] See Appendix I for a graphic representation of U.S. thermal and met coal exports by destination.

Federal Mineral Ownership

The Federal government ownership of coal resources is concentrated in the western U.S.[I] In 1920, the Mineral Leasing Act (the 1920 MLA) was enacted to establish governance for coal and other minerals. Thereafter, development of Federal coal required a Federal coal lease. The Bureau of Land Management (BLM) is responsible for ensuring the Federal government receives fair market value when the leases are entered into and for administering the leases. BLM's authority is through the 1920 MLA as amended, the Mineral Leasing Act of 1947 (the 1947 MLA), as amended, and the Federal Land Policy Management Act of 1976 (FLPMA).

The Federal government receives three payment streams upon the leasing of Federal coal – bonus payments, rents and royalties. The first two are paid independent of production. Bonus payments are the amount paid to BLM to win a leasing contract.[12] Rents are paid annually on a per acre basis. Royalties are production taxes that are paid on a per ton sold basis. The current royalty rates are 12.5% for surface coal and 8% for underground coal.[13] As the royalty rates are standard, it is the bid on bonus payments that determines whether and to whom a property will be leased. BLM will only enter into leases when it deems the bonus payment level is appropriate.[14]

During the prior Administration, a pause on Federal leasing was imposed and alternative ways to apply royalty rates were under consideration, ranging from the rate applied to a market price (rather than the actual price) to a rate based upon the delivered price to simply a higher royalty rate (i.e., greater than 12.5% for surface mined coal and 8% for underground mined coal). While the pause was withdrawn with the change in Administration and the discussions on revising the royalty rates were abandoned, not surprisingly the possibility of such changes could affect the ability and willingness of parties to fund investments in mine development and expansions related to future exports.

Equally problematic are the challenges to the current practice of leasing Federal coal as related to the use of logical mining units (LMU)[15], the lack of transparency in how the BLM determines whether a bonus payment is acceptable and the timing of the bonus payments.

In addition, the Federal government may need to revise its expectations for bonus bids – the upfront payments companies make to acquire leases that allow for the mining of the coal. These upfront payments – generally made years in advance of the commencement of mining – represent a significant impediment to continued development of Federal coal reserves.

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[12] The bonus payment is paid effectively over a four-year period with the first payment upon selection and the remaining four payments on the annual anniversaries.

[13] Parties can petition for lower rates for economic reasons. This does not occur often.

[14] Producers do not believe there is sufficient transparency in the determination of whether the bonus payment is adequate.

[15] A logical mining unit is an area of land in which coal resources can be developed in an efficient, economical and orderly manner as a **unit** with due regard to conservation of coal reserves and other resources.

Each new lease (or "lease-by-application" – LBA) is offered through a public auction in which the high bidder acquires the right to mine the coal – with the caveat being that the bid must meet the government's fair market value (FMV) test for the lease. The BLM has the ability to take recent market developments into consideration when it conducts its FMV calculation. However, it is likely that future bonus bids will need to be far lower than historical levels given the vast changes to domestic coal markets. It would behoove the BLM to consider these significant changes – as well as the value of preserving ongoing Federal royalty payments, rents, tax receipts and jobs – when analyzing what constitutes reasonable FMV today.

Moreover, other changes to the LBA system – such as revising the payment terms from five equal, upfront payments to something more manageable for the coal industry – should be considered. With permitting times lengthening, many mining companies may not realize revenue from the lease prior to all five payments being due.

Mining Regulations

Mining regulations, like Federal leasing, can affect the competitiveness of U.S. coal exports. The industry believed that the Stream Protection Rule would impair the ability to surface mine in Appalachia and to use longwall mining technology throughout the U.S.; this rule was repealed early in the Trump Administration under the provisions of the Congressional Review Act. The specter of future such regulations imparts uncertainty for coal producers and the investment community, potentially impairing the ability to mine economically.

Support for Traditional Coal Supply Regions

While the Appalachian metallurgical coal fields have been heavily mined for decades, existing production could be expanded with selected government initiatives. For example, in Virginia, Governor Northam recently signed into law a tax credit for metallurgical coal production from thin-seamed underground mines and surface mines. For the underground mines, the level of the tax varies with seam thickness.

Given the very sizable economic benefits provided by the coal industry in mining communities and the challenges associated with justifying new investment in a marketplace that is changing rapidly, states may benefit from offering a range of support mechanisms for new mining investment. Absent a renewed tranche of investment in new mining capacity, reserve degradation and depletion are likely to lead to a gradual erosion in U.S. mining activity over time.

New investment, on the other hand, should enable the U.S. coal industry to continue to compete on the global stage. This is particularly important given the fact that U.S. coal producers are competing with international players that may be more proximate to the fastest growing demand centers in Asia, or may be operating in a less rigorous regulatory environment. In addition, huge recent investments in mine, rail and port capacity in some of these countries may be providing a significant operating cost advantage that U.S. producers must overcome.

Incentives could include tax credits or other mechanisms that reduce severance or other forms of public payments related to new investments. In such a scenario, the state would still achieve incremental revenues by incenting investment that would not otherwise occur. Moreover, the state would benefit heavily from the new, high-paying jobs – both direct and indirect – that would be created, as well as the many other economic benefits that would result.

Development of Non-Traditional Coal Supply Regions

A significant share of the global demand for coal is metallurgical coal. With a limited global supply base, the ability for the U.S. to expand its production of metallurgical coals beyond the traditional supply regions would enhance the ability for U.S. coals to be exported. By way of example, there are large metallurgical coal reserves in Oklahoma, Arkansas and Alaska that have not been developed.[16] All three states could develop high quality metallurgical coal projects that would produce coal attractive to the international market if appropriate infrastructure is concurrently developed.

Transportation & Shipping Considerations

The nation's coal transportation and shipping network would benefit from various infrastructure improvements. It should be noted that the infrastructure improvements highlighted in this report would also benefit industries in addition to coal, including agriculture, manufacturing and other commercial industries dependent on a sound transport network.

U.S. East Coast

Terminal capacity on the U.S. East Coast is generally adequate. Efforts are underway to deepen the Newport News channel to 55 feet and make other improvements[li] which will improve navigational efficiencies, allow safe passage of vessels in and out of the harbor, and improve accommodation of the existing fleet. Similar opportunities exist at other eastern U.S. ports; dredging and maintaining key shipping channels to accommodate large, more cost-effective vessels and maximize navigational efficiencies would help to enhance the competitiveness of U.S. coal exports.

Train availability is periodically an issue, particularly if shipments are not somewhat ratable.[17] Further, rail and terminal preference are generally given to higher value shipments, i.e., metallurgical coals, which means steam coal exports may get short shrift.

[16] Farrell-Cooper's Bull Hill mine in Oklahoma was idled in 2017.
[17] Ratable refers to a steady and/or predictable schedule of movements upon which the railroad can plan.

U.S. Gulf Coast

Coal exported through the U.S. Gulf Coast is either railed or barged. The railed coal goes to one of the rail terminals where it is transloaded into ocean-going vessels. The barged coal goes to one of the barge-served terminals where it is unloaded and then reloaded into ocean-going vessels or loaded directly into an ocean-going vessel through mid-stream loading.

The rail terminals in the Gulf are adequate for current volumes. In addition, several can be expanded if market conditions warrant. Train availability is periodically an issue, particularly if shipments are not somewhat ratable.

The barge terminals combined with the mid-stream loading option is adequate for current export levels. Mid-stream loading can be expanded to accommodate larger volumes if market conditions warrant. Barging, or more specifically the maintenance of the inland water system is more of an issue for coal exports through the Gulf than is terminal capacity.

The inland waterways transportation systems requires consistent maintenance. Maintenance refers to both maintenance/modernization of the over 170 locks and dams and maintenance of the channels. In 2014, the National Waterways Foundation released a study performed by researchers at the Universities of Kentucky and Tennessee[lii] that analyzed the economic impacts of preserving the current inland waterways transportation system and expediting the construction of lock and dam modernization projects so that they would be completed in 10 years rather than the current estimate of more than 20 years. The study concluded that there were significant impacts associated with lock outages which could be minimized by accelerating the modernization efforts.

The remaining major project affecting coal is the Olmstead locks, the last locks on the Ohio River before it flows into the Mississippi River. Locks 52 and 53, which have consistently been bottlenecks when water levels are low, are being replaced. Every ton of export coal originating on the Ohio River which is barged to the U.S. Gulf will pass through this lock. Recent data on the Olmsted Locks and Dam indicate this project will be completed in 2019.[liii]

While there are other lock and dam modernization projects that are important to the inland waterways, for coal destined to the export market through the U.S, the projects of most importance are those on the Ohio River, including modernization of the Greenup Lock and the J.T. Myers Lock.

According to the industry, what has become an increasingly large issue for barging is insufficient maintenance of the river channels. The lack of regular dredging has significantly restricted movements on the inland waterways, a situation that is exacerbated during periods of low water.

Dredging is also an issue with respect to the loading of vessels in the U.S. Gulf. The Mississippi River is the maritime highway from the central portion of the U.S. Exports that travel to the U.S. Gulf via the Mississippi River include coal, petroleum coke and agricultural products. The ability to accommodate larger ocean vessels improves the competitiveness of all of the products. Recent legislative attempts to direct the Secretary of the Army to dredge and maintain a 50 foot deep navigational channel from Baton Rouge to the Southwest Pass sea buoy[liv] have failed.

U.S. West Coast

The limited capacity of export terminals on the U.S. West Coast has greatly limited the ability to export western coals. The non-U.S. West Coast options for western bituminous coals include the U.S. Gulf (including direct rail to Houston), the Mexican port of Guaymas, and possibly the Great Lakes (with transloading in Quebec).[18] The alternatives have transportation disadvantages compared to U.S. West Coast terminals in California which can only be overcome with strong market conditions.

Powder River Basin coal exports are limited to the export terminals in British Columbia, Canada (e.g., Westshore and Ridley), the Great Lakes (with transloading in Quebec), and the U.S Gulf. While the market price will occasionally allow for these alternative transportation options, none are efficient compared to having a coal terminal sited in the Pacific Northwest.

The Los Angeles area was once host to a 10 million ton transloading facility (referred to as the LAX Terminal or LAXT). LAXT was decommissioned in 2001 when the expected throughput volume did not materialize. While some nearby terminals have continued to handle coal, the possibility of a larger terminal took hold when a local developer entered into an agreement in 2013 to build a new shipping terminal on the old Oakland Army Base called the Oakland Bulk and Oversized Terminal (OBOT). The agreement contained no prohibition regarding coal throughput and the developer subsequently proceeded with plans to transload up to 10 million tons of coal per year. The plan was put on hold when the Oakland City Council passed a resolution that determined coal shipments were "a substantial danger to the people of Oakland." The developer appealed in 2016; a May 2018 ruling in favor of the developer stated that the ban did not "contain enough evidence to support the conclusion that the proposed coal operations would pose a substantial danger to people in Oakland." The City Council has appealed the decision.

The efforts to build the Millennium Bulk Terminals-Longview LLC (MBT-Longview Terminal) in the Pacific Northwest have also been challenging throughout its six-year and counting permitting process.[19] The MBT-Longview Terminal is seeking to build a coal transloading facility with an initial throughput capacity of 25 million tonnes with expansion potential up to 44 million tonnes.[lv] As detailed in the following section of this report, despite major accomplishments the timing to obtain permits remains uncertain. A state environmental impact statement (EIS) concluded that the terminal met all environmental standards, yet the State of Washington denied a water certification. The Federal Draft EIS was published in September 2016 with similar conclusions but has not been finalized by the U.S. Army Corps of Engineers.

The challenges encountered at Oakland and Millennium demonstrate the mountains that must be scaled to move forward with new coal terminals that would enable increased exports of western U.S. coals.

[18] Montana bituminous coal is primarily exported through British Columbia.

[19] The Millennium Terminal is the most likely terminal to move forward at this time. Permits were submitted in February 2012.

Funding

Funding for a number of the identified projects could be available from the Harbor Maintenance Tax (HMT) which is a fee collected from users of the maritime transportation system to fund U.S Army Corps of Engineers' operation and maintenance activities.[20] According to the American Great Lakes Ports Association, about $1.6 billion is collected annually but disbursement of the funds has been limited by Congress.[lvi] As of January 1, 2018, there was an excess balance of about $9 billion in the HMT Fund.

The Water Resources Reform and Development Act of 2014 called for the full use of HMT revenue and provided spending targets for the period between FY 2015 and FY 2025.[lvii,lviii] The spending targets started at 67% of revenues and rose to 100% of revenues. For the first three years, i.e., FY 2015 through FY 2017, Congress complied with the targets. The spending targets are a minimum; nothing prevents higher spending targets.

In January 2018, the nation's ports reached an agreement on the sharing of the annual distribution. The agreement reportedly requires that 10% of the funds go to each of the six port regions (North Atlantic, South Atlantic, Great Lakes, Gulf, Pacific Northwest and Pacific Southwest) and 10% go to emerging harbors. This distribution can be changed.

Institutional & Regulatory Factors

Barriers to Coal Export Terminal Development

As noted throughout this report, opportunities for U.S. West Coast coal exports to supply high growth markets in Asia have been restricted due to a lack of port capacity. This led to significant interest in the development of new export terminals, and a number of projects have advanced to the proposal stage (see Appendix D for proposed U.S. West Coast terminals).

Each of these proposals underwent an exhaustive public review process marked by intense activist opposition, unprecedented review requirements from regulatory and permitting authorities, and lengthy judicial challenges that in some cases remain ongoing. These complex and costly processes inject a high degree of risk and uncertainty that limits capital investment in such projects and serves as a general barrier to development. They therefore warrant further review to identify policy and process reforms that can reduce project risks and uncertainties without compromising longstanding environmental protections.

The case of the Millennium Bulk Terminal proposal in Longview, Washington is instructive in this regard. The nearly $700 million project, first proposed in 2012, would restore an underutilized industrial facility to export up to 44 million tonnes of Powder River Basin coal to markets in Asia. Review of the Millennium project centered on development of its environmental impact statement (EIS). Led by the U.S. Army Corps of Engineers, a three-year Federal review of the proposal culminated in an exhaustive draft EIS exceeding 3,000 pages in length and attracting more than 3,000 public comments.[lix]

[20] The U.S. Harbor Maintenance Tax (HMT) was enacted by Congress in 1986. The HMT is an ad valorem tax paid by the owner of the cargo. While the original tax applied to all cargo, in 1998 the Supreme Court struck down the taxation of export cargo as unconstitutional.

The Federal EIS studied potential impacts and mitigation measures related to a broad range of issues – land use, aesthetics, cultural and tribal issues, geologic, hydrologic, and fish and wildlife impacts, railroad and traffic issues, air quality, greenhouse gas emissions, and more. Project developers spent more than $15 million on environmental studies supporting the EIS, and committed to a number of measures to eliminate or mitigate potential adverse impacts. Ultimately, while the draft Federal EIS was generally favorable toward the project, because Federal and state authorities could not agree on a joint scope for the EIS, the Washington Department of Ecology chose to undertake its own 13,500-page EIS for the proposed project.[lx,21]

The final state EIS, released in April 2017, showed that the project could meet all environmental standards. However, it concluded that a coal export terminal at Millennium would result in "unavoidable and significant adverse impacts" that could not be mitigated in nine different areas: social and community resources; cultural resources; tribal resources; rail transportation; rail safety; vehicle transportation; vessel transportation; noise and vibration; and air quality.[lxi] In September 2017, the Washington State Department of Ecology then cited the EIS in denying a key water quality permit under section 401 of the Clean Water Act, in spite of the fact that the EIS concluded there would be no measurable impact to water quality.[lxii] These actions and others triggered a federal lawsuit against the state by project advocates that remains in litigation.

Other proposed export terminals have faced a similar series of regulatory and permitting barriers, and at least two – the Gateway Pacific Terminal and the Morrow Pacific Project – have been cancelled as a result. While these examples illustrate that barriers to such projects will always be significant, there are a number of ways that the federal government can help facilitate a smoother review process that ultimately reduces project risks and uncertainties.

Review and Permitting Process. In particular, the environmental review and permitting process is unnecessarily slow and cumbersome. This barrier is not unique to coal export facilities but rather tends to be common with major infrastructure reviews of all kinds. The Trump Administration has taken positive steps to address these shortcomings, particularly as they relate to implementation of the National Environmental Policy Act (NEPA). The Administration has noted that, while NEPA remains a critical tool for ensuring sound environmental decision-making, in the decades since its creation in 1970, project opponents have increasingly sought to use review processes under the law to obstruct and block the development of energy and infrastructure plans.

[21] In October 2012, the U.S. Army Corps of Engineers, Washington Department of Ecology, and Cowlitz County agreed to collaborate on a joint National Environmental Policy Act (NEPA)/State Environmental Policy Act (SEPA) document for Millennium. Approximately 3 years later, due to a dispute over consideration of greenhouse gas emissions, state and local authorities chose to undertake their own environmental review.

Executive Order 13766 directed the White House Council on Environmental Quality (CEQ) to begin efforts to address these shortcomings by identifying high priority NEPA projects for expedited consideration. Follow-up directives such as Executive Order 13807 and a related 12-agency memorandum of understanding aim to reduce the length of federal environmental reviews to not more than two years through improved coordination and accountability.[lxiii,lxiv]

Additionally, implementation and legislative codification of a number of policy reforms detailed in the White House's February 2018 *Legislative Outline for Rebuilding Infrastructure in America* would help to address many of the aforementioned regulatory and permitting barriers that have hindered development of coal export facilities.[22] Specifically, recommendations described in Parts 3 and 4 of the outline – *Infrastructure Permitting Improvement* – would greatly reduce Federal barriers to coal exports. These recommendations include:

- Establish firm deadlines to complete environmental reviews and permits (3.I.A.1.)
- Require a single environmental review document and a single record of decision coordinated by a lead agency (3.I.B.1.)
- Clarify that alternatives outside the scope of an agency's authority or applicant's capability are not feasible alternatives (3.I.B.2.)
- Issue new CEQ NEPA regulations to increase efficiency, predictability, and transparency in environmental reviews (3.I.B.3.)[23]
- Focus the scope of federal agency NEPA analysis on areas of special expertise or jurisdiction (3.I.B.4.)
- Curtail costs by allowing for advance acquisition and preservation of rail rights-of-way before NEPA is complete (3.I.B.8.)
- Create incentives for enhanced mitigation (3.I.B.13.)
- Eliminate redundancy, duplication, and inconsistency in the application of clean water provisions (3.I.C.1.)
- Reduce delays for Clean Water Act Section 401 certification decisions and limit decisions to be based on water quality (3.I.C.2.)
- Require timelines to be met under the Magnuson-Stevens Act or allow agency to proceed with action (3.I.D.1.)
- Limit injunctive relief to exceptional circumstances (4.A.)
- Revise statute of limitations for federal infrastructure permits or decisions to 150 days (4.B.)

[22] Pages 36-51 of the outline are available at https://www.whitehouse.gov/wp-content/uploads/2018/02/INFRASTRUCTURE-211.pdf

[23] On June 20, 2018, CEQ initiated a preliminary rulemaking seeking comment on potential updates to NEPA regulations. It is available at https://www.federalregister.gov/documents/2018/06/20/2018-13246/implementation-of-procedural-provisions-of-national-environmental-policy-act

Greenhouse Gas Emissions Considerations. Another area of significant attention is the consideration of greenhouse gas (GHG) emissions in the review and permitting of coal export facilities. Historically, the scope of NEPA reviews has been limited to potential impacts that are "reasonably foreseeable" and the "proximate cause" of the proposed facility under review.[lxv] Because GHGs associated with coal exported for overseas consumption are far removed from the project under consideration, they have typically been considered to be beyond the scope of the permitting process.

In recent years, however, a number of efforts to reverse this practice were initiated, beginning with guidance proposed by the CEQ in 2014 directing agencies to consider mitigation related to "life-cycle" GHG emissions upstream and downstream from the specific project under review.[lxvi] This guidance was accompanied by a number a lawsuits challenging federal NEPA reviews that did not address such emissions, as well as a similarly expanded approach at the state level.

Prior to finalization of CEQ's guidance in August 2016, treatment of indirect GHG emissions was disparate across individual Federal agencies. In the case of the proposed Millennium coal export terminal, the U.S. Army Corps of Engineers determined that such emissions were beyond the scope of its NEPA review. However, the Washington State Department of Ecology disagreed, instead proposing that project developers develop a GHG mitigation plan that would offset up to two million tons of GHGs annually.[24]

In March 2017, President Trump issued an Executive Order rescinding the CEQ guidance.[lxvii] However, confusion remains regarding the appropriate application of GHG considerations in NEPA reviews, and a growing number of lawsuits involving energy infrastructure projects have challenged the Administration's position. Efforts to reduce project risks and uncertainties associated with continued litigation and dissimilar approaches across the Federal government would benefit from CEQ's engagement to develop updated regulations or guidance clarifying how agencies should address GHGs in NEPA scoping processes.

Aside from the question of whether GHG emissions upstream and downstream from proposed projects warrants NEPA consideration, it is important to note that the impact of expanded coal exports on GHG emissions remains a matter of open debate. For example, the technical report accompanying Washington's final EIS for the proposed Millennium terminal found that when coal extraction activities are included, total net GHG emissions would decrease by over three million tons annually.[lxviii] Moreover, preliminary conclusions of a 2017 analysis by Stanford University found that relaxing constraints of U.S. West Coast coal exports

[24] "To address the potential impacts of greenhouse gas emissions attributable to the Proposed Action, the Applicant will prepare a greenhouse gas mitigation plan that mitigates for 100% of the greenhouse gas emissions identified in the 2015 U.S. and International Energy Policy scenario. For operations at maximum capacity this is 1.99 million metric tons CO2e per year from 2028 through 2038...carbon credits could be purchased through existing carbon markets, or through on-site reductions achieved through efficiency measures or changes in technology." Section 5.8 of SEPA EIS, available at http://www.millenniumbulkeiswa.gov/assets/section_5-8_greenhouse_gas_climate_change2.pdf

would reduce global GHG emissions due to substitution effects in U.S. and foreign markets.[lxix] The study also projected a reduction in local air emissions in China and India as a result of U.S. coal displacing higher-sulfur and higher-ash foreign coals.

Export Facilities on Federal Lands. Because objections to export facilities are often driven by fundamental and philosophical opposition to the production and use of coal, and given prior examples of divergent approaches between the Federal government and state and local entities, policy reforms recommended within this report may not be sufficient to reduce uncertainties in a manner that enables projects to move forward. Further study is warranted into the long-term potential to reduce export constraints through the development of export terminals on Federal properties that would benefit from a streamlined and simplified review and permitting process.

International Coal Plant Financing: Multilateral Development Banks

With more than 900 gigawatts (GW) of coal capacity placed into service worldwide since 2000, and over 600 GW planned or under construction, the potential for U.S. thermal coal exports to supply steadily growing international demand is significant.[lxx] However, the inability for the U.S. and Multilateral Development Banks (MDB) to support these projects may prevent this potential from being realized.

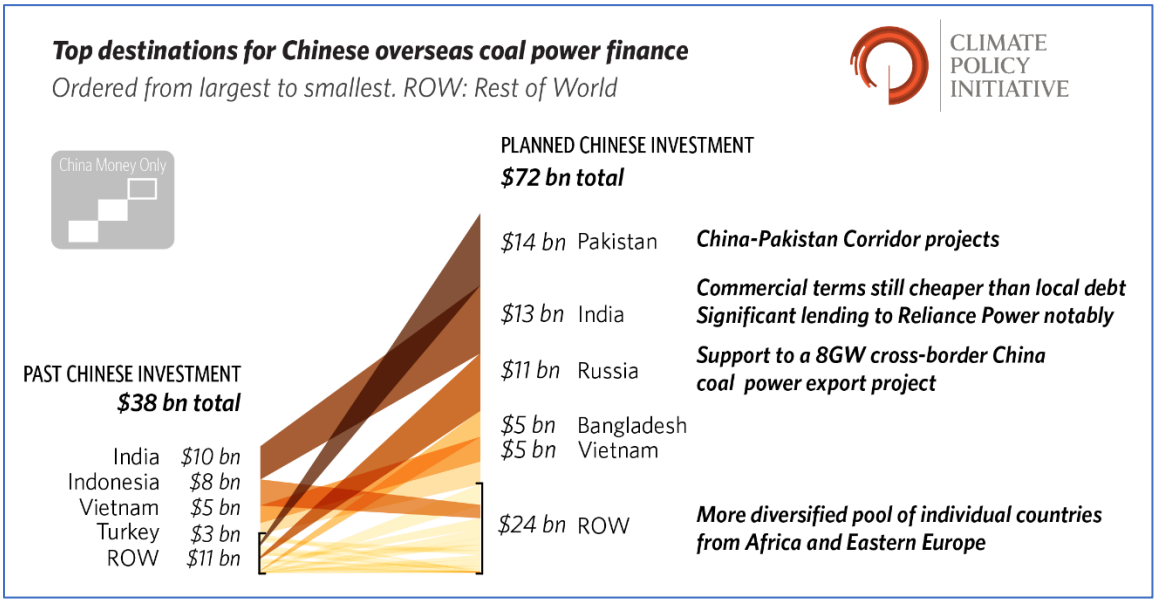
In June 2013, President Obama announced that the U.S. would no longer provide public financial support for construction of new coal-fired power plants overseas.[lxxi] The objective of the President's directive – which was announced as part of his Climate Action Plan – was to limit GHG from coal-fired power plants.

This directive was implemented through Treasury Department guidance[lxxii] which effectively directed U.S. representatives of Multilateral Development Banks (MDBs) to vote against any such projects. Similar restrictions were adopted by the U.S. Export-Import Bank (EXIM) [lxxiii] and the World Bank followed suit shortly thereafter, as did other entities such as the European Bank for Reconstruction and Development and the European Investment Bank.[lxxiv] In response to government and activist pressure, a number of commercial banks also adopted a variety of restrictions.[lxxv] Similarly, while the Asian Development Bank did not institute an explicit prohibition, it discontinued pursuit of most coal projects.

While it is difficult to quantify the impacts of these policies, they are likely significant. Because many developing countries lack robust private capital markets, the importance of government financing support through MDBs and other entities is particularly important. Even minimal participation from such entities can help advance projects otherwise too risky for commercial banks to finance on their own.

In response to the void created by U.S. and MDB funding prohibitions, China, Japan, Korea and other countries stepped in to provide financial support for – and outsized influence over – continued coal development. A 2017 IEA report found that China planned to provide up to $72 billion in investment for new coal-fired power plants in developing countries.[lxxvi] Similarly, Japan is investing $14 billion in new Indonesian coal-fired power plants.

Figure 16. Chinese Overseas Coal Power Financing Destinations



Source: Climate Policy Initiative, Herve-Mignucci & Wang, 2015
https://climatepolicyinitiative.org/publication/slowing-the-growth-of-coal-power-outside-china-the-role-of-chinese-finance/

This funding is typically leveraged to influence related aspects of energy development in recipient countries. For example, IEA reports that "a large proportion of equipment procurement must come from companies shortlisted as preferred suppliers from the lenders' country. By offering a one-stop-shop, China, Japan and Korean banks simplify the project development and can be vital to a country under pressure to develop new generating capacity."[lxxvii]

These circumstances not only place the U.S. at a disadvantage by limiting the potential for U.S. coals and plant technologies to meet supply international markets, in many cases they result in inferior environmental controls. For example, between 2008 and 2016, China, Japan, and Korea combined to supply over 55 gigawatts of less efficient subcritical boiler technology to developing countries.[lxxviii]

According to the World Coal Association (WCA), a typical one gigawatt subcritical power plant in Southeast Asia emits 1.2 million tonnes of additional carbon dioxide (CO_2) annually compared to a supercritical plant of equal size.[lxxix] By this metric, if the subcritical plants supplied by China, Japan and Korea had instead used high efficiency, low emissions (HELE) supercritical and ultra-supercritical boiler technology, annual CO_2 emissions from those plants would be nearly 66 million tonnes lower – an amount nearly equivalent to the total annual coal-related emissions in countries such as Thailand and Brazil. These statistics illustrate that, to the extent that U.S.-driven prohibitions on international coal plant financing have led to the deployment of inferior coal plant technologies in developing countries, CO_2 emissions have *increased* as a result – precisely the opposite effect intended by their supporters.

Reversing these policies and restoring U.S. and MDB support for construction of new coal power plants, therefore, not only holds promise to expand market opportunities for U.S. coal exporters, it presents an opportunity to ensure developing countries have an opportunity to deploy advanced CO_2-minimizing HELE technologies, such as the Advanced Ultra Super Critical power plants developed by the U.S. DOE/industry consortium, that they otherwise may not be able to afford. In July 2017, the Trump Administration set the foundation for these changes by rescinding the 2013 Treasury prohibition on financing construction of coal plants internationally through MDBs, committing instead to "help countries access and use fossil fuels more cleanly and efficiently."[lxxx]

Unfortunately, financing prohibitions at most MDBs remain in place, in part because the U.S. holds a minority position in those banks, and other leading countries maintaining significant ownership positions remain opposed to a change in policy. (See Appendix J Coal Financing Policies of Key International Lending Institutions) Nonetheless, U.S. influence remains significant. For example, its 16% share of the World Bank constitutes a supermajority in relation to other countries. Accordingly, the U.S. government could actively encourage MDBs, both directly and through participating member countries, to resume financing coal plants in developing countries. One potential opportunity exists at the Asian Development Bank (ADB), which will soon begin a review of its energy and climate strategy.

Involvement of and guidance from the Trump Administration and Treasury Department could significantly impact both the implementation of current policy as well as the development of new policy at the ADB. In addition to Executive Branch actions, Congress maintains an influential role in MDB policies by virtue of its funding for them through the appropriations process, and thus could be an instrumental component of any reform effort.

One notable exception to MDB opposition to coal financing is the African Development Bank, which continues to support all sources of energy as part of its effort to achieve universal access to electricity in Africa by 2025. In July 2017, the African Development Bank announced the Japan-Africa Energy Initiative, a partnership in which Japan will provide up to US$6 billion to support expanded energy access in Africa, including access to clean coal technologies.[lxxxi] In light of this supportive approach, the U.S. government could proactively engage with the African Development Bank and leaders of African countries seeking to expand electricity access in pursuit of similar partnerships. This effort should include reforms to the Power Africa Initiative to allow coal-related projects to compete for financing aimed at supporting economic growth and development throughout Africa.[lxxxii]

Another model for advancing financing mechanisms could be through bilateral relationships. In 2017, the U.S. and Japan launched the Japan-United States Strategic Energy Partnership (JUSEP) under the framework of the Japan-U.S. Economic Dialogue.[lxxxiii] The core principles of JUSEP are to ensure energy security and universal access to affordable and reliable energy in order to eradicate poverty, including through the deployment of HELE coal technologies. This program, focused on Southeast Asia, South Asia and Sub-Saharan Africa, holds significant promise. It should continue to be a priority and the U.S. should aim to incorporate JUSEP's core principles into similar bilateral efforts.

More recently, in November 2017, a group of 36 national and subnational governments joined to launch the "Powering Past Coal Alliance," which among other things, committed to restricting financing for coal-fired power plants.[lxxxiv] Many of these governments are shareholders in MDBs, and collectively exert significant influence over coal-related MDB policies. In response, the Trump Administration is preparing to lead the formation of an alliance to counter those policies and work to advance energy access and security through responsible use of advanced fossil fuel technologies. Continued development and operationalization of this concept may be a means through which to leverage policy changes at MDBs and related financing entities.

International Coal Plant Financing: Domestic Entities

A number of domestic entities also have a potential role in supporting continued development of coal-fired power plants overseas. These are discussed below.

Export Import Bank of the United States. The Export-Import Bank of the United States (EXIM Bank) is the official export credit agency of the U.S. government. Its mission is to support American jobs by providing working capital to facilitate the export of U.S. goods and services. Historically, energy resources, including coal exports and overseas coal-fired power plants were an important part of the bank's portfolio.[25] In 2013, however, the EXIM Bank adopted guidelines prohibiting support for projects associated with coal mining or electricity generation except in rare circumstances.[lxxxv] The Bank followed this policy by leading a coalition of international export credit agencies to sign an agreement under the OECD committing to the same prohibitions.[26]

While Congress has acted to block funding for the EXIM Bank's 2013 prohibition on support for coal projects, and the Trump Administration has indicated it intends to reverse the decision administratively, the Bank has remained largely dormant since 2015 due to the lack of a quorum needed to approve major projects and policy changes. Prioritizing the fulfillment of the EXIM Bank Board will allow the agency to realign with the Administration's official Treasury Department guidance, grant new coal exporters access to the EXIM Bank financing and allow existing exporters to increase their financing facilities, thus supporting the growth of U.S. coal exports.

[25] Most recently, in 2012, EXIM provided a $90 million loan guarantee to support East Coast coal exports.
[26] Participating countries included Australia, Canada, the EU, Korea, Japan, New Zealand, Norway, Switzerland, and the U.S. http://www.oecd.org/newsroom/statement-from-participants-to-the-arrangement-on-officially-supported-export-credits.htm

Overseas Private Investment Corporation. The Overseas Private Investment Corporation (OPIC) is charged with mobilizing private capital to help foster economic development in emerging economies, and in doing so, advance U.S. foreign policy objectives. While perhaps lesser known, OPIC's importance in international finance and economic development is significant. According to the agency, it has supported more than $200 billion of investment in over 4,000 projects, generated an estimated $75 billion in U.S. exports and supported more than 277,000 American jobs.

While OPIC's mission and focus makes it well-suited for supporting foreign policy objectives by enhancing opportunities for U.S. coal exports, in 2009, a legal settlement with non-governmental organizations committed OPIC to a cap on greenhouse gas emissions from its portfolio of investments that was then codified by Congress in appropriations legislation later that year.[lxxxvi] According to OPIC's most recent environmental and social policy guidance issued in January 2017, the agency has committed to reduce GHGs associated with its portfolio by 50% over a 15-year period (2008-2023).[lxxxvii] As a practical matter, these restrictions have effectively barred OPIC from supporting coal-related projects.

Of note, Congress is currently considering important reforms to OPIC and related international development assistance programs. The "Better Utilization of Investments Leading to Development Act of 2018, or "BUILD Act," would create a new International Development Finance Corporation to assist developing nations efforts to realize broad-based economic growth and poverty reduction.[lxxxviii] This legislation has bipartisan support in Congress and the White House has signaled its backing as well. Given the central importance of electricity access to achieving these goals, joint efforts by Congress and the Trump Administration would help ensure that projects authorized by the BUILD Act explicitly allow development and use of all energy resources, including coal.

U.S. Agency for International Development. The U.S. Agency for International Development (USAID) is an independent federal agency charged with furthering America's interests while improving lives in the developing world. Africa is a major focus area of USAID, and in 2013, President Obama launched the Power Africa initiative, a public-private effort led by USAID and aimed at increasing electricity access in sub-Saharan Africa.[lxxxix] Working with program partners such as EXIM Bank, OPIC and the Millennium Challenge Corporation, the goal of Power Africa is to establish 60 million new electricity connections powered by "30,000 megawatts of new and cleaner generation."[xc]

To date, Power Africa has helped 90 projects comprising nearly 7,500 megawatts move forward. While the initiative does not include an explicit prohibition on support for coal-related projects, an August 2016 report to Congress stated that the program "adheres to the policy articulated in President Obama's Climate Action Plan" pertaining to a ban on international support for coal-fired power plants, and the program's current Roadmap states its intent to "prioritize economically viable renewable energy transactions where possible, but also focus on non-renewable projects with lower carbon emissions, such as natural gas."[xci,xcii]

The Trump Administration has continued support for the program and its goals, but in March 2018 launched "Power Africa 2.0," which expands electricity access targets and commits to improving distribution and transmission infrastructure as well.[xciii] Publicly available information on the modified initiative does not appear to address the eligibility of or emphasis on coal-related projects.

U.S. Trade and Development Agency. The U.S. Trade and Development Agency (USTDA) is an independent Federal agency that helps companies create U.S. jobs through the export of U.S. goods and services for priority development projects in emerging economies. Specifically, USTDA aims to link U.S. businesses to export opportunities by funding project preparation and partnership building activities. The energy sector is a priority focus of USTDA. In May 2018, it announced a reverse trade mission with India, Indonesia and Vietnam focused on coal-fired emissions control technologies.[xciv] Foreign delegates participating in such meetings gain an opportunity to build relationships with U.S. industry representatives that can be developed into longer-term trade partnerships.

Similarly, USTDA is soliciting applications for proposals aimed at facilitating the development of cleaner coal infrastructure projects overseas. According to USTDA, this effort hopes to build upon prior agency successes in markets such as Namibia, where a USTDA-funded study led to environmental and performance upgrades of a coal-fired power plant that the country relies on for affordable and reliable electricity.[xcv] It would be beneficial for these USTDA activities to be continued and expanded.

Table 7. U.S.-based entities with a role in coal financing and export development.

Bank/Entity	Support Mechanisms	Coal Status/Policy
Export-Import Bank (EXIM Bank)	Project finance, loan guarantees, export credit insurance for U.S. exporters	2013 guidelines prohibit support for projects associated with coal mining or coal-powered electricity generation
Overseas Private Investment Corporation (OPIC)	Direct loans, loan guarantees, investment funds	Cap on project GHG emissions effectively serves as prohibition on coal-related projects
U.S. Agency for International Development (USAID)	Strategy development, partnership building, technical assistance	No explicit policy, but coal not included among 90 projects supported through USAID-led Power Africa initiative
U.S. Trade and Development Agency (USTDA)	Partnership building, reverse trade missions, studies	No restrictions on coal; funding coal-focused reverse trade missions and soliciting applications related to clean coal infrastructure projects

Energy Access, Poverty Elimination and Energy Security

Continued growth in global demand for coal-fired power originates with developing countries' prioritization of economic growth and alleviation of energy poverty. In fact, this is the *central purpose* of developed countries' historical support for construction of new coal plants, and it has proven undeniably successful. According to the IEA[xcvi], 1.2 billion people gained access to the electricity grid between 2000 and 2017. Coal-fired power comprised 45% of this electrification, providing affordable energy to 540 million people (often through MDBs and other government-backed financing mechanisms that have since imposed prohibitions on support for coal-powered electricity access).

It is difficult to overstate the contributions of this electrification to human health and well-being in these developing countries. Modern life is inconceivable without adequate access to electricity. Electricity makes life easier and healthier, improving nutrition and freeing time for other productive pursuits. It makes modern education and medicine possible. It is critical to reducing infant mortality and undernourishment. It helps provide adequate supplies of clean water for people and crops. It makes agriculture more efficient through mechanization and affordable fertilizers. It makes people more mobile. And it connects them to a broad array of information through various communication technologies that all run on electricity.

"The importance of coal in the global energy mix is now the highest since 1971. It remains the backbone of electricity generation and has been the fuel underpinning the rapid industrialization of emerging economies, helping to raise living standards and lift hundreds of millions of people out of energy poverty."

Fatih Birol, IEA Executive

That importance continues today. As of 2016, an estimated 1.1 billion people still live without access to electricity – between one-seventh and one-eighth of the global population.[27,xcvii] By 2030, IEA projects that nearly 400 million of these people will gain access, in large part due to new coal-fired power plants, to over 600 gigawatts of electricity which are currently planned or under construction around the world. Accordingly, direct and indirect U.S. government support for financing this electrification would not only advance longstanding economic development and humanitarian objectives but also serve to enhance diplomatic and trade relationships that could enable new partnerships to expand U.S. exports of thermal coal.

[27] IEA defines electricity access as a minimum of 250 kilowatt hours (kWh) per year for rural households (of five people) and 500 kWh per year for urban households. "In rural areas, this level of consumption could, for example, provide for the use of a floor fan, a mobile telephone and two compact fluorescent light bulbs for about five hours per day. In urban areas, consumption might also include an efficient refrigerator, a second mobile telephone per household and another appliance, such as a small television or a computer." International Energy Agency, 2014. Defining and modelling energy access. *World Energy Outlook*. Available at: http://www.worldenergyoutlook.org/resources/energydevelopment/definingandmodellingenergyaccess/.

The importance and value of such efforts may be best exemplified by prior missed opportunities. For example, a 2015 analysis by George David Banks of the American Council on Capital Formation described the implications of U.S. opposition to a clean coal plant in Pakistan:[xcviii]

> *"This shift was best exemplified in December 2013 when the United States – albeit unsuccessfully – opposed Asian Development Bank (ADB) funding for a supercritical coal-fired plant in Pakistan. In overcoming U.S. disapproval, ADB officials claimed that the power plant would help address acute power shortages of up to 20 hours per day and save the Pakistani economy $535 million by replacing imported oil with coal. Power shortages cost the Pakistani economy an estimated 2% of its annual economic growth….Blocking funding to the plant would have reduced Pakistan's access to affordable power that is needed for job creation, increasing the odds of political instability – a risk that the United States should seek to reduce, particularly given Pakistan's nuclear weapons stockpile."*

In addition to highlighting the importance of energy access to broader U.S. geopolitical interests, this example also serves to remind that enhancing the energy security of allied nations presents similar diplomatic opportunities around the world. We have already seen the impact of U.S. liquefied natural gas (LNG) exports as a potential antidote to geopolitical meddling in energy markets. Expanded U.S. coal exports could play a similar role.

> ***"Ukraine already tells us they need millions and millions of metric tons right now. There are many other places that need it, too. And we want to sell it to them, and to everyone else all over the globe who need it."***
>
> **President Trump, June 2017**

Ukraine, for example, faces energy security challenges related to disputes with Russia over critical natural gas deliveries as well as coal supply uncertainties stemming from Russian-backed separatists contesting the eastern portion the country (the source of most coal production). In July 2017, the government of Ukraine awarded Pennsylvania-based Xcoal Energy a contract to supply its state-owned power generation company with 700,000 tons of coal. The partnership, which was facilitated by the U.S. Department of Energy (DOE) and U.S. Department of Commerce (DOC), illustrates the potential for U.S. political leadership to enhance allies' energy security while also providing a boost to the domestic coal industry.[xcix] Administration efforts to leverage diplomatic relationships would help identify and facilitate similar partnership opportunities elsewhere around the world.

Trade Barriers

As detailed throughout this report, increasing coal exports has the potential to improve the U.S. balance of trade while also providing a boost to coal producers facing uncertainty in domestic markets, both of which are key priorities of the Trump Administration. In addition to the aforementioned barriers that indirectly limit the potential to advance exports, there are numerous trade-specific challenges and opportunities that must be considered and addressed.

First and foremost among these are opportunities to elevate coal exports specifically as part of trade negotiations and international trade development efforts. The case for U.S. coal is strong – it provides a high-quality, reliable and competitive source of supply that can also provide market diversity and an energy security hedge for importing countries. It is also a volatile subject in broader ongoing trade negotiations. For example, in the span of just two weeks in June 2018, China reportedly first offered to increase its imports of U.S. coal in an effort to reduce its $375 billion trade surplus with the U.S., then promptly reversed course and included coal on a list of potential retaliatory tariffs issued in response to $50 billion of Trump Administration tariffs on Chinese goods.[c] On August 8, 2018, China's Ministry of Commerce announed that it would proceed to impose a 25% tariff on $16 billion worth of U.S. imports, including coal.[ci]

This rapid turn of events illustrates how escalating trade tensions are a serious concern that could result in significantly restricted markets for U.S. coal. In addition to China, a number of other countries have initiated retaliation measures to U.S.-imposed tariffs on steel and aluminum imports, and at least one – Turkey – has included coal among the list of targeted U.S. products.[cii] Amidst escalating tensions, on August 15, 2018, Turkey raised the level of its coal tariffs from 10% to 14%. Moreover, beyond specific barriers such as tariffs, the general ongoing friction on trade issues threatens to reduce the willingness of U.S. trade partners to enter into agreements to buy U.S. energy resources.

Meanwhile, a number of key markets have long imposed unfair tariffs on U.S. coal imports. For example, Indonesia places a 5% tariff on imports of U.S. coal, while China places 6% and 3% tariffs on U.S.-based thermal and metallurgical coal, respectively.[ciii] These artificial costs exacerbate the geographical disadvantage of U.S. coal exports to Asia and impact the competitiveness of deliveries to the region, especially from the East Coast. U.S. government efforts to reduce or eliminate these tariffs would facilitate increased coal export opportunities.

Ultimately, while the potential for current tensions to negatively impact U.S. coal is high, heightened attention to global trade issues also presents an opportunity for U.S. negotiators to expand market access for U.S. coal. Efforts by the DOE, U.S. trade negotiators and diplomatic officials to actively encourage such purchases and undertake dedicated steps to identify and pursue bilateral and multilateral opportunities throughout the world would also facilitate opportunities for expanded U.S. coal exports.

Technological Considerations

Technological Improvements in Mining.[28] Another important consideration on the supply side is ensuring that the industry is keeping up with the potential technological improvements in mining and preparation that would allow U.S. producers to better compete with other producing countries. The coal industry has been challenged in recent years due to adverse market conditions and high debt levels. Producers accounting for about 40% of total coal production went through bankruptcy in the last four years. Demand in 2017 was over 20% below demand in 2012. Not surprisingly, capital expenditures declined during this period.

The industry has identified areas where it can reduce operating costs with capital investments. In the PRB, for example, a move to driverless vehicles has started. In Pittsburgh seam mines, producers have incorporated advanced technology into their longwalls and are now focusing on extending advanced technology to continuous miners which account for a major share of the labor and costs in both longwall and room-and-pillar mines. Many future advances could take advantage of state-of-the-art digital technology, including consolidated data platforms, real-time analytics and optimization, advanced control systems, artificial intelligence and machine learning, and predictive maintenance to improve decision making and reduce downtime across the many interdependent processes involved in a mining operation. Advances can be achieved in most supply regions. Since innovation is capital intensive, Federal support would accelerate technology integration.

Coal Washing and Upgrading. Coal washing and upgrading technologies are designed to reduce the amount of mineral matter and/or moisture in coal, which can be particularly important for coal slated for export. Transporting coal with a higher heat content could reduce transportation costs on a quality adjusted evaluated basis – improving the value proposition for some U.S. coal compared to the international market. In addition, reducing the ash, sulfur and mercury content may also allow U.S. coal to be increasingly competitive in some markets where lower impurities is an attribute that is highly valued. Although coal washing and upgrading technologies are being used globally, further technological improvements may be possible with additional research and development. One potential example would be the development of technologies that could increase the heat content of Powder River Basin coal, especially if export opportunities are expanded.

[28] The forthcoming (Sept. 2018) National Coal Council report, "Power Reset: Optimizing the Existing Coal Fleet" includes a more expansive discussion on improving the cost-competitiveness of U.S. coal through advances in coal mining and production technologies. See NCC website www.NationalCoalCouncil.org.

Exports of U.S. Advanced Coal Technologies. Some international markets for U.S. coals are restricted or could become restricted due to coal quality constraints or lack of environmental technologies/controls at end-user facilities. For example, some higher-sulfur coals from the Eastern U.S. (NAPP, ILB) are limited/excluded from certain Asian and European markets because of sulfur constraints. Growing Asian markets are increasingly recognizing the need to control emissions but still have a number of unscrubbed/uncontrolled power plants, precluding the use of certain U.S. coals.

While it is beyond the scope of this report, it would be beneficial to continue U.S. efforts to research, develop and deploy advanced coal technologies that could be retrofit to existing plants and/or adopted in new plant construction that would enable other nations to make use of a wider range of U.S. coals. For example, installation of state-of-the-art, commercially available emissions controls, such as sulfur dioxide (SO_2) scrubbers, would enable fuel sulfur limits to be modified thus enabling a wider range of coals to be used with an accompanying net reduction in SO_2 emissions.

A number of nations, including China, India and Japan, are deploying HELE coal plants employing Advanced Ultra Super Critical technologies. The opportunity exists for the U.S. to pursue technology exchanges with these nations as part of its efforts to develop and adopt advanced coal technologies in the U.S. and abroad, enhancing markets for U.S. coals in the process.

Chapter 4. Conclusions & Recommendations

Global demand for coal-fired power is driven in large part by developing nations' efforts to grow their economies and alleviate energy poverty. The Trump Administration has emphasized its interest in unlocking U.S. energy and coal export potential to service rising international market demand and aid its global partners in their quest to end energy poverty and advance energy security. Unleashing U.S. coal exports will advance both U.S. and global energy security objectives.

The primary strategic objective recommended by the National Coal Council is to advance U.S. coal exports as part of the nation's efforts to achieve U.S. energy dominance, enhance international energy security and eliminate global energy poverty. This report provides recommendations in support of these objectives in the areas of coal production, transportation, trade and international relations, and regulatory reform. Executing these recommendations will result in a more robust role for the U.S. in global coal trade, providing economic benefits to the U.S. as well as economic, environmental and social benefits to our trading partners.

To facilitate execution of the recommendations in this report, NCC recommends establishing a DOE-led, government-wide Coal Exports Task Force (or Energy Exports Coordination Task Force) to monitor and coordinate policy developments relevant to advancing coal exports. Participants should include all agencies engaged in energy development and international relations, including the U.S. Departments of Energy, Interior, State and Treasury, as well as USTDA, OPIC and the EXIM Bank, among others.

The competitiveness and growth of U.S. coal exports depends primarily on the ability of U.S. producers to mine and ship coal to end-use markets at an overall evaluated delivered cost that is economically competitive vis-à-vis other global coal suppliers and vis-à-vis other energy sources[29]. Numerous opportunities exist to enhance the competitiveness of U.S. coal exports at every link in the coal supply chain and by addressing various trade and regulatory barriers. NCC's primary strategic recommendations are:

- **Coal Production.** Deploy advanced coal mining and processing technologies to reduce production costs, thus making U.S. coals more competitive in international markets. Enhance U.S. coal mining operations with the greatest export potential in both traditional and non-traditional coal supply regions.
- **River Transport.** Streamline the funding to the nation's inland waterway system locks and dam infrastructure to facilitate the cost-efficient flow of U.S. coals to international markets via U.S. East and Gulf Coast ports.

[29] Such as LNG, petroleum coke, etc.

- **Ports & Terminals.** Enhance coal export port and terminal capacity on the U.S. Atlantic, Gulf and Pacific coasts.
- **Trade and International Relations.** Eliminate policy and technology barriers to the deployment of advanced coal facilities in international markets. Additionally, capitalize on trade opportunities, assessing policies and approaches that inhibit or promote U.S. trade and U.S. coal exports.
- **Economic Development in International Markets.** Support efforts to advance economic growth in international markets and the global development of advanced coal technologies, as well as the elimination of regulatory and institutional barriers to the deployment of coal-fired facilities worldwide.

NCC recommends the following tactics be employed to achieve these strategic objectives.

Coal Production

Strategic Objective 1: Deploy advanced coal mining and processing technologies to reduce production costs, thus making U.S. coals more competitive in international markets.

Recommended Tactics:

- Support research and development (R&D) initiatives to develop more efficient mining technologies to reduce the cost of extracting coal. Initiatives for new production-enhancing technologies in coal mining should include automation, robotics, big data/advanced computing, machine learning/artificial intelligence, and remote mining technologies.
- Support R&D to develop advanced coal preparation and upgrading technologies – such as coal fines/waste coal recovery and coal drying/coal beneficiation – to increase coal heat content[30], remove impurities and lower costs.

Strategic Objective 2: Enhance U.S. coal mining operations with export potential in both traditional and non-traditional coal supply regions.

Recommended Tactics:

- States may benefit from offering a range of support mechanisms to induce continued mining activity. One such initiative was undertaken by the State of Virginia whose legislature passed tax credits for metallurgical coal production from thin-seamed underground mines and surface mines. Tax credits that reduce severance or other forms of public payments associated with investment in new mining capacity might also prove effective and could well be revenue positive when applied appropriately.
- Identify and support infrastructure projects in non-traditional coal supply regions, including Oklahoma, Arkansas and Alaska.
- Eliminate barriers to production of coal on Federal lands associated with bonus payments, rents and uncertain royalty payments.
- Assess any future mining regulations, such as the Stream Protection Rule repealed by the Trump Administration, to determine their impacts on U.S. coal exports.

[30] Heat content is measured on a Btu per pound (Btu/lb) or on a kilocalorie per kilogram basis (kcal/kg).

River Transport

Strategic Objective: Streamline the funding to the nation's inland waterway system locks and dam infrastructure to facilitate the cost-efficient flow of U.S. coals to international markets via East and Gulf Coast ports.

Recommended Tactics:

- Support regular maintenance and dredging of inland waterway river channels to ensure non-restricted movements of coal barge traffic especially during period of low water.
- Deploy funds from the current excess balance of fees collected from the Harbor Maintenance Tax and support efficient funding levels from the Inland Waterways Trust Fund to maintain and modernize inland waterway locks and dams, specifically those on the Ohio River as is being done with the Olmstead Locks and Dam projects.

Ports & Terminals

Strategic Objective: Enhance coal export port and terminal capacity on the U.S. Atlantic, Gulf and Pacific coasts.

Recommended Tactics:

- Dredge key export ports and ship channels to accommodate larger vessels – such as Capesize and Baby Capes – thereby lowering shipping costs and enhancing the delivered economics of U.S. eastern and interior basin coals in international markets.
- Facilitate improved planning and cooperation between state and Federal authorities responsible for environmental review and permitting of proposed projects, limit state misuse of such processes aimed at challenging exports of U.S. produced goods.
- Undertake further study to assess the potential to reduce export constraints through development of export terminals on Federal properties.
- Identify and analyze bottlenecks and infrastructure upgrades at existing export terminals and assess opportunities to address logistical constraints to enable optimal utilization of the U.S. coal export transportation system (rail, waterway, port).
- Advance comprehensive reforms to NEPA and related permitting processes, including relevant proposals described in Parts 3 and 4 of the *Infrastructure Permitting Improvement* portion of the White House's February 2018 *Legislative Outline for Rebuilding Infrastructure in America.*
- Clarify the application of GHG considerations in NEPA reviews associated with development of U.S. coal export facilities. Engage CEQ to develop updated regulations or guidance clarifying how agencies should address GHGs in NEPA scoping processes.

Trade & International Relations

Strategic Objective 1. Eliminate policy and technology barriers to the deployment of advanced coal facilities in international markets.

Recommended Tactics:

- Reform Export-Import (EXIM) Bank of the U.S. policies and guidelines to allow support for projects associated with coal mining or high efficiency, low emissions (HELE) coal generation. Finalize appointments to the EXIM Bank board to facilitate reforms.
- Revise Overseas Private Investment Corporation (OPIC) and U.S. Agency for International Development (USAID) policies to allow for support for coal generation projects using HELE technology.
- Reassess U.S. policy prohibiting public financial support for construction of coal power plants overseas instituted under the Obama Administration and implemented through the U.S. Treasury Department (Multilateral Development Banks). These policies put the U.S. at a disadvantage as other nations step in to fill the financing void and secure lucrative contracts for fuel supplies, technology, equipment and operations. Restore U.S. and MDB support for construction of HELE coal power plants in international markets.
- Promote installation of state-of-the-art, commercially available emissions controls on international coal-fired facilities to expand opportunities for more varied qualities of U.S. coal to be exported.
- Work with key end-use nations to make the technical and economic case that new power plants should be designed for a wide range of coal qualities.

Strategic Objective 2. Capitalize on trade expansion opportunities, assessing policies and approaches that inhibit or promote U.S. trade and U.S. coal exports.

Recommended Tactics:

- Pursue opportunities to expand market access for U.S. coal through the reduction or elimination of trade barriers, while avoiding escalation of barriers that could conversely result in reduced access to markets.
- Support U.S. Trade and Development Agency (USTDA) initiatives to advance exports of coal and advanced coal technologies through development of cleaner coal infrastructure projects overseas.
- Proactively engage with the African Development Bank and leaders of African nations to expand electricity access in pursuit of partnership opportunities. Work with Power Africa to reform policies and allow coal-related projects to compete for financing in support of economic growth and development throughout Africa.
- Pursue bilateral relationships that advance efforts to ensure energy security and universal access to affordable and reliable energy in order to eradicate poverty. Model these partnerships on the Japan-United States Strategic Energy Partnership (JUSSEP).
- Facilitate relationships between U.S. coal exporters and overseas markets similar to the recent Ukraine coal export agreement.

Economic Development in International Markets

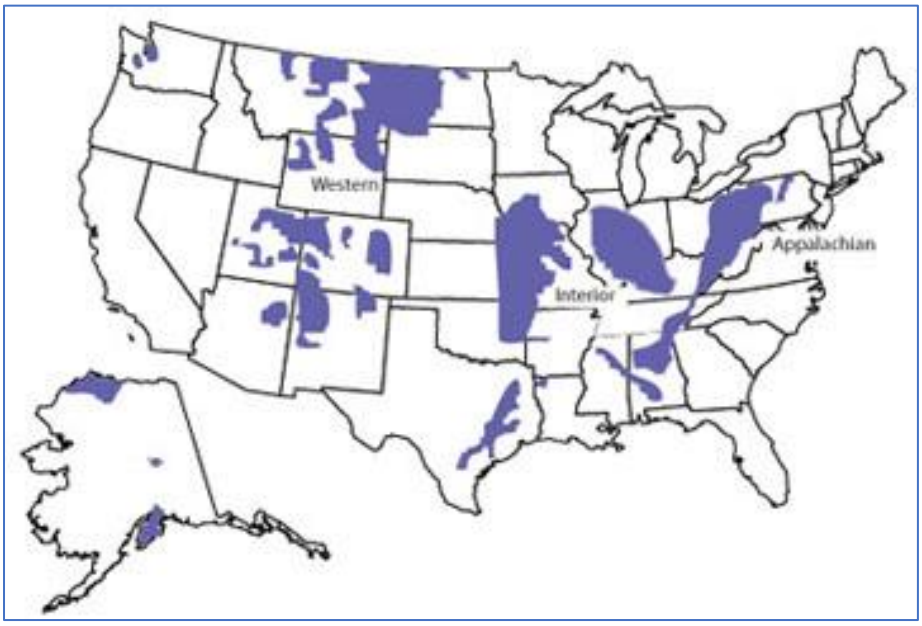
Strategic Objective: Support efforts to advance economic growth in international markets and the global development of advanced coal technologies, as well as the elimination of regulatory and institutional barriers to the deployment of coal-fired facilities worldwide.

Recommended Tactics:

- Support initiatives such as the BUILD Act to create a new International Development Finance Corporation to assist developing nations' efforts to achieve broad-based economic growth and poverty reduction.
- Assess the negative environmental impacts associated with restrictive financing for deployment of high efficiency, advanced coal technology facilities in international markets.
- Assess opportunities for U.S. industry to export advanced coal technologies to international markets and the associated environmental and poverty-reduction benefits for emerging economies.
- Support efforts to establish a global fossil fuels alliance to promote energy access and security through responsible use of advanced fossil fuel technologies.

APPENDIX A: Coal Statistics

U.S. Coal Production Basins
Source: Energy Information Administration



National Mining Association – Most Requested Coal Statistics 2010-2017

https://nma.org/wp-content/uploads/2017/12/c_most_requested.pdf

Most Requested Statistics - U.S. Coal Industry

	2010	2011	2012	2013	2014	2015 r/	2016 r/	2017 p/
Production (1,000 Short Tons) *	1,084,368	1,095,628	1,016,458	984,842	1,000,049	896,941	728,364	774,118
East of Mississippi River 5/	446,197	456,447	423,476	407,341	409,521	348,978	281,631	304,645
West of Mississippi River	638,171	639,181	592,983	577,501	590,528	547,963	446,734	469,473
Appalachian 5/	337,104	336,017	293,253	271,638	268,603	222,114	180,477	198,730
Interior	155,653	170,327	179,961	182,994	188,604	167,430	143,917	145,164
Western	591,611	587,633	543,244	530,210	542,842	507,397	403,971	430,224
Refuse Recovery	1,857	1,650	1,324	1,966	1,624	1,384	851	843
U.S. Recoverable Reserves (Mil. Sht. Tons)	259,518	258,619	257,648	256,709	255,755	254,896	254,197	253,500
Recoverable Reserves at Producing Mines								
(Million Short Tons) 1/	17,937	19,223	18,664	19,746	19,351	18,327	16,956	n/a
Total Value of Production ($1,000)	$38,625,188	$44,931,704	$40,607,497	$36,675,516	$34,831,707	$28,549,632	$22,266,087	$23,997,658
Domestic Consumption (1,000 Short Tons)	1,048,514	1,002,948	889,185	924,442	917,731	798,115	731,071	716,961
Electric Utilities/power	975,052	932,484	823,551	857,962	851,802	738,444	678,554	664,749
Coking	21,092	21,434	20,751	21,474	21,297	19,708	16,485	17,538
Other Industrial	49,289	46,238	42,838	43,055	42,946	38,459	34,849	33,613
Residential/Commercial	3,081	2,793	2,045	1,951	1,687	1,503	1,183	1,061
Stocks at End of Year (1,000 Short Tons)								
Consumers 2/	181,920	180,055	192,696	154,676	158,833	202,560	167,681	142,431
Producer/Distributor	49,820	51,897	46,157	45,652	38,894	35,871	25,309	21,108
Exports (1,000 Short Tons)	81,716	107,259	125,746	117,659	97,257	73,958	60,271	96,953
Imports (1,000 Short Tons)	19,353	13,088	9,159	8,906	11,350	11,318	9,850	7,777
Price Indicators (Avg. $/Short Ton or $/mmBtu)								
Mine Sales Price Average ($/short ton) 3/	$35.61	$41.04	$39.95	$37.24	$34.83	$31.83	$30.57	$31.00
Cost of Coal Receipts at Elec.Gen. Plants ($/mmBtu)	$2.27	$2.39	$2.38	$2.34	$2.39	$2.22	$2.11	$2.08
Cost of Coal at Electric Utility Plants (receipts)	$45.33	$47.75	$47.51	$45.03	$45.66	$43.71	$42.01	$40.91
Cost of Coking Coal at Coke Plants (receipts)	$153.59	$184.44	$190.55	$156.99	$131.41	$118.69	$102.00	$130.89
Cost of Coal for Industrial Uses (receipts)	$59.28	$70.62	$70.35	$69.16	$68.20	$65.44	$60.34	$57.87
Fuel Production Price (sales value $/mmBtu)	$1.77	$1.83	$1.98	$1.99	$1.72	$1.59	$1.62	$1.63
Railroad Freight Charge, avg. (Frt. Rev./Tons Orig.)	$17.08	$19.78	$20.40	$20.65	$20.11	$19.00	18.49	19.67
Methods of Mining								
Underground (1,000 Short Tons)								
Continuous	163,354	173,119	156,862	147,667	142,574	122,380	96,327	102,341
Conventional & Other	4,767	3,061	2,871	4,824	5,178	2,373	11,947	12,693
Longwall	169,033	169,425	182,653	189,193	206,952	182,068	143,832	152,811
Total Underground Production	337,155	345,606	342,387	341,685	354,704	306,821	252,106	267,845
% of Total Production	31.0%	32.0%	33.7%	34.7%	35.5%	34.2%	34.6%	34.6%
Total Surface (1,000 Short Tons) 5/	747,214	750,022	674,072	643,157	645,345	590,120	476,258	506,273
% of Total Production	69.0%	68.0%	66.3%	65.3%	64.5%	65.8%	65.4%	65.4%
Number of Mines (EIA)	1,285	1,325	1,229	1,061	985	853	710	n/a
Underground Mines (includes refuse)	525	506	488	424	372	324	268	n/a
Surface Mines	760	788	719	637	613	529	442	n/a
Number of Mine Operations (MSHA)	1,944	1,973	1,871	1,701	1,632	1,460	1,289	1,208
Average Number of Miners (EIA) 3/	86,195	91,611	89,838	80,396	74,931	65,971	51,795	n/a
Underground Mines (includes refuse)	50,515	54,395	54,426	49,691	46,475	40,157	30,105	n/a
Surface Mines	35,542	37,087	35,310	30,705	28,456	25,814	21,690	n/a
Average Coal Mining Employment (MSHA) 5/	135,500	143,940	138,338	123,446	116,318	102,871	81,875	82,843
Number of Mine Injuries 4/								
Fatal	48	21	20	20	16	12	8	15
All Injuries	4,307	4,555	3,878	3,346	3,323	2,635	2,019	2,294
Production Per Miner Per Hour 3/	5.55	5.19	5.19	5.54	5.96	6.28	6.61	6.80
Underground Mines	2.89	2.72	2.84	3.07	3.35	3.45	3.83	n/a
Surface Mines	9.47	8.97	8.97	9.69	10.42	10.95	10.73	n/a

Notes:

p/ Preliminary estimates. r/ Revised. e/ Estimated. n/a Not available.

1/ At active producing coal mines. 2/ The residential/commercial sector included.

3/ Excludes mines producing less than 10,000 short tons of coal during the year.

4/ Includes contractors and office workers. Excludes mines producing less than 10,000 short tons and prep plants with less than 5,000 employee hours.

5/ Includes refuse. 6/ Includes contractor employees.

Sources: U.S. DOE/EIA, Mine Safety & Health Administration, Association of American Railroads, and NMA estimates.

Updated: June 2018

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National Mining Association – U.S. Coal Production by State 2006-2017

https://nma.org/wp-content/uploads/2017/11/coal_production_by_state_2017p.pdf

U.S. Coal Production by State, 2006-2017 (Thousand Short Tons)

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State	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 r/	2017 p/
East:												
Alabama	18,830	19,327	20,611	18,796	19,915	19,071	19,321	18,620	16,363	13,191	9,643	12,613
Illinois	32,729	32,445	32,918	33,748	33,241	37,770	48,486	52,147	57,969	56,101	43,422	48,128
Indiana	35,119	35,003	35,893	35,655	34,950	37,426	36,720	39,102	39,267	34,295	28,767	31,418
Kentucky	120,848	115,280	120,323	107,338	104,960	108,766	90,862	80,380	77,335	61,425	42,868	42,760
Eastern	93,607	87,068	90,258	74,719	68,063	67,930	48,798	39,501	37,390	28,101	16,772	18,842
Western	27,241	28,212	30,064	32,619	36,897	40,836	42,063	40,879	39,945	33,324	26,096	23,766
Maryland	5,054	2,301	2,860	2,305	2,585	2,937	2,283	1,925	1,978	1,922	1,616	1,662
Mississippi	3,797	3,545	2,842	3,440	4,004	2,747	2,953	3,575	3,737	3,143	2,870	2,604
Ohio	22,722	22,575	26,251	27,501	26,707	28,166	26,328	25,113	22,252	17,041	12,564	9,336
Pennsylvania	66,929	65,048	65,414	57,979	58,593	59,182	54,719	54,009	60,910	50,031	45,720	49,065
Bituminous	64,500	63,484	63,713	56,248	56,888	57,051	52,384	51,949	59,076	48,077	44,220	47,217
Anthracite	1,529	1,564	1,701	1,731	1,705	2,131	2,335	2,060	1,833	1,953	1,500	1,849
Tennessee	2,804	2,654	2,333	1,996	1,780	1,547	1,090	1,098	839	897	644	431
Virginia	29,740	25,346	24,712	21,175	22,385	22,523	18,965	16,619	15,059	13,914	12,910	13,205
West Virginia	152,374	153,480	157,778	136,971	135,220	134,652	120,425	112,786	112,187	95,633	79,757	92,733
Total East	490,046	477,004	491,934	446,904	444,340	454,797	422,151	405,374	407,895	347,592	280,781	303,804
West:												
Alaska	1,425	1,324	1,477	1,860	2,151	2,149	2,052	1,632	1,502	1,177	932	959
Arizona	8,216	7,983	8,025	7,474	7,752	8,111	7,493	7,603	8,051	6,805	5,423	6,221
Arkansas	23	83	69	5	32	133	98	59	94	91	49	27
California	0	0	0	0	0	0	0	0	0	0	0	0
Colorado	36,322	36,384	32,028	28,267	25,163	26,890	28,566	24,236	24,007	18,879	12,634	15,047
Iowa	0	0	0	0	0	0	0	0	0	0	0	0
Kansas	426	420	229	185	133	37	16	22	66	199	27	0
Louisiana	4,114	3,127	3,843	3,657	3,945	3,865	3,971	2,810	2,605	3,439	2,798	2,079
Missouri	394	236	247	452	458	465	422	414	363	138	234	244
Montana	41,823	43,390	44,786	39,486	44,732	42,008	36,694	42,231	44,562	41,864	32,336	35,232
New Mexico	25,913	24,451	25,645	25,124	20,991	21,922	22,452	21,969	21,963	19,679	13,341	13,198
North Dakota	30,411	29,606	29,627	29,945	28,949	28,231	27,529	27,639	29,157	28,802	28,121	28,788
Oklahoma	1,998	1,648	1,463	956	1,010	1,145	1,054	1,136	904	780	654	561
Texas	45,548	41,948	39,017	35,093	40,982	45,904	44,178	42,851	43,654	35,918	39,001	36,338
Utah	26,018	24,307	24,365	21,718	19,351	19,648	17,016	16,977	17,934	13,966	13,966	14,326
Washington	2,580	0	0	0	0	0	0	0	0	0	0	0
Wyoming	446,742	453,568	467,644	431,107	442,522	438,673	401,442	387,924	395,665	375,773	297,218	316,454
Total West	671,953	668,475	678,465	625,329	638,171	639,181	592,983	577,503	590,527	547,510	446,734	469,474
Refuse/unknown	752	1,156	1,408	2,688	1,857	1,650	1,324	1,966	1,624	1,384	851	843
Appalachian	391,159	377,800	390,218	341,443	335,248	336,017	291,929	269,672	266,979	220,730	179,626	197,887
Interior	151,389	146,668	146,586	145,811	155,653	170,327	179,961	182,994	188,604	167,430	143,917	145,164
Western	619,449	621,012	633,597	584,981	591,611	587,633	543,244	530,210	542,842	507,397	403,971	430,224
Grand Total	1,162,750	1,146,835	1,171,809	1,074,923	1,084,388	1,095,828	1,016,468	984,842	1,000,048	896,841	728,384	774,118

Note: Data include mines producing less than 10,000 short tons/year.

r/ Revised. p/ Preliminary. N/A Not available. Data may not add to totals due to rounding.

Source: U.S. Department of Energy/Energy Information Administration Updated: May 2018

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National Mining Association – Coal Data at a Glance 2001-2017

https://nma.org/wp-content/uploads/2017/11/data_at_a_glance_2017p.pdf

Coal Data at a Glance

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U.S. Coal Production
(Million Short Tons)

Region	2017 p/	2016r/	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
East [1/]	304.6	281.6	348.9	409.5	407.3	432.5	456.4	446.2	449.6	493.3	478.2	490.8	493.8	484.8	469.3	492.9	528.8
West	469.5	446.7	548.0	590.5	577.5	593.0	639.2	638.2	625.3	678.5	668.5	672.0	637.7	627.3	602.5	601.4	598.9
Surface [1/2/]	506.2	476.3	590.1	645.3	643.2	674.1	750.0	745.4	742.9	814.7	794.9	803.7	762.8	744.5	717.7	735.9	747.1
Underground [2/]	267.9	252.1	306.8	354.7	341.7	342.4	345.6	337.2	332.1	357.1	351.8	359.0	368.6	367.6	354.0	358.4	380.6
Refuse Recovery	0.8	0.9	1.4	1.6	2.0	1.3	1.7	1.9	2.7	1.4	1.2	0.8	0.7	1.0	1.0	1.0	1.8
Total:	774.1	728.4	896.9	1,000.0	984.8	1,016.5	1,095.6	1,084.4	1,074.9	1,171.8	1,146.6	1,152.7	1,131.5	1,112.1	1,071.8	1,094.3	1,127.7

Coal Consumption by Market [1/]
(Million Short Tons)

Market	2017p/	2016r/	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
Electric Power	664.7	678.6	738.4	851.6	858.0	823.6	932.5	975.1	933.6	1,040.6	1,045.1	1,026.6	1,037.5	1,016.3	1,005.1	767.8	806.3
Other Generation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	209.7	158.1
Other Industrial	33.6	34.8	38.5	42.9	43.1	42.8	46.2	49.3	45.3	54.4	56.6	59.5	60.3	62.2	61.3	60.7	65.3
Coke	18.8	16.5	19.7	21.3	21.5	20.8	21.4	21.1	15.3	22.1	22.7	23.0	23.4	23.7	24.2	23.7	26.1
Resid./Comm.	1.0	1.2	1.5	1.9	2.0	2.0	2.8	3.1	3.2	3.5	3.5	3.2	4.7	5.1	4.2	4.4	4.4
Total:	718.1	731.1	798.1	917.7	924.6	889.2	1,002.9	1,048.6	997.4	1,120.6	1,127.9	1,112.3	1,125.9	1,107.3	1,094.8	1,066.3	1,060.2
Exports	97.0	60.3	74.0	97.3	117.7	125.7	107.3	81.7	59.1	81.5	59.2	49.6	49.9	48.0	43.0	39.6	48.7
Imports	7.8	9.9	11.3	11.4	8.9	9.2	13.1	19.4	22.6	34.2	36.3	36.2	30.5	27.3	25.0	16.9	19.8

U.S. Coal Exports
(Million Short Tons)

Type	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
Bituminous:																	
Steam	41.4	18.9	27.6	35.4	51.2	55.3	37.2	25.0	22.5	38.5	26.4	21.7	20.8	20.5	20.8	18.1	22.0
Metallurgical	55.3	40.9	46.0	61.6	65.7	69.9	69.5	56.2	37.3	42.6	32.3	27.6	28.7	26.8	22.1	21.2	25.0
Lignite	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.3	0.3	0.4	0.3	0.2	2.2
Anthracite	0.3	0.4	0.3	0.3	0.8	0.6	0.4	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.4	0.4

Note: p/ Preliminary. East region includes all states east of the Mississippi River. West region includes Alaska and states west of the Mississippi River. Exports include overseas and Canada. Numbers may not add due to rounding.
n/a = Not Available e/ Preliminary or estimated r/ Revised 1/ Includes refuse. 2/ Estimated in 2017 based on 2016 ratio.

Sources: Energy Information Administration and National Mining Association, *International Coal Review*.

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APPENDIX B: U.S. Coal Exports by State

U.S. Coal Exports by State (000s tons)

State	2011	2012	2013	2014	2015	2016
East:						
Alabama	10,640	10,658	11,091	12,049	8,555	6,329
Illinois	5,619	13,776	13,028	11,043	10,269	6,250
Indiana	120	472	42	85	20	172
Kentucky	7,984	8,839	12,416	4,449	3,437	1,351
Eastern	6,087	6,045	11,372	4,248	3,437	1,255
Western	1,898	2,793	1,044	202	0	97
Maryland	171	262	103	101	239	209
Mississippi	0	0	0	0	0	0
Ohio	0	0	0	0	0	137
Pennsylvania	15,379	14,443	12,234	8,156	7,633	6,008
Bituminous	14,992	13,856	11,472	7,844	7,297	5,607
Anthracite	387	587	762	312	336	401
Tennessee	0	0	0	0	0	0
Virginia	10,845	8,893	8,542	6,748	6,881	5,004
West Virginia	39,565	47,484	38,169	33,957	23,460	24,068
Total East	**90,324**	**104,825**	**95,624**	**76,588**	**60,494**	**49,528**
West:						
Alaska	1,203	968	635	554	149	75
Arizona	0	0	0	0	0	0
Arkansas	0	0	37	9	0	0
Colorado	2,607	6,507	6,282	3,819	1,684	968
Louisiana	0	152	0	0	0	0
Missouri	0	0	0	0	0	0
Montana	9,025	9,085	12,121	12,409	10,339	6,871
New Mexico	0	0	0	0	0	0
North Dakota	0	0	0	0	0	0
Oklahoma	0	0	0	0	0	0
Texas	0	0	0	0	505	1,780
Utah	1095	1,080	1,453	2,869	735	1,049
Washington	0	0	0	0	0	0
Wyoming	3,005	3,129	1,508	1,010	52	0
Total West	**16,935**	**20,920**	**22,035**	**20,669**	**13,464**	**10,743**
Total US	**107,258**	**125,745**	**117,659**	**97,257**	**73,958**	**60,271**

Source: National Mining Association, US Department of Energy

Includes mine exports and exports by brokers and traders

Companies that export U.S. coal range from coal producers, brokers/traders and international commodity and trading firms. Some specialize in certain grades or coal producing regions while others represent overseas trading partners.

Alphabetical listing of the top U.S. coal exporting firms in 2017 based on data from company reports, news reports and export data from TP Host.

Company	Metallurgical	Thermal
Alliance Coal		X
Arch Coal	X	X
Blackhawk Mining	X	
Bowie Resource Partners		X
Cloud Peak Energy		X
Consol Energy	X	X
Contura	X	
Drummond Company	X	
Global Mining (Signal Peak)		X
Integrity Coal Sales (Trader)	X	
Javelin (Trader)	X	X
JERA Trading (Trader)	X	X
Lighthouse Resources		X
Murray Energy		X
Robindale Energy (Trader)	X	X
United Coal Company	X	
Vitol (Trader)		X
Warrior Met Coal	X	
Xcoal Energy and Resources' (Trader)	X	X

APPENDIX C: Principal U.S. Coal Export Facilities

Facility Name	Owner	Port Name	Pier	Loading Rate	Throughput Capacity	Stockpile (tonnes)	Vessel Size	Restrictions	Primary User or Destination	Access
US West Coast Ports										
Oxbow Terminal/Metro P	Koch Carbon	Port of Long Bea	G	Loader 1: 3500 tonnes/hr Loader 2: 5000 tonnes/hr	1.8 Mt	175,000	Panamax	40-50 ft	Coal & Petcoke	BNSF/UP
Metropolitan Bulk Termir	City of Stockton	Port of Stockton	12-13	Loader 1: 800 tonnes/hr Loader 2: 4000 tonnes/hr	2.6 Mt	100,000	Panamax to 50,000 tonnes to 35 ft	35 ft	Coal and other bulk commodities	UP
Levin-Richmond	Levin-Richmond Termina	Port of Richmon	22-26	12000-15000 tonnes/day	2.6 Mt	80,000	Panamax to 55,000 tonnes	Berth A: 39 ft, Berth B 30 ft	Coal and other bulk commodities	UP
Millennium Bulk Terminal	Lighthouse Resources	Port of Longview	Docks 2-3	tbd	Plan: Phase 1: 25 Mt; Phase II: 44 Mt	1.5 mm	Panamax	43 ft	Coal and other bulk commodities	BNSF/UP
Oakland Bulk and Oversized Terminal (proposed)	Oakland Global	Port of Oakland,	1	tbd	5 Mt	180,000	Cape	50 ft	Coal and other bulk commodities	BNSF/UP
Canadian and Mexican Ports Currently Handling US Coal										
Westshore Terminals	Westshore Terminals Investment Corp	Roberts Bank, BC		7000 tonnes/hr	33 Mt	2.0 mm	Cape	Berth 1: 20.9 M, Berth 2: 19.4 M	Coal & Petcoke	BNSF/CN/CP
Puerto de Guaymas	Administración Portuaria Integral de Guaymas	Guaymas, Sonora, MX		15000 tonnes/day	2 Mt (est)		Panamax		Coal and other bulk commodities	Ferromex
US EAST COAST -- BALTIMORE (Atlantic Ocean via Chesapeake Bay)										
Consol Marine Terminal	Consol Energy	Port of Baltimore	CNX Pier		16 mm	1.2 mm	Cape (small)	47 ft	Coal	CSX, NS
Curtis Bay Coal Piers	CSX Railroad	Port of Baltimore	Bayside, Curtis (B&O)		14 mm	500,000	Cape (small)	41 ft	Coal	CSX
US EAST COAST -- HAMPTON ROADS (Atlantic Ocean at mouth of Chesapeake Bay)										
Dominion Terminal Associates	Arch Coal 35%, Contura 65%	Port of Hampton Roads	DTA		22 mm	1.7 mm	Cape (small)	55 ft	Coal	CSX
Pier IX	Kinder Morgan	Port of Hampton Roads	Pier 9		18 mm	1.4 mm	Cape (small)	50 ft	Coal	CSX
Lamberts Point Coal Terminal	Norfolk Southern Railroad	Port of Norfolk	Pier 6		38 mm	na - Inventory held in railcars	Cape (small)	50 ft	Coal	NS
US EAST COAST -- Charleston (Atlantic via)										
Shipyard River Coal Terminal	Kinder Morgan	Port of Charleston	Shipyard Bulk		2.5 mm	250,000	Panamax	45 ft	Bulk Commodities	CSX, NS
US GULF COAST (Atlantic Ocean via the Gulf of Mexico)										
McDuffie Coal Terminal	Alabama State Docks	Port of Mobile	McDuffie Island		14 mm	2.3 mm	Baby Cape	45 ft	Coal and other Bulk Commodities	CN, BNSF, NS, CSX, KCS & barge
United Bulk Terminal	Marquard & Bahls	Lower Mississippi	Mile Post 55.3 (east)		12 mm	4.0 mm	Baby Cape	47 ft at S. Pass	Coal and other Bulk Commodities	Barge
International Marine Terminal	Kinder Morgan	Lower Mississippi	Mile Post 61.0 (west)		10 mm	1.3 mm	Baby Cape	47 ft at S. Pass	Coal	Barge
Convent Marine Terminal	SunCoke Energy	Lower Mississippi	Mile Post 160.8 (east)		15 mm	1.5 mm	Baby Cape	47 ft at S. Pass	Coal	CN (IC) & Barge
Impala Burnside	Trafigura (Impala subsidiary)	Lower Mississippi	Mile Post 169.9 (east)		7.5 mm	600,000	Baby Cape	47 ft at S. Pass	Coal and other Bulk Commodities	CN (IC) proposed
Midstream Buoys	various	Lower Mississippi	Lower Mississippi		approx 20 mm	na - Inventory held in barges	Baby Cape	47 ft at S. Pass	Coal and other Bulk Commodities	Barge
Deepwater Terminal	Kinder Morgan	Houston Ship Channel	Deepwater - shares w/ Petcoke		10 mm	650,000	Panamax	40 ft	Petcoke and Coal	UP, BNSF, KCS

Source: Doyle Trading Consultants

Category	Deadweight Tonnage Range (DWT)	Typical Length (meters)	Draft (feet)
Handysize	<40,000		up to 33
Handymax	40,000-50,000	150-200	
Supramax	50,000-60,000	150-200	
Panamax	60,000 - 80,000	294 max	41.2
New/Post Panamax	120,000	366 max	49.9
Capesize	150,000-400,000		60 plus
Chinamax	up to 400,000	360 max	79
http://maritime-connector.com/wiki/ships/			

APPENDIX D: Status of Proposed Coal Export Projects

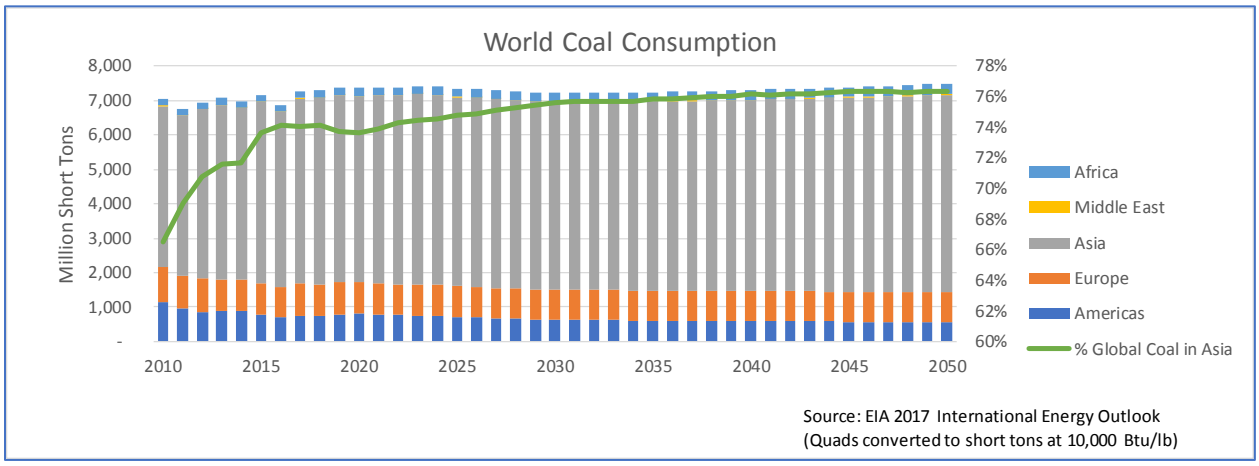
Summary of Recent Proposed Coal Export Projects		
Project	**Background/info**	**Status**
Gateway Pacific Terminal	Location: Cherry Point, Washington Proposed: 2011 Overview: $700 million investment in new bulk terminal that would have exported up to 54 million tons per year (mostly coal but agricultural products as well). Local economic impacts: Project estimated to create up to 4,400 direct and indirect jobs during the construction phase, and 1,250 jobs during operation, generating $140 million in local economic activity each year.[31]	Cancelled. In May 2016, the U.S. Army Corps of Engineers denied a water permit under section 404 of the Clean Water Act, citing potential impacts to treaty fishing rights.[32] Local authorities subsequently denied development and zoning permits.[33] In February 2017, GPT withdrew its permit applications, effectively cancelling the project.[34]
Millennium Bulk Terminal	Location: Longview, Washington Proposed: 2012 Overview: $680 million investment would revitalize 70-year old industrial site to allow for up to 44 million tons per year of coal exports. Local economic impacts: Project estimated to create up to 2,650 direct and indirect jobs during the construction phase, and 300 jobs during operation, generating $49 million in local economic activity each year.[35]	Active. In September 2016, the U.S. Army Corps of Engineers released a generally favorable draft environmental impact statement for the project,[36] but in April 2017, the Washington State Dept. of Ecology issued a separate EIS under the State Environmental Policy Act (SEPA) concluding that the project would result in "unavoidable and significant adverse impacts" in a number of different areas.[37] In September 2017, the Ecology Department denied a key water quality permit under section 401 of the Clean Water Act.[38] Project developer Lighthouse Resources then sued the state of Washington in federal court, citing a number of process objections and arguing that permit denials violated the Interstate Commerce Clause. Six states (MT, WY, SD, UT, KS and NE) have filed a brief in support of the suit, which is awaiting argument.
Morrow Pacific Project	Location: Boardman, Oregon (Port of Morrow) Proposed: 2012	Canceled. While the Oregon state DEQ issued air quality, water quality, and

[31] http://createnwjobs.com/education/proposed-projects/
[32] http://www.nws.usace.army.mil/Media/News-Releases/Article/754951/army-corps-halts-gateway-pacific-terminal-permitting-process/
[33] http://www.whatcomcounty.us/DocumentCenter/View/23248/Letter-to-Pacific-International-Holdings-October-252016
[34] https://www.whatcomcounty.us/993/Gateway-Pacific-Terminal-Proposed-Projec
[35] http://createnwjobs.com/education/proposed-projects/
[36] http://www.millenniumbulkeiswa.gov/nepa-draft-eis.html
[37] https://fortress.wa.gov/ecy/publications/documents/1706013.pdf
[38] http://www.millenniumbulk.com/wp-content/uploads/2017/10/401-WQ-Certification-Denial-Letter.pdf

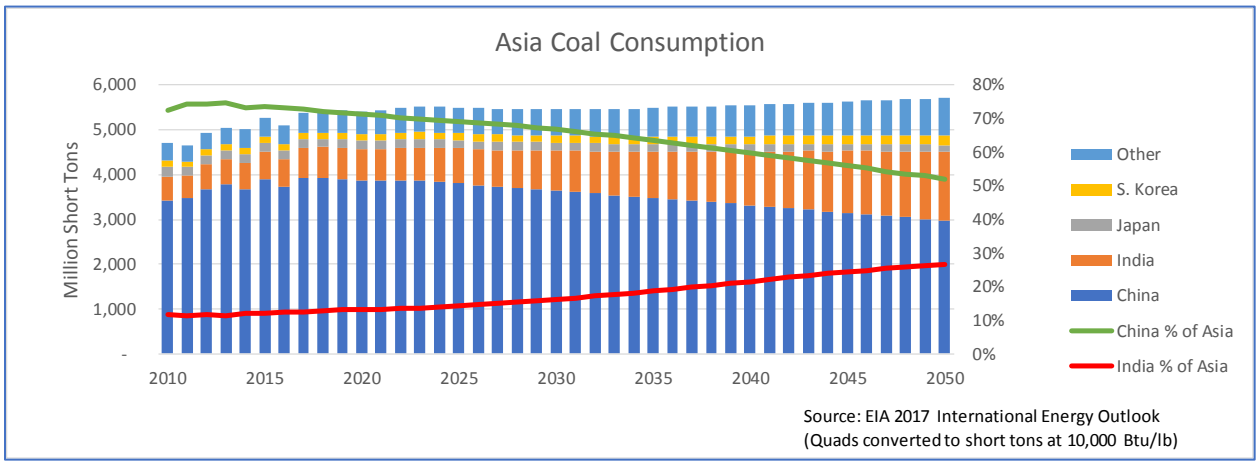
	Overview: $200 million investment to in facility to barge up to 8.5 million tons per year of coal along Columbia River to Port Westward for export. Local economic impacts: According to project supporters, development of the facility would have created 2,100 direct and indirect jobs during the construction phase, and 1,000 permanent jobs during full operation.	construction stormwater permits for the project,[39] in August 2014, the Oregon Department of State Lands (ODSL) denied a removal-fill permit for the project, citing potential concerns related to waterways and fishing.[40] An administrative law judge later upheld the decision, and in October 2016, Lighthouse Resources withdrew its application for the project, noting that it would instead route exports through Vancouver, British Columbia.[41]
Oakland Bulk & Oversized Terminal	Location: Oakland, California Proposed: 2012 Overview: In 2012, the city of Oakland entered into an agreement with the Oakland Bulk & Oversized Terminal (OBOT) to develop a shipping terminal on land near a former Army base. Among other bulk goods, the developers planned for the facility to export roughly 5 million tons of coal per year sourced from mines in Utah. Local economic impacts: The OBOT is projected to create up to 12,000 jobs, generating $300 million annually in direct and indirect local employment income.[42]	Active. In 2016, the City of Oakland passed an ordinance prohibiting the storage and handling of coal at the facility, citing concerns with particulate emissions from coal dust. OBOT sued to block the ordinance, and in May 2018, the U.S. District Court for the Northern District of California overturned the ordinance.[43] The City appealed the decision to the Circuit Court.[44]

[39] https://www.oregon.gov/deq/Programs/Pages/Coyote-Island-Coal-Project.aspx
[40] http://op.bna.com.s3.amazonaws.com/env.nsf/r%3FOpen%3dsbra-9n5t2g
[41] http://www.lighthouseresourcesinc.com/lighthouse-resources-sending-coal-to-asia/
[42] http://www2.oaklandnet.com/oakca1/groups/ceda/documents/agenda/oak039156.pdf
[43] http://blogs2.law.columbia.edu/climate-change-litigation/wp-content/uploads/sites/16/case-documents/2018/20180515_docket-316-cv-07014_decision.pdf
[44] https://www.eastbayexpress.com/SevenDays/archives/2018/06/14/city-of-oakland-appeals-decision-striking-down-coal-ban

APPENDIX E: Global Coal Market Statistics



Source: EIA 2017 International Energy Outlook
(Quads converted to short tons at 10,000 Btu/lb)



Source: EIA 2017 International Energy Outlook
(Quads converted to short tons at 10,000 Btu/lb)

World Coal Trade (million tonnes)

	Japan		Other Asia		OECD Europe		Oth. Eur. + Eurasia		Africa + Mid. East		North America		Latin America		Balancing item		World	
Exporters	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**
Australia	125.1	120.7	225.3	229.4	22.2	21.5	1.1	0.5	1.1	1.3	3.8	3.5	9.6	10.7	4.1	1.7	392.3	389.3
Canada	8.7	8.2	14.2	15.1	3.9	4.2	1.3	1.0	0.2	0.2	1.2	1.0	1.5	1.6	-0.4	-0.9	30.5	30.3
Poland	-	-	-	-	9.3	8.4	0.4	0.6	0.4	0.9	-	-	-	-	-0.6	-0.6	9.4	9.3
United States	4.3	5.6	11.7	10.1	36.0	29.5	4.3	3.3	0.7	1.1	9.2	7.6	7.3	6.9	-6.3	-9.5	67.1	54.7
Other OECD	0.1	0.1	1.8	2.0	13.1	15.1	0.5	0.5	0.1	0.1	0.0	0.0	0.1	0.0	32.0	31.8	47.7	49.6
Total OECD	**138.1**	**134.7**	**253.0**	**256.6**	**84.5**	**78.7**	**7.6**	**5.9**	**2.5**	**3.6**	**14.2**	**12.1**	**18.5**	**19.2**	**28.7**	**22.5**	**547.1**	**533.2**
PR of China	1.6	2.6	4.9	6.2	0.1	0.1	0.0	-	0.1	0.0	0.0	0.0	0.0	0.0	-1.5	-0.3	5.2	8.6
Colombia	0.0	0.9	5.9	10.1	63.0	58.7	0.3	0.3	5.8	4.9	10.2	10.5	13.9	14.6	-21.4	-16.6	77.8	83.3
Indonesia	32.0	31.8	326.3	336.4	7.9	5.5	0.0	0.1	0.2	0.3	0.8	0.6	0.0	-	-0.5	-4.7	366.7	369.9
Kazakhstan	0.2	0.0	0.0	0.0	1.0	1.3	25.0	21.2	-	-	-	-	-	0.1	5.1	3.0	31.2	25.7
Russian Fed.	17.0	17.9	57.1	67.7	71.0	63.6	11.5	12.7	3.8	5.7	0.1	0.3	1.8	2.0	-7.2	1.1	155.2	171.1
South Africa	0.2	0.1	44.5	51.1	21.6	21.6	1.2	0.5	10.6	12.1	0.1	0.0	1.2	1.1	-3.7	-10.0	75.5	76.5
Oth. non-OECD	0.5	1.4	44.4	63.8	16.6	10.5	3.7	0.4	3.5	0.8	0.2	0.1	1.9	0.7	-21.4	-12.3	49.4	65.2
Tot. Imp./Exp.	**189.6**	**189.4**	**731.4**	**779.6**	**265.3**	**239.0**	**47.3**	**39.5**	**25.7**	**26.3**	**25.5**	**23.5**	**36.6**	**37.3**	**-13.3**	**-1.1**	**1308.1**	**1333.5**

Source: IEA Coal Information 2017 Table 3.1

Chinese Coal Imports by Country of Origin
(thousand tonnes)

	1978[2]	1990	2000	2005	2010	2013	2014	2015	2016p
Total coal[3]	**2440**	**2003**	**2119**	**26173**	**163065**	**327182**	**291586**	**204132**	**255604**
Coking coal	**-**	**900**	**547**	**7195**	**47082**	**75421**	**62440**	**47999**	**59307**
Australia	-	600	547	4422	24152	30177	31279	25704	26819
Canada	-	300	-	1239	4018	11087	7204	5711	5189
Czech Republic	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	-
United States	-	-	-	-	2754	6065	2090	115	-
Other OECD	-	-	-	179	138	562	500	277	533
China, People's Rep.	-	-	-	-	-	-	-	-	-
Colombia	-	-	-	-	23	175	105	-	-
Indonesia	-	-	-	-	767	2673	657	231	574
South Africa	-	-	-	-	-	-	-	-	-
Former Soviet Union[4]	-	-	x	x	x	x	x	x	x
Russian Federation	*x*	*x*	-	*61*	*1804*	*8442*	*5760*	*3228*	*2620*
Other FSU	*x*	*x*	-	-	-	*237*	*38*	-	*10*
Venezuela	-	-	-	-	39	-	-	-	-
Viet Nam	-	-	-	-	-	-	-	-	-
Non-specified/other	-	-	-	1294	13387	16003	14807	12733	23562
Steam coal[5]	**2440**	**1103**	**1572**	**18978**	**115983**	**251761**	**229146**	**156133**	**196297**
Australia	-	-	1034	2307	15158	58032	63227	45208	43723
Canada	-	-	-	-	710	888	994	-	-
Czech Republic	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	-
United States	-	-	-	12	1132	2769	1696	-	-
Other OECD	-	-	-	796	26	1	150	-	4
China, People's Rep.	-	-	-	-	-	-	-	-	-
Colombia	-	-	-	-	3756	328	1	-	-
Indonesia	-	-	141	2260	56295	123110	105698	73531	103226
South Africa	-	-	325	-	4183	12740	5759	-	-
Former Soviet Union[4]	-	-	x	x	x	x	x	x	x
Russian Federation	*x*	*x*	*72*	*791*	*6801*	*18812*	*19632*	*12569*	*16227*
Other FSU	*x*	*x*	-	-	*1*	*333*	*15*	*10*	*10*
Venezuela	-	-	-	-	-	-	-	-	-
Viet Nam	-	-	-	11469	18065	13146	6831	719	487
Non-specified/other	2440	1103	-	1343	9856	21602	25143	24096	32620
Lignite	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Source: IEA Coal Information 2017

APPENDIX F: Principal Global Suppliers of Metallurgical Coal – Country Breakdown[civ]

Australia

Australia is one of the world's largest metallurgical coal producers and the world's largest metallurgical coal exporter. Australian metallurgical coal exports circle the globe and provide competition to all suppliers everywhere. Its highly-desired low-volatile coals set the industry standard.

Australia has a large remaining marketable reserve of metallurgical coal in Queensland and New South Wales. Reserves exist in the Bowen Basin in Queensland, and in the Sydney and Gunnedah basins of New South Wales. Much of the marketable reserve is located at currently operating mines. Nearly all this coal reserve is earmarked for the export market. A good portion of the Australian reserve is hard coking coal with the remainder split between soft coking coal and pulverized injection coal (PCI).

With only occasional and modest market driven setbacks, Australian metallurgical coal production has been steadily climbing for many years on the back of rising Asian demand for coke and steel. Recent annual metallurgical production has approached 200 million tonnes and additional increases are expected in the future. Hard coking coal production exceeds 100 million tonnes per year, with the remainder of production split between soft coking coal and PCI coal. Most of the production is from surface mines.

Australian metallurgical coal is valued for its high quality. When building metallurgical coal blends, consumers appreciate the diversity of coal types in Australia and the stability of supply offered by Australian producers. Australian low volatility hard coking coal is considered the industry benchmark. Prime Australian coking coals typically make strong coke as evidenced by their high CSR values. However, the best high-volatility Australian coking coals lack the high fluidity of their U.S. competitors and therefore do not flow as well and are not as prized in blends as their U.S. counterparts.

For some consumers, Australian coal is distant from their operations and the long haulage adds significantly to its delivered cost. Furthermore, Australian mines are often subject to the impacts of tropical cyclones that can last for days to weeks. Customers must remain flexible to accommodate these potential and unpredictable interruptions, either by contracting for non-Australian supply or by carrying extra inventory during the wet season. Customers of Australian metallurgical coal are also wary of the increased supplier pricing power arising from dominance by a few large producers.

Coal exports from Australia utilize nine terminals at seven ports, and by rail systems servicing these ports.

Australian mining companies are subject to a range of taxes that vary by location. Taxes and other fees in Queensland and New South Wales include royalties, a federal corporate income tax, a research contribution tax, service leave and mine safety taxes, and a voluntary "Coal21" greenhouse gas abatement contribution.

United States

The U.S. is a significant global producer of metallurgical coal and usually the second or third largest exporter. At today's prices, its marketable reserve is substantial, in the neighborhood of one billion tons. Most of this reserve exists in Central Appalachia (CAPP), with the remainder split between Northern and Southern Appalachia (NAPP and SAPP). States with large reserves include West Virginia, Alabama, Virginia, Pennsylvania and Kentucky. Most of the U.S. metallurgical coal reserve is hard coking coal. There is a small amount of PCI coal. Almost all the reserve must be accessed using underground mining methods.

U.S. metallurgical coal production has been variable over the years. In 2015, metallurgical coal production totaled about 60 million tons, but was lower in 2016 given weak market fundamentals and higher in 2017 as the global market improved.

High-volatility A and B coking coals dominate production, but some low-volatility and mid-volatility coal is also produced. When market conditions and ocean freight rates allow, substantial amounts of high-volatility C metallurgical coal are exported from NAPP.

In NAPP, there are two broad categories of coking coal: low- and mid-volatile coals in the eastern side of the basin; and high-volatility coals in southwestern Pennsylvania. The high-volatility coking coals in Pittsburgh seam mines have sulfur contents greater than coking plants desire, so much of this coal is consumed in thermal markets.

Most NAPP metallurgical and thermal export coal is exported through Baltimore, Maryland, via the CNX Marine Terminal or the Chesapeake Bay Piers. Baltimore's CNX Marine Terminal is owned by CONSOL Energy and served by both CSX and Norfolk Southern (NS). CNX Marine is the largest export coal terminal serving NAPP and can load small capesize vessels. CSX's Chesapeake Bay Piers is a smaller terminal in Baltimore that also handles domestic coast-wise business.

CSX and NS are the Class 1 railroads serving NAPP mines along with a few small short lines. The MGA Railroad (jointly operated by the CSX and NS railroads) serves some large Pittsburgh seam mines.

SAPP production is primarily low-volatile and mid-volatile coals. Steel makers like the low sulfur, low ash, low moisture, and high CSR Blue Creek seam coal for making coke. SAPP metallurgical coal is considered to be one of the highest quality coals in the world. Coking coals from SAPP generally have a lower ash and sulfur content than competing Northern and CAPP coals.

Consumers of U.S. coal appreciate the high fluidity of the high-volatility. A U.S. coals given their ability to improve flowing in the blend and make a larger coke. Some U.S. metallurgical coals are considered to have quality equal to the best of the premium Australian coals thereby providing a good supply diversity option for consumers.

Most CAPP export coal (both metallurgical and thermal) is exported through one of three coal terminals at Hampton Roads, Virginia. DTA (Dominion Terminal Association) and Pier IX are served by CSX, and Lamberts Point is served by NS. New Orleans also remains an important center for coal exports from these eastern regions given its location at the mouth of the Mississippi River which many coal mines can access via inexpensive river transport.

Lamberts Point Coal Terminal is the largest capacity coal port in North America. The terminal is owned, operated and served by the NS railroad. Virtually all export coal produced by NS-served mines in Central Appalachia is moved through Lamberts Point. Nearly all the coal exported from Lamberts Point is metallurgical coal.

The CSX-served DTA terminal is the larger of the two terminals in Hampton Roads. Most of the coal shipped from DTA is metallurgical grade. Pier IX terminal is the other CSX-served export terminal at Hampton Roads and it exports both thermal and metallurgical coal depending on then-current market conditions.

U.S. suppliers have a transportation advantage to most European locations. Also, FOB mine costs for the high sulfur high-volatility C coals are very competitive which improve the economics somewhat into far-distant markets in Asia.

In the U.S., taxes and fees imposed on export coals at the federal level include corporate income taxes, reclamation taxes, and corporate income taxes. State governments typically impose income and severance taxes and guide counties on the imposition of property taxes except in West Virginia where property taxes are assessed at the state level. Royalties and taxes vary by state and sometimes by mining method.

Russia

Russia is a major global producer of metallurgical coal. Even though it consumes most of its domestic production, Russia remains one of the top five metallurgical coal exporters in the world.

Russian remaining marketable metallurgical coal reserves are quite large, larger than those in the U.S. The reserve base exists primarily at operating mines with about half at mines serving domestic customers and half serving the export market. The reserve spans all qualities of metallurgical coal, from hard to semi-soft to soft coking coals. Russia also has a significant amount of high quality PCI coal.

Russia's metallurgical coal reserves are accessed by both underground and surface mining methods. Most of the reserves exist in the Kuzbass region of central Russia. Production is spread among many companies, but two-thirds of production is controlled by the five largest producers.

Unlike most other coal producing and exporting countries, Russia was not significantly affected by the recent multi-year production rationalization process. Despite weaker international and domestic coal demand and continued ruble cost inflation during the rationalization period, most major Russian coal producers have kept production and exports stable.

There is a limited amount of hard coking coal in Russia. Its coal often contains impurities and delivery is sometimes inconsistent.

Ocean freights from eastern Russian terminals to metallurgical coal customers in northeast Asia are very low providing them with a significant transportation advantage compared to most suppliers, although the rail cost to their ports is very high. Consumers of Russian coal like that Russian coal allows them to diversify from Australian metallurgical coal. Russian PCI coal directed into the European Union has almost complete dominance due to its low sulfur and high energy content. Note that the low CSR levels of Russian coal (compared to many other sources) can make it less desirable.

The location of Russian mines in the center of the country creates extremely long haulage distances to eastern and western terminals or to most western landborne customers. Weather can be a problem, as can railroad maintenance, both of which can and do interrupt supply periodically.

Coal export infrastructure is remote with high capital and operating costs that impact availability. Some ports are impacted by ice and shallow water depths. Coal is exported from ports in Russia's Northwest, Baltic Sea, Black Sea and the Far East. In the aggregate, loading capacity is nearly double actual exports. However, Far East ports are currently operating at or near total capacity and port expansion plans are numerous.

Government-owned Russian Railways operates the rail system but rail car operation services are privately controlled.

Russia's legal framework is evolving as its economy trends to becoming less government controlled. Foreign investment inside Russia is challenging and limited. Mining companies pay an assortment of taxes including a corporate profits tax, a value added tax, a mineral extraction tax, and property and land taxes.

Canada

Marketable metallurgical coal reserves in Canada are similar in size to those in the U.S. Most of this reserve is located in British Columbia with nearly all the remainder found in Alberta. There is a very small metallurgical coal reserve in Nova Scotia.

There are multiple possible projects in Western Canada which could add significantly to Canadian reserves and could potentially replace existing mines if market conditions allow.

Since 2010, Canadian metallurgical coal production has ranged from 25 to 35 million tonnes per year and is currently increasing. Depending on the year, between three and five companies contribute to metallurgical coal production. Production has been highly concentrated with one producer responsible for most of the production. The new Donkin underground mine in Nova Scotia owned by Kameron Collieries is looking to expand metallurgical coal production.

Most of Canada's production is thermal coal. While most of Canada's coal exports are metallurgical coal, the Donkin mine could also export significant volumes of thermal coal. Of total metallurgical coal production in Canada only one to two million tonnes is consumed domestically.

Canada has some of the highest quality metallurgical coal in the world. Its low- and mid-volatility metallurgical coals are in high demand with steel producers around the world, particularly in Asia. Volatile matter in the western Canadian metallurgical coal mines is usually low. Most of it is blended with high-volatile coal by customers. Most Canadian coal also has low fluidity requiring other high-volatile coals to be introduced into the blend to make proper coke. Canada can also produce some high quality PCI coal.

Western Canadian port capacity has been expanded to over 60 million tonnes per year. Primary Canadian terminals include Westshore, Neptune and Ridley Island terminals. In addition to Canadian metallurgical coal, a few million tonnes of U.S. western thermal coal is shipped through Westshore. The Nova Scotian coal is exported through the Provincial Energy Ventures terminal near Sydney, Nova Scotia.

Two railroads control the movement of most Canadian coal: Canadian Pacific (CP) railway and Canadian National (CN) railway. CP controls most of the export coal, and eastbound shipments to the U.S. and to Thunder Bay Terminal on Lake Superior. CN serves mines in central Alberta and north-eastern BC. If new mines are developed in northern British Columbia, the CN is well-positioned to transport their coal to Ridley Terminal for export. Ample rail capacity exists for the foreseeable future.

The coal mining industry in Canada is subject to federal, provincial and local regulation and legislation. Mining operations are regulated primarily by provincial legislation, but also by federal legislation and local by-laws.

All new projects must prepare environmental impact assessments. Jurisdiction over mining is provided by the province with particular attention paid to heritage and cultural resources, site remediation and reclamation.

Provinces assess lease fees, income taxes and royalties, and the federal government assesses a federal net profits tax. Furthermore, British Columbia has a substantial carbon tax that applies when fuel is purchased for any reason; however, coal sold and exported outside British Columbia is exempt.

Mozambique

Mozambique is emerging as a producer and exporter of metallurgical coal. Thermal coal exports are, essentially, a byproduct of metallurgical coal production. Higher production and export of coal in Mozambique depends on investment in the coal value chain, higher coal prices and guarantees of improved internal country security. All of Mozambique's marketable reserves are located in the Tete Province, mostly in the Moatize coal basin. Although there are reports of a total reserve of 20 billion tonnes of coal, actual marketable reserves are probably much smaller, perhaps comparable to those in the U.S., at most.

Mozambique coal production began in 2011 and is increasing as infrastructure is improved, mostly at Vale's Moatize mine. While there is no internal consumption of coal in Mozambique, efforts are underway to develop a coal-fired station, called the Benga Independent Power Project. A recent joint venture agreement between Kibo Mining and a Mozambique energy company Termoelectrica de Benga S.A. was formed for this purpose.

Mozambique has high quality hard coking coal. CSR levels are high. Some Mozambique hard coking coal is on par with the premiere Australian coking coals. However, ash and phosphorous levels are high so the coal must be blended in order to make high quality coke.

Coal is exported using two rail and port systems – Beira and Nacala. The completion of the Nacala Logistics Corridor which includes a 912-kilometer rail line and a new export coal terminal in Nacala in 2017 has significantly improved the logistics of moving coal to the export market with a large reduction in cost. Acknowledgement of Mozambique's potential was the purchase by Mitsui of a portion of the Moatize mine and the Nacala Logistics Corridor.

Multiple new projects are planned in Mozambique. The economic viability of these projects is in question. Mineral resources in Mozambique are owned by the state and governed by a federal mining law. Foreign companies are allowed to apply for an exploration license but to mine coal, companies must be registered in Mozambique and the government must provide its consent to mine. Mining companies are subject to the usual royalties and corporate income taxes.

APPENDIX G: Principal Global Suppliers of Thermal Coal – Country Breakdown[cv]

Indonesia

Indonesia has an extremely large, marketable coal reserve of billions of tonnes, nearly all of which is thermal coal. The majority of this reserve is located in Kalimantan, with most of the rest located in Sumatra. More than one-half of this reserve is classified as low-rank coal. However, since much of the reserve is located in South Sumatra and East Kalimantan, a substantial amount of infrastructure development will be required in order to mine and market the coal.

Indonesian thermal coal production exceeded 400 million tonnes in 2015 but has fallen since. Accurate production statistics are difficult to obtain since some Indonesian coal production is "illegal", a problem the government is making good progress in rectifying. Most production has been in Kalimantan. All production is by surface methods in mines whose costs are typically very low. Most of the coal is exported. The government reserves a certain amount (the domestic market obligation, or DMO) for domestic use and the rest is exported. The DMO was about 80 million tonnes in 2015.

Indonesia produces three types of thermal coal: bituminous coal (>5,400 kcal/kg on a gross as received (gar) basis), sub-bituminous coal (>4,600 to 5,400 kcal/kg gar), and low rank or lignite coal (less than 4,600 kcal/kg gar). Three-quarters of coal production is low rank (lignite and sub-bituminous) coal. Of the low rank coal, about one-third is lignite coal. U.S. PRB coals are on a quality par with the best Indonesian coal.

In Indonesia, producers usually manage their own logistics. Exported coal moves from mine to ocean vessel mainly by barge to low capital and operating cost trans-shipment facilities where current capacity is more than sufficient. There are some possible future projects in Indonesia that are essentially "stranded" by the lack of infrastructure available to deliver their coal to market.

Australia

Australian thermal coal marketable reserves are in the billions, much greater than those in the U.S. The reserve is split roughly equally between New South Wales and Queensland. Important coal basins include the Sydney, Bowen, Surat, Galilee and Gunnedah Basins.

Recent thermal coal production totals about 250 million tonnes per year, roughly 80% of which is exported. Thermal coal production is primarily concentrated in the Sydney Basin in New South Wales and the Bowen Basin in Queensland. Over 50 companies produce thermal coal in roughly 75 mines, but the top eight companies control 75% of total thermal coal production. The largest miner produces nearly three times the thermal coal of its nearest competitor.

Australian thermal coal exports total about 200 million tonnes per year. Japan is the largest consumer of Australian thermal coal, consuming twice as much as the next largest consumer, China. South Korea, and Taiwan are also large consumers.

Russia

Marketable reserves of thermal coal in Russia are similar to those in Australia in size. Half of this reserve is located in the Kuzbass region in Kemerovo. High rank coals form the majority of the marketable reserves. Low-rank lignite accounts for about one-quarter of the reserve, mostly in Krasnoyarsk and Irkutsk. Most of the Russian coal reserves are far from major international markets and require an inland transport to exporting port of as much as 4,000 – 6,000 km.

Russian thermal coal production exceeds 250 million tonnes per year thereby making up the majority of total Russian coal production. Bituminous coal accounts for 70% of thermal coal production, with lignite accounting for most of the rest.

Recently, exports have strengthened, now totaling about 120 million tonnes. Most exports to Asia are by seaborne methods. To the west into Europe, exports are by both landborne and seaborne methods.

Russia's thermal coals are good quality bituminous coals. They are characterized by low sulfur content typically usually below 0.6% and often below 0.4% making them attractive to European buyers, in particular. Ash content of Russian bituminous thermal coal is average but energy content almost always exceeds 6,000 kcal/kg, except for high ash coals. High-ash coals can have an ash content well above 20% with an energy content of about 5,500 Kcal/kg nar.

Most Russian coal producers' costs are denominated in Russian currency. The ruble exchange rate is still the main driver in cost trends, with cost inflation in ruble-denominated categories of prime importance. Recent changes in the ruble exchange rate have lifted Russian mining costs. FOB port costs are similar to those in Australia, but inland rail transport can reach one-half of the total FOBT cost. Russian port costs are high, being impacted by the ruble exchange rate.

Colombia

Colombia’s total marketable reserves are greater than those in the U.S. but smaller than those in Russia and Australia. Most of the reserves are located in the departments of La Guajira and Cesar.

Production has continued to expand, reaching over 89 million tonnes in 2017 with expectations of exceeding 100 million tonnes per year early in the next decade. The vast majority of production is from surface mines, most of them large and very efficient, and the vast majority of production is exported. FOB mine costs are among the lowest in the Atlantic Basin, making Colombia a preferred source of thermal coal in the Atlantic markets.

New projects will require a build-out of rail and port capacity. Projects outside of La Guajira and Cesar are located in interior Colombian states and, for the coal to be exported, will require new rail lines at very high capital cost.

Most Colombian thermal coals are high volatile bituminous coals with medium to high calorific value, low sulfur and ash levels, and generally good thermal combustion characteristics. Quality has declined over time as the large mines expanded production into somewhat poorer quality coals. The primary market for Colombian coal has been the Atlantic market. With the decline in U.S. imports, Europe remains the primary source of demand followed by Mexico and Central and South America. With the opening of the third channel at the Panama Canal, exports to Asia are believed to be a promising growth market.

Nominal rail and port capacity are sufficient to accommodate existing production but increased production will require expansion of both rail and ports. By regulation, all exports are direct-loaded into vessels. The major producers have invested in ports to provide direct ship loading and eliminate barge-to-ship transfers. Currently, any coal produced in the Colombian interior can only be transported by truck. Ongoing expansion efforts have been delayed for a variety of reasons.

South Africa

South Africa's large thermal coal reserves are similar in size to those in Australia. Mpumalanga Province contains the majority of marketable coal within South Africa. Reserves are greatest in the Waterburg and Witbank coalfields, but the Witbank, Highveld and Ermelo coalfields are the key current coal producing areas

Thermal coal production has surpassed 250 million tonnes. The majority of this coal is consumed in the domestic market. Currently, about 75 million tonnes per year. Export coal is sourced primarily from the Witbank field.

Although port capacity is far greater, exports of South African thermal coal have hovered around 75 million tons per year for a few years, hindered by rail-to-port delivery problems. Most recently, exports are split between standard and high-ash bituminous coals. India is by far the largest destination market. Other markets include Europe, Northeast Asia and Turkey. Pakistan and Egypt represent markets of opportunity for South African thermal coal.

South African thermal coal for export ranges greatly in quality from under 5,000 kcal/kg nar to over 7,000 kcal/kg nar. Typically, coal is processed to meet a standard seaborne market specification for bituminous coals. However, coal qualities have been falling but with increased yields, margins are being maintained, nonetheless. A high-ash product for the Indian and Chinese market is also produced at a quality similar to that of the Australian high-ash coals. The growth in this high-ash market has been swift and its volume already significantly exceeds that of the standard 6,000 kcal/kg specification market. Eventually, high quality South African coal reserves will be exhausted.

In local currency terms, mining costs have increased substantially since 2013. But in U.S. dollar terms, the cost has actually declined due to exchange rate changes, although this last year, costs increased.

South African coal exports are serviced by four terminals at three ports, and by three main rail systems. Total port capacity is over 100 million tonnes and total rail capacity is about 90 million tonnes. Exports have failed to perform partly due to constraints on the rail system which state-owned Transnet hopes to solve through additional capital spend on rolling stock and upgrades to the existing Richards Bay coal line. A guarantee is in place to lift capacity on the important Richards Bay line up to 81 million tonnes per year of capacity.

The South African government owns all mineral rights. Historically disadvantaged South Africans are given preference regarding the opportunity to invest in the mining industry. Minimum black ownership levels are mandated.

South African miners are subject to taxes including royalties and corporate income taxes.

United States

Northern Appalachia (NAPP). At today's prices, marketable thermal coal reserves are in the low single digit billions of tons range, although additional underground reserves are present that could support new mines if sustained market conditions warrant. Thermal coal production in NAPP totals around 90 million tonnes per year, of which 0 to 8 million tonnes per year is annually exported, usually to Europe, the Mediterranean and Latin America. Exports of NAPP coal have increased significantly over the last four years. When petroleum coke prices are high, some NAPP coal is often exported to India as a low-cost replacement fuel in cement plants.

Thermal coal produced in NAPP is high in energy content and generally high in sulfur. The average quality for NAPP thermal coal is high, over 12,500 Btu/lb, with ash under 10%, but sulfur in the range of 3%. Most of the thermal production occurs in large Pittsburgh Seam longwall operations. The sulfur content of future production will rise as mine operations move westward in NAPP.

Low natural gas prices in the Marcellus region are threatening NAPP coal producers. This pressure has driven thermal coal mines to reduce costs over the last several years although higher wages and higher diesel costs have lifted costs in the last two years.

Central Appalachia (CAPP). Marketable thermal coal reserves in CAPP are small and occur mostly in West Virginia. Current thermal coal production totals about 30 million tonnes per year, but CAPP is under pressure from low-cost natural gas and environmental regulation. Thermal coal exports can range from 0 to 5 million tonnes per year depending on market conditions.

The average quality of CAPP coals is roughly 12,500 Btu/lb nar, under 10% ash and less than 1% sulfur. Overall quality has been declining since producers tend to mine their highest-quality reserves first. Almost all CAPP coals are low in sulfur content.

Average mining and transportation costs are high in CAPP, reflecting a mature basin where low-cost reserves are mined out. These high costs make it difficult for CAPP producers to earn a margin in the export market.

Illinois Basin (ILB). Marketable thermal coal reserves in the Illinois Basin (Illinois, Indiana and western Kentucky) are quite large in the range of several billion tons. Low-strip-ratio surface reserves are largely controlled by two companies and will be gone within 10 years. Abundant dragline-amenable, mid-strip-ratio surface reserves remain, as do significant reserves of underground thermal coal at fairly shallow depth.

Production in the ILB grew in the early 2000s, peaked in 2014 then declined sharply through 2016 as domestic demand fell. The domestic and export market for ILB coal has rebounded and production has increased in 2017 and 2018. Costs declined through 2016, as poor market conditions forced operators into austerity programs, but are now rising as demand returns and royalties rise along with sales prices. Productivity improvement will help to minimize cost increases.

ILB coal is typically a high-volatile, bituminous thermal coal. Average ILB thermal coal quality is around 11,300 Btu/lb, under 10% ash, and close to 3% sulfur, with great variation seen around those figures. Chlorine content can be high in some of the deeper coals. Its low cost allows ILB thermal coal to penetrate the export market, but its high sulfur reduces its potential market and allows those customers willing to consume it to heavily discount the price.

Powder River Basin (PRB). This purely thermal coal basin possesses a very large marketable reserve base about twice the size of that in the ILB. Coal is produced from 17 mines almost all of which are large surface operations. Coal seams are thick allowing for efficient and low-cost mining. Surface mining cash costs in the PRB are typically extremely low. Just two companies produce over 50% of the coal in the PRB.

Just as elsewhere in the rest of the U.S., competition with low-cost natural gas is hindering production. From its peak in 2015, production has fallen by about 20%. Production will stay under pressure as long as natural gas prices stay low. Even so, production exceeds 300 million tons per year, making the PRB the largest U.S. coal producing basin.

The PRB possesses mostly low-sulfur, sub-bituminous thermal coal. Sub-bituminous coal quality ranges from 8,000 Btu/lb to 9,400 Btu/lb, with low ash content (well under 10%) and very low sulfur content (averaging under 0.5%). Some low-ash, very low-sulfur bituminous coal is produced as well, with an energy content of about 10,500 Btu/lb.

Some PRB coal is exported, largely to Asia and South America. It competes well with Indonesian coal for markets in northeast Asia, especially South Korea and Japan. However, the lack of available export port capacity limits its potential as new port projects experience permit denials and litigation continues. Meanwhile, modest volume is exported though Canadian ports in British Columbia when they have available capacity.

APPENDIX H: Competitive Assessment of U.S. vis-à-vis Global Suppliers[cvi]

Australia

Coal producers in Australia are, by far, the largest and most significant competitor to U.S. metallurgical coal exporters. Where qualities are similar, the U.S. and Australia compete for met markets globally.

Advantages enjoyed by Australian producers include the superiority of their low- and mid-volatility products as well as the size and diversity of their production base. The reserve base of equivalent, high-quality coal is much smaller in the U.S. where there are also fewer, and generally smaller producers.

U.S. metallurgical coal mining costs are higher on average than those in Australia, and U.S. rail costs to port are two to three times higher than rail-to-port costs in Australia. To Asia, ocean freight rates favor Australian shippers; to Europe, they favor U.S. shippers. Where quality is similar, then, the total cost structure provides a net margin advantage to Australian metallurgical coal producers in Asia and usually to U.S. coal producers in Europe.

But, qualities are not always similar. While Australia enjoys a reputation as the premier low- and mid-volatility products, the U.S. is recognized for having a significant high-volatility reserve and production base that is far superior to that found in Australia, given its desirability in blends requiring highly fluid coal. On the other hand, some U.S. coals are too expanding and need to be blended with others to balance.

For thermal coals, the comparison is more nuanced. U.S. thermal coal producers in Appalachia and the Illinois Basin compete with Australian thermal coal producers for markets in Asia.

On an energy-adjusted basis, thermal coal costs at U.S. Appalachian mines are slightly higher than Australian mining costs but rail costs are roughly twice those in Australia, creating a definite cost disadvantage to Australian thermal coal mines. Barge costs for Illinois Basin thermal coal mines to port are also twice the cost of Australian inland transportation, but ILB mining costs are significantly lower on an energy-adjusted basis. On an energy-adjusted basis, the average total FOB port cost of ILB thermal mines is lower than in Australia.

However, the high sulfur content of Illinois Basin coal is heavily penalized by consumers. The penalty is usually greater than the cost advantage leaving Australian producers with the advantage over U.S. ILB coals in Asian markets.

Thus, FOB origin port costs for Australian thermal producers are typically lower than those in the U.S. giving Australian producers pricing flexibility versus their higher cost U.S. competitors. Furthermore, into the Asian market, Australia enjoys a transportation cost advantage over U.S. metallurgical coal producers. In the Atlantic region, however, transportation favors U.S. coals where U.S. coals can often out-compete Australian metallurgical and thermal coals.

Russia

U.S. and Russian coals compete in both thermal and metallurgical markets. Geographically, competition is centered in Europe and the Mediterranean, where both countries have an ocean freight advantage over Australian shippers.

Both metallurgical and thermal coal in Russia are produced at costs lower than in the U.S. (FOB mine). Rail costs, however, favor U.S. producers given the very long Russian rail haulages both east and west from the mines in central Russia. On the other hand, U.S. ocean freight rates to Asia are higher than Russian rates. To the Atlantic, however, Russian ocean freight is more expensive, partly because much of the coal is delivered using smaller vessels.

U.S. coking coal is of better quality than Russian coking coal. However, Russian coals are very low in sulfur, an advantage over U.S. coals. In the PCI category, Russian coal is highly prized in Europe given its low sulfur and high energy content. It easily displaces PCI coal from other sources.

Russian thermal coal is helpful to consumers in Europe given its very low sulfur content. It is used to blend with higher sulfur coals.

Russia has an advantage in its ability to load full capesize vessels at many ports. U.S. suppliers are limited to loading small capesize vessels at best, and often just Panamax vessels unless "light-loading" methods are used. This is not as important in metallurgical markets, where customers usually prefer a smaller vessel. But in thermal markets, consumers usually want to keep costs as low as possible and prefer larger vessels when they can be used. This is an advantage to Russian suppliers.

U.S. suppliers have an advantage over Russian suppliers (both thermal and metallurgical) in their ability to provide security of supply through regular shipments of coal. The harsh Russian winter can interrupt deliveries. U.S. suppliers are also careful to provide their consumers with uniform shipment quality.

Finally, Russia is an economy in transition to being market-based. At this time, U.S. suppliers can provide greater fiscal and regulatory stability as well as a stable currency.

Canada

The U.S. and Canada compete for metallurgical coal markets globally when qualities are similar. Metallurgical coal competition between Canada and the U.S. is limited by geography and trade flow. Canada sends the majority of its metallurgical coal to Asia; the U.S. sends most of its coal to the EU.

Average mining and coal preparation costs are similar in both countries. Inland transportation to port favors Canada, but port costs are lower in the U.S. Average total FOB port costs are basically equal. But Canada exports from its west coast (and recently smaller volumes from its east coast) and the U.S. exports metallurgical coal from its east coast. Both countries have secure supply and uniformity in shipments. Thus, competition is based on required quality and the impact of ocean freight rates on delivered cost.

At times of high prices, when U.S. coal incentives to Asia are greater, there is some competition, but the greater freight cost to Asia from the U.S. east coast limits U.S. exports in most Asian markets. Canadian low- and mid-volatility, low-fluidity coals are stable parts of Northern Asian blends. The U.S. coals can be used to enhance fluidity in the blends, and lower the ash content, but tend only to be economic when prices are very high.

Mozambique

Mozambique is an emerging supplier of metallurgical coal. Competition with the U.S. is currently limited and sporadic. Should it occur, the U.S. has an advantage given its lower mine and inland transportation costs.

The U.S. coal is perceived to have a better quality as regards the level of impurities. Metallurgical coal in Mozambique is at the high end for sulfur and ash. However, Mozambique has high fluidity coal that is helpful in certain blends.

Indonesia

The U.S. and Indonesia compete in Asian thermal markets, particularly those in Northeast Asia. Specifically, U.S. Powder River Basin (PRB) coal competes with Indonesian sub-bituminous coal.

U.S. coal producers enjoy a substantial mine cost advantage over Indonesian producers. However, Indonesian inland transportation (barge to transshipment facility) costs are roughly one-third the cost of U.S. rail to Canadian ports. The absence of a U.S. west coast port is a clear disadvantage to U.S. producers, since U.S. coal must export either in Canada, where capacity is limited or in the U.S. Gulf of Mexico which increases both inland transportation and ocean freight costs.

Furthermore, Indonesia's producer-owned logistics chain gives them an advantage over the U.S., where third party transportation and infrastructure costs are higher. Port costs in the U.S. are a few dollars per tonne greater than typical offshore transloading costs in Indonesia. Coal specifications are similar for sub-bituminous coal, but the U.S. enjoys a general advantage in providing a stable and secure source of supply that consistently meets contract specifications. Indonesian producers must cope with the constant threat of rising taxes and royalties, licensing and permitting issues, and the requirement that Indonesian coal is obligated first and foremost to the Indonesian domestic market.

Colombia

Colombia and the U.S. compete directly in Atlantic thermal markets. With its low mining, inland transportation and port costs, and with its ocean freight advantage to markets in Europe and the Mediterranean, Colombian coal producers are able, when necessary, to lower their prices more than their competitors are willing or able to do.

Colombian coal is low in sulfur and ash content and competes well against certain U.S. coals with higher sulfur content, such as those in NAPP. While consumers in the European Union desire NAPP and ILB coals for their very high energy content, they dislike the high sulfur content and, in the case of the ILB, the high chlorine content. Including Colombian coal in a blend with NAPP and ILB coals with Colombian coal lowers the sulfur and chlorine contents.

Financial transactions are easier to manage in the U.S. as lenders are more efficient given the existence of credit information and better regulation which make the coal transactions less risky. Also, in Colombia, government policy is discouraging existing producers from investing.

South Africa

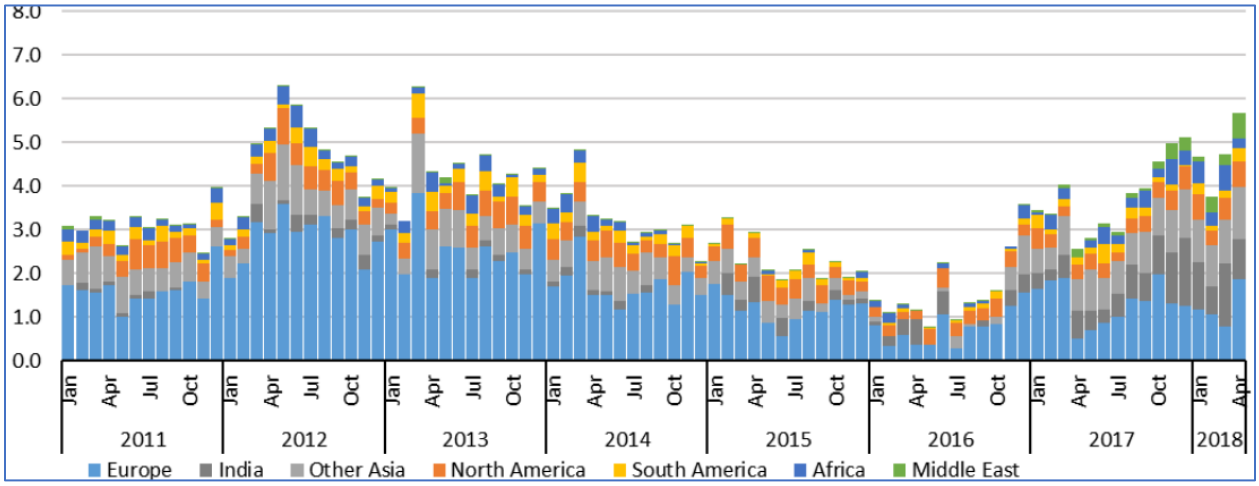
For years, South Africa has been slowly lowering its exports to the Atlantic and increasing its exports to the Pacific, particularly India. For this reason, direct competition between South Africa and the U.S. is declining. Where they compete on a head-to-head basis, South Africa has an advantage with its lower FOB mine, inland transportation and port costs. Rail capacity constraints for rail shipments from mine to port are a problem, however.

South African coal quality is declining as the availability of standard 6,000 kcal/kg coal is declining. South Africa is increasingly offering a non-standard high-ash product, similar to what the Australians offer in the seaborne market. U.S. coals have a quality advantage, although washing rates and yields determine the final South African specification. If costs allow, South African coal can be washed to any normal standard specification.

Policy uncertainty is high in both countries, but fiscal stability is greater in the U.S. There is growing concern that the South African government will institute some form of a domestic mine obligation if South African public utility company Eskom is unable to source sufficient coal from domestic suppliers under normal market circumstances. These uncertainties create an advantage for U.S. producers, who operate in much more stable market.

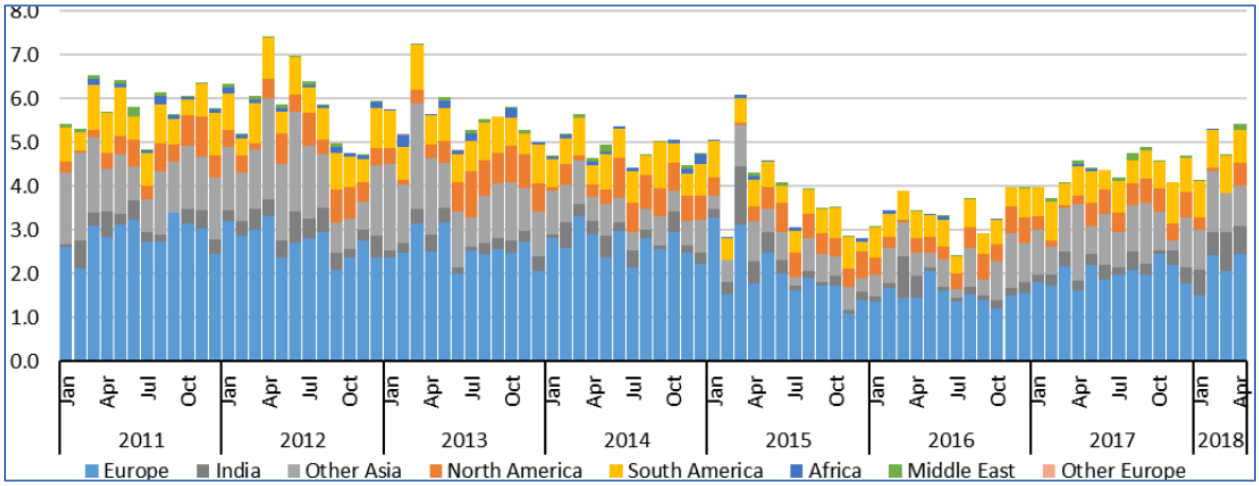
APPENDIX I: U.S. Thermal & Metallurgical Coal Exports by Destination

U.S. Thermal Coal Exports by Destination (million tons)



Source: Doyle Trading Consultants

U.S. Metallurgical Coal Exports by Destination (million tons)



Source: Doyle Trading Consultants

APPENDIX J: Coal Financing Policies of Key Lending Institutions

Coal Financing Policies of Key International Lending Institutions[45]			
Bank/Entity	**U.S. share %**	**Coal financing, 2007-2013**	**Policy on financing coal-fired power plants**
African Development Bank	6%[46]	$2.84 billion	2012 AfDB energy sector policy states that the bank will support coal power plants when investment will have a strong development impact and is also environmentally responsible.
Asian Development Bank	16%[47]	$1.69 billion	2009 ADB energy policy[48] states the Bank will support coal-fired power plants selectively if adequate emissions mitigation measures are incorporated into project design. However, ADB has not pursued recent coal projects of any significance.
Asian Infrastructure Investment Bank	0%	N/A (bank launched in 2016)	June 2017 policy draft energy strategy states "Carbon efficient oil- and coal-fired power plants would be considered if they replace existing less efficient capacity or are essential to the reliability and integrity of the system, or if no viable or affordable alternative exists in specific cases. The Bank will pay attention to the particular needs of its less developed members."[49]
European Bank for Reconstruction and Development	0%	$.41 billion	2014 policy states coal-fired plants will only be financed "in rare and exceptional circumstances."[50]
World Bank:			2013 WB policy eliminates financing support for coal power generation except in rare circumstances.[51]
International Bank for Reconstruction and Development	16%[52]	$4.6 billion	
International Development Agency	54%[53]	$.05 billion	
International Finance Corporation	21%[54]	$1.83 billion	

[45] Unless otherwise noted, information drawn from 2017 IEA report on *International Coal plant financing*, p. 66. Available at http://www.iea.org/access2017/

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[xiii]Management Information Services, Inc., op. cit.

[xiv]DOE Secretary Perry noted that "This Administration looks forward to making available even more of our abundant natural resources to allies and partners like Ukraine in the future to promote their own energy security through diversity of supply and source. Partnerships like this are crucial to the path forward to achieve energy dominance." See "Secretary Perry and Secretary Ross Hail New Coal Deal with Ukraine," U.S. Department of Energy press release, July 31, 2017, https://energy.gov/articles/secretary-perry-and-secretary-ross-hail-new-coal-deal-ukraine.

[xv]Management Information Services, Inc., "Job Benefits of U.S. Coal Exports to Ukraine," prepared for the National Coal Council, May 2018.

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