

# Subcommittee on Energy and Mineral Resources

Paul Gosar, Chairman

Hearing Memorandum

July 20, 2018

**To:** All Subcommittee on Energy and Mineral Resources Members

**From:** Majority Committee Staff, Rebecca Konolige (x61879)  
Subcommittee on Energy and Mineral Resources

**Hearing:** Oversight Hearing entitled “*Assessing Innovative and Alternative Uses of Coal*”  
**July 24, 2018, at 10:00 A.M. in 1324 Longworth House Office Building**

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The Subcommittee will hold a hearing on **July 24, 2018, at 10:00 A.M. in 1324 Longworth House Office Building**, focusing on the potential uses of coal for innovative purposes at home and abroad.

## **Policy Overview**

- Coal, America’s most abundant energy source, provides approximately 37% of the world’s electricity and is the second-largest source for electricity generation in the United States. Despite the challenges facing the U.S. coal industry, the fuel will remain a viable and substantial source for power generation in the U.S. and globally for decades to come.
- As market trends have affected demand for coal as a source of electricity in the United States, demand has grown abroad with the advancement of the developing world. Coal is also beginning to attract greater attention for a broader array of non-fuel and reuse applications and products for markets at home and abroad.
- Exports to international markets, uses of metallurgical coal in steel production, and extractions of valuable materials from coal refuse are all innovative and profitable fields in which coal is in high demand.
- The hearing will review how coal will continue to be a vital energy source in meeting the world’s electricity needs and the range of innovative technologies and applications being used and developed for this abundant domestic resource.

## **Invited Witnesses**

*Mr. Randall Atkins*  
CEO  
Ramaco Carbon  
Sheridan, WY

*Mr. Vernon Haltom*  
Executive Director  
Coal River Mountain Watch  
Naoma, WV

*Mr. Michael Klein*  
VP Legal and Business Development  
Lighthouse Resources Inc.  
South Jordan, UT

*Mr. Julian McIntyre*  
Founder and CEO  
Arq  
Lexington, KY

## **Background**

Coal has historically been the workhorse of global energy production. Since the 1800s, coal combustion powered the rapid technological advancement of much of the world and helped bring humanity into modernity.

Coal consumption in the United States was reliably high throughout the 20<sup>th</sup> century, but began decline in the last decade, largely due to the increasing economic competitiveness of natural gas.<sup>1</sup> Despite this, advances in technology and the rapid development of international markets has created multiple new avenues and applications for coal usage domestically and abroad, as discussed below.

Coal exports, the use of metallurgical coal in steel production, and the ability to extract hydrocarbons, rare earths, and other materials from coal refuse are a few examples of innovative, developing uses of coal that will continue to contribute to our domestic and global economy in the coming decades.

### *Coal Exports*

By the end of 2018, the U.S. will have exported 104 million tons of coal, an increase of 7.2 percent from a year earlier.<sup>2</sup> Growth in international markets has been steep, particularly in Asia. India, the largest foreign purchaser of American coal, imported nearly three times as much coal from the U.S. in the first quarter of 2018 compared to a year ago.<sup>3</sup> Along with India, the top

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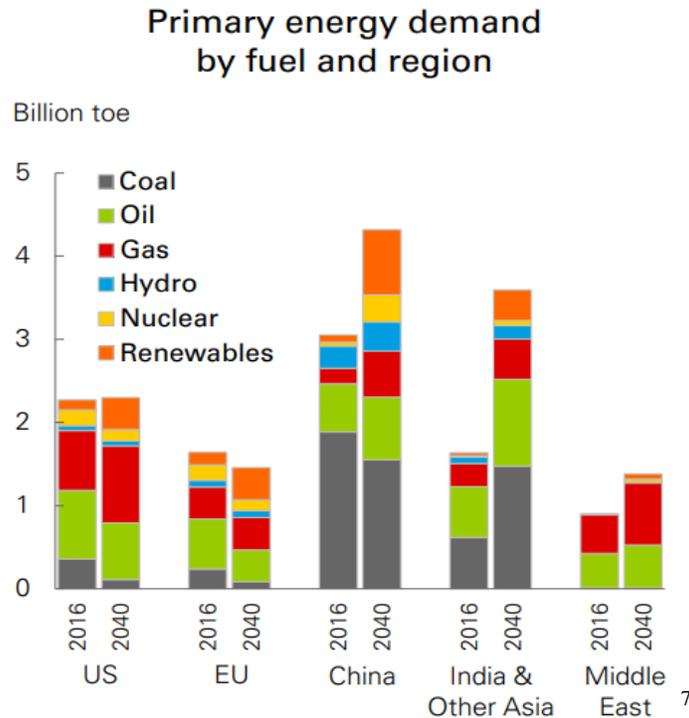
<sup>1</sup> CRS, “U.S. Energy: Overview and Key Statistics,” Michael Ratner and Carol Glover. June 27, 2014. <https://fas.org/sgp/crs/misc/R40187.pdf>

<sup>2</sup> Tim Loh and Rajesh Kumar Singh, “Hurting for buyers, US coal miners are learning to love India.” Economic Times. July 12, 2018. <https://economictimes.indiatimes.com/industry/indl-goods/svs/metals-mining/hurting-for-buyers-us-coal-miners-are-learning-to-love-india/articleshow/64954903.cms>

<sup>3</sup> Tim Loh and Rajesh Kumar Singh, “Hurting for buyers, US coal miners are learning to love India.”

five recipients of American steam coal exports – used for electricity generation – included South Korea and Japan in 2017.<sup>4</sup>

Projections out to 2040 show growth in global energy demand, particularly in China, India, and other Asian nations, which all show a strong continuing reliance on coal in the coming decades.<sup>5</sup> The demand for coal in China is estimated to start to slow somewhat by 2040, while demand in India is projected to continue to grow.<sup>6</sup>



Japan is an interesting example of a developed nation with high coal demand. Once reliant on nuclear power to allow a certain amount of self-sufficiency in their national energy production, Japan suffered a catastrophe in 2011 with the magnitude-9.0 earthquake, tsunami, and resultant meltdown at the Fukushima Dai-ichi power plant.<sup>8</sup> Since then, the country has increasingly depended on fossil fuels for its electricity generation.

A country greatly lacking in domestic energy resources, over 90 percent of Japan’s energy needs are met by imported resources.<sup>9</sup> The nation is now one of the top global importers

<sup>4</sup> U.S. Energy Information Administration, “U.S. coal exports increased by 61% in 2017 as exports to Asia more than doubled.” April 19, 2018. <https://www.eia.gov/todayinenergy/detail.php?id=35852>

<sup>5</sup> 2018 BP Energy Outlook. <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/energy-outlook/bp-energy-outlook-2018.pdf>

<sup>6</sup> 2018 BP Energy Outlook.

<sup>7</sup> 2018 BP Energy Outlook.

<sup>8</sup> Shozo Kaneko, “The coal-terminal debate: A view from Japan.” Seattle Times. September 19, 2017. <https://www.seattletimes.com/opinion/the-coal-terminal-debate-a-view-from-japan/>

<sup>9</sup> Shozo Kaneko, “The coal-terminal debate: A view from Japan.”

of coal.<sup>10</sup> At least eight new coal plants opened since 2016, with 36 additional plants planned for the next ten years.<sup>11</sup>

At the same time, Japan's focus on limiting CO<sub>2</sub> emissions as much as possible has led to the development of the most efficient coal plants in the world.<sup>12</sup> These high-energy, low-emissions coal plants have specific requirements for their coal supply, including resources from the Powder River Basin in Wyoming and Montana.<sup>13</sup>

For several countries in East Asia, including South Korea, access to energy resources is not just about maintaining reliable electricity generation, but is also a matter of national security. Australia and Indonesia, the two major suppliers of coal to the region, utilize shipping routes through the South China Sea.<sup>14</sup> That particular area of the Pacific has become increasingly fraught with geopolitical uncertainty, as China has used the region on several occasions to demonstrate the strength and influence of its military, and continues to do so.<sup>15</sup>

Also troubling are attempts by North Korea to squeeze through international sanctions to raise money for its regime, and the energy sector is not exempt from these efforts.<sup>16</sup> Specifically, South Korea is now investigating the source and current whereabouts of 9,000 tons of coal, thought to be of North Korean origin, that arrived in South Korean ports last year.<sup>17</sup> The coal appears to have been shipped by way of Russia, presumably to disguise its true source.<sup>18</sup>

While foreign relations with North Korea, China, and other nations in the region are shifting, and may ultimately show improvement, it seems clear that a reliable source of coal from the United States may help limit the vulnerability of Japan, South Korea, and other nations in East Asia to sudden supply chain interruptions.

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<sup>10</sup> Shozo Kaneko, "The coal-terminal debate: A view from Japan."

<sup>11</sup> Haley Zaremba, "One developed country is moving back to coal." Business Insider. May 10, 2018.

<http://www.businessinsider.com/japan-moving-back-to-coal-2018-5>

<sup>12</sup> International Energy Agency, "Energy Policies of IEA Countries: Japan 2016 Review." 2016.

<https://www.iea.org/publications/freepublications/publication/EnergyPoliciesofIEACountriesJapan2016.pdf>

<sup>13</sup> Shozo Kaneko, "The coal-terminal debate: A view from Japan."

<sup>14</sup> Dylan Brown. "Japanese engineer makes case for U.S. coal exports." September 22, 2017.

<https://www.eenews.net/greenwire/stories/1060061471>

<sup>15</sup> Lynn Kuok, "China Is Winning in the South China Sea." The Wall Street Journal. July 17, 2018.

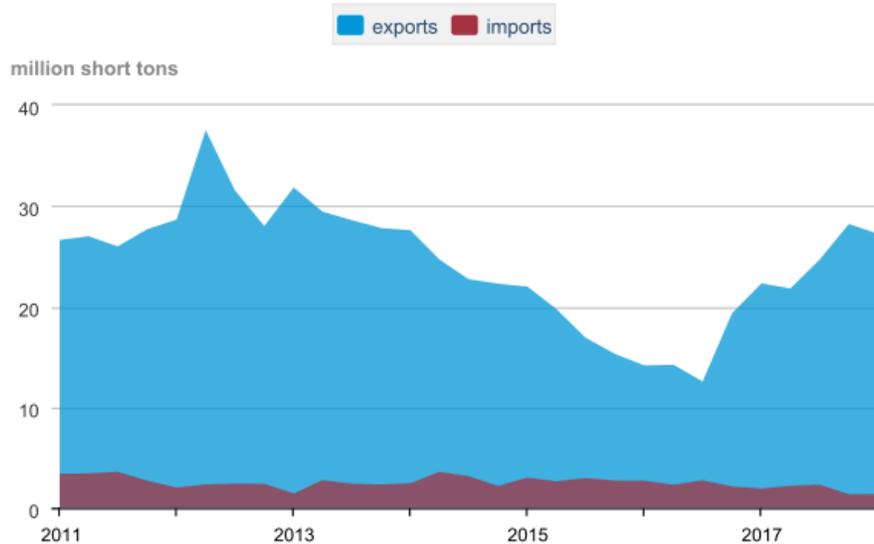
<https://www.wsj.com/articles/china-is-winning-in-the-south-china-sea-1531868329>

<sup>16</sup> Andrew Jeong, "South Korea Suspects 9,000 Tons of North Korean Coal Made It Into the Country." The Wall Street Journal. July 18, 2018. <https://www.wsj.com/articles/south-korea-suspects-9-000-tons-of-north-korean-coal-made-it-into-the-country-1531911034?mod=e2fb>

<sup>17</sup> Andrew Jeong, "South Korea Suspects 9,000 Tons of North Korean Coal Made It Into the Country."

<sup>18</sup> Andrew Jeong, "South Korea Suspects 9,000 Tons of North Korean Coal Made It Into the Country."

### Quarterly U.S. coal exports and imports, 2011-2018



 Source: U.S. Energy Information Administration: *Quarterly Coal Report*

From the perspective of the United States, the economic effects of exporting coal to international markets are clear – in 2017, exports to Asia more than doubled and American coal exports increased by 61 percent.<sup>19</sup> As international demand for coal is expected to stay strong, the United States should continue to meet the demand with a reliable supply.

#### *Metallurgical Coal*

There are multiple types of coal used for different purposes. Steam coal, or thermal coal, is used for electricity generation.<sup>20</sup> Metallurgical coal (or “met” coal), in comparison, is a different grade of coal used in steel production. Also known as coking coal, metallurgical coal must satisfy specific requirements including low ash and sulfur content.<sup>21</sup>

In the first quarter of 2018, the U.S. exported 14.9 million tons of metallurgical coal, showing an increase from the fourth quarter of 2017.<sup>22</sup> As foreign nations including China and India continue to grow, their need for steel, metallurgical coal, and other materials for industrialization are likely to remain high.

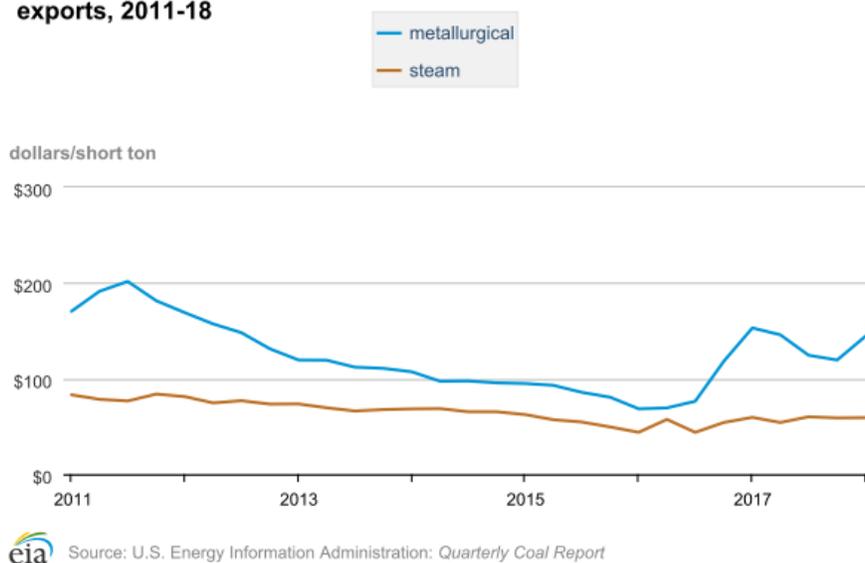
<sup>19</sup> U.S. Energy Information Administration, “U.S. coal exports increased by 61% in 2017 as exports to Asia more than doubled.”

<sup>20</sup> U.S. Energy Information Administration, Glossary. “Coal Grade.” Accessed July 17, 2018. <https://www.eia.gov/tools/glossary/index.php?id=coal%20grade>

<sup>21</sup> U.S. Energy Information Administration, Glossary. “Coal Grade.”

<sup>22</sup> U.S. Energy Information Administration, “Quarterly Coal Report.” July 6, 2018. <https://www.eia.gov/coal/production/quarterly/>

### Average quarterly price of U.S. steam and metallurgical coal exports, 2011-18



### *Extractions from Coal Refuse*

Modern technology is making it possible to extract valuable resources from byproducts of coal production, commonly known as coal refuse or coal waste. Many of these technological advances are very new, but the field shows great potential to isolate such materials as rare earths elements,<sup>23</sup> hydrocarbons for use in transportation fuels,<sup>24</sup> and other resources from what had once generally been disposed of as a byproduct of coal production.

As electricity demand in the United States is being met by a broader array of fuel sources than coal alone, coal is beginning to attract attention for other purposes. A readily available supply of coal refuse already exists in U.S. coalfields, and this offers an opportunity for a low-cost source of valuable products which would not require new mining.<sup>25</sup> According to some estimates, more than one billion tons of coal waste are disposed of every year, about the equivalent of approximately 5 million barrels of oil being discarded per day.<sup>26</sup>

Among other developments, new processes are being explored to break down coal refuse into microparticle size, such that individual components may be separated out, ultimately

<sup>23</sup> Britt E. Erickson, "From coal, a new source of rare earths." *Chemical & Engineering News*. July 8, 2018. <https://cen.acs.org/materials/inorganic-chemistry/coal-new-source-rare-earths/96/i28>

<sup>24</sup> Julia Payne, "Vitol invests in coal-to-oil venture as UN shipping fuel rules loom." *Reuters*. July 18, 2018. <https://www.reuters.com/article/vitol-peabody-oil-coal/vitol-invests-in-coal-to-oil-venture-as-un-shipping-fuel-rules-loom-idUSL8N1UD3AY>

<sup>25</sup> Taylor Kuykendall, "Getting more from less." *S&P Global*. February 8, 2018.

<https://platform.mi.spglobal.com/web/client?auth=inherit#news/article?id=43468541&ccid=A-43468541-11057>

<sup>26</sup> Arq Official Webpage. Accessed July 17, 2018. <http://www.arq.com/>

yielding high-performing unconventional fuel.<sup>27</sup> Other innovations include using coal to develop carbon fiber and building products.<sup>28</sup>

Developing technologies also seek to withdraw rare earth elements from coal refuse. This process could offer a reliable contribution to the domestic supply of critical minerals, used in everything from airplane engines to computer screens.<sup>29</sup> In fact, the Department of Energy (DOE) is investing millions of dollars to pursue this application. According to DOE, extracting rare earths from coal and byproducts of coal mining decreases impacts on the environment, costs of production, and the amount of processing required to make rare earths ready for the market.<sup>30</sup>

President Trump's recent announcement of tariffs on rare earths from China highlights the vulnerability of the U.S. supply chain.<sup>31</sup> Thus, exploring options to secure steady domestic sources of these materials is important.

Extractions of rare earths, hydrocarbons, and other materials would add value into the American economy. These fields could also offer new employment opportunities, particularly in regions where traditional coal mining jobs are becoming harder to find.<sup>32</sup>

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<sup>27</sup> Taylor Kuykendall, "Getting more from less."

<sup>28</sup> Ramaco Carbon Official Webpage. Accessed July 19, 2018. <http://www.ramacocarbon.com/>

<sup>29</sup> BBC News, "What are 'rare earths' used for?" March 13, 2012. <https://www.bbc.com/news/world-17357863>

<sup>30</sup> U.S. Department of Energy, National Energy Technology Laboratory, Rare Earth Elements, "Frequently Asked Questions." Accessed July 17, 2018. <https://www.netl.doe.gov/research/coal/rare-earth-elements/faq>

<sup>31</sup> Bloomberg News, "Trump Tariff List Targets High-Tech Minerals That U.S. Needs." July 11, 2018.

<https://www.bloomberg.com/news/articles/2018-07-11/trump-s-tariff-list-targets-high-tech-minerals-that-u-s-needs>

<sup>32</sup> U.S. Department of Energy, National Energy Technology Laboratory, Rare Earth Elements.