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Coal Trading Regimes and the Future of Coal: The Political Struggle to Eliminate Coal

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This article examines the evolution of global coal production and consumption markets. It also assesses the prospect for reducing coal use. Though coal today exhibits more in the way of global characteristics than in the past, unlike oil, coal remains dominated by domestic coal production and consumption. In fact, coal is dominated by ten major domestic markets. These major coal markets are divided into four distinct trading regimes – *Exporters*, *Importers*, *Exporting Consumers and Importing Producers*. We hypothesize that the type of coal trading regime will materially affect the type of political and economic incentives and policies for dealing with environmental pressures to limit coal use. We argue that whether a country exports or imports and the ratio over domestic production will affect the type of policies that these governments, the coal industry, and their publics will find acceptable in reducing coal use. It will also affect the type of policies the country's government might choose to bolster its coal-related industries. This mix of trade-related incentives and domestic politics suggests efforts to reduce significantly coal use by major coal producers and users will remain challenging and must be calibrated to counter-act these pressures.

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1. Introduction

Changes in the global energy market look deceptively positive. For the three years, and up until what might be only a temporary increase in 2017, improved efficiency and a transition to cleaner energy sources have allowed global emissions to remain relatively constant despite continued economic growth (International Energy Agency (IEA), 2017a). While these trends are a positive development, avoiding the adverse effects of climate change requires a substantial reduction in the amount of greenhouse gas emissions. To have a 66 percent chance of remaining under 1.5℃ of global warming, the current amount of greenhouse gases that can be emitted into the atmosphere will be exhausted by 2021 (McSweeney and Pearce, 2017). To achieve any significant reduction in carbon emissions, however, countries must undertake a significant reduction in the use of coal, the dirtiest of the fossil fuels. New innovations in energy use appear to make coal, as an energy source, a thing of the past. Such thinking, however, may be unhelpful for designing policies aimed at achieving a global energy transition. Even if the energy markets are no longer favourable to coal use, political factors may well prevent an easy or successful transition to other energy sources.

Coal is a resilient energy resource. Coal use has survived despite the onset of numerous competitors. Long after its dramatic usage during the industrial revolution, coal in 2013 still composed 29 percent of the global energy profile. In fact, coal is second only to oil - at 31 percent – in its contribution to the global energy mix (IEA, 2017b). Partial responsibility for 2017's resurgent greenhouse gas emissions can be attributed to the growth of coal use in China and the United States, which came despite the downward trend of recent years (Hausfather, 2017). The IEA (2017b) anticipates coal use will grow

through the year 2020. And the global reserves of coal will last far longer than oil and natural gas combined (BP, 2016).

To devise successful strategies for addressing climate change and managing the transition away from coal, we argue that efforts to limit coal use must take account of the different forms of coal trading regimes in existence and particularly how national coal market structures influence, promote and protect the coal industry. The following analysis investigates the relationship between coal trading regimes and the incentives and disincentives for coal use in the key national markets.

2. The Not-So-Global Coal Market

The contemporary coal market has become more globalized than in previous decades. The global coal trade has risen from 385 million tons in 1982 to 1,276 million tons in 2012 (Cornot-Gandolphe, 2011). Spot trading of coal, although at a rather rudimentary stage, has appeared (Thurber and Morse, 2016). Moreover, the reach of the coal market has expanded as coal use shifts from the developed to the developing world. In perhaps the most recent and comprehensive book on global coal, Thurber and Morse (2016) argue that today's coal market is much like the other major fuel market, oil:

> The fact that today's global coal market functions more like the modern oil market than the coal market of the 1970s will increasingly force policy and investment decisions in the coal space to consider global factors and implications (Thurber and Morse, 2016).

As a result, solutions to reduce coal require awareness of this new international dimension. While there is certainly more exchange in coal globally, as Thurber and Morse (2016) argue, this characterization of a 'global coal market' fails to evaluate the persistent dynamics of coal production and use. A global coal market perspective obscures the continued dominance of domestic coal markets. In efforts to mitigate the use of coal, therefore, we are driven back to an examination of a select group of states and their coal production and use, as the following section shows.

3. Coal vs. Oil and Gas:

If one looks at coal use, coal remains a domestically contained phenomenon limited, and this is important, to a small number of national markets. In fact, about half of all coal consumption and production takes place in one country alone - China. The next two largest coal consuming states after China are India followed by the United States. These two states together compose another 20 percent of global coal consumption (BP, 2016; p.32-33). Of all the countries in the world, only 10 countries (all listed in Table 1) have either production or consumption rankings greater than 60 Million Tonnes of Oil Equivalent (Mtoe) in a year (less than 1.5 percent of either total consumption or production). Less than 10 percent of all coal production globally occurs outside these ten countries, and less that 15 percent of all coal consumption globally occurs outside these countries. The coal market is concentrated overwhelmingly in this limited set of countries rather than a characterization of a truly global industry.

Table 1. Major Coal Markets (BP, 2016; p.32-33)

Country	*Net Exports (2015)*	*Domestic Production (2015)*	*Domestic Consumption (2015)*
China (excluding Hong Kong)	-93.4	1827.0 (47.7%)	1920.4 (50.0%)

India	-123.3	283.9 (7.4%)	407.2 (10.6%)
United States	58.9	455.2 (11.9%)	396.3 (10.3%)
Japan	-118.8	0.6 (0.0%)	119.4 (3.1%)
Russia	95.8	184.5 (4.8%)	88.7 (2.3%)
South Africa	57.9	142.9 (3.7%)	85.0 (2.2%)
Republic of Korea	-83.7	0.8 (0.0%)	84.5 (2.2%)
Indonesia	160.8	241.1 (6.3%)	80.3 (2.1%)
Germany	-35.4	42.9 (1.1%)	78.3 (2.0%)
Australia	228.4	275.0 (7.2%)	46.6 (1.2%)
Rest of World		**376.2 (9.8%)**	**533.2 (13.9%)**
World Total		**3830.1**	**3839.9**

*All figures denoted in million tonnes of oil equivalent.

In comparison, the oil and gas markets are significantly more reliant on trade and these markets are more equally distributed in terms of production and consumption. Dependence on foreign oil markets is much deeper. In the United States' oil production is only two thirds of its consumption while China and India do not even produce half of what they consume (BP, 2016; p.10-11). Trade is essential to satisfying oil demand within the largest consumer countries. On the other hand, coal consumption largely would continue unabated if global markets were suddenly to be frozen.

And unlike coal, the biggest producers of oil and gas are not necessarily the biggest users. For oil, the three biggest producers in 2015 were the United States, Russia, and Saudi Arabia; but the biggest consumers were the United States, China, and India (BP, 2016; p.10-11). For gas, the largest producers were the United States, Russia, and Iran; but the United States, Russia, and China were the largest consumers (BP, 2016; p.22-33). Trade permits this differentiation to occur by sustaining demand for the major producers and supply for major consumers

Additionally, both oil and gas have a much more even distribution in terms of global consumption and production. Whereas China makes up for about half of global coal production and consumption, the largest oil producer in 2015 did not possess a market share greater than 15 percent and the largest gas producer in 2015 did not exceed a market share of 25 percent (BP, 2016; p.10, 23, 33).

The global oil market is more diverse, also, than the coal market. The threshold for calculating the top ten producers or consumers was 4.0 percent market share or greater for oil in comparison to the 1.5 percent market share for coal. This means that oil markets that did not make the top ten still command a rather substantial market share compared to their counterparts in coal. The gas market is similar to the oil market.

The concentration of coal use in just a select few countries presents both opportunities and challenges in reducing coal use. It would appear that current coal use can be dramatically reduced by successfully targeting the identifiable major markets. However, such targeting also poses a challenge. If political or economic circumstances among these top coal consuming markets make it difficult to reduce coal use, then overall progress to reducing coal use will remain elusive.

4. Coal Market Regimes

How national coal industries engage with the international market can be divided into four ‘coal trading regime’ types:

1. *Exporters*

   These states produce coal mainly for export. Their domestic demand is relatively marginal compared to the amount of coal they produce. A great part of coal

production in these countries is destined for the international market and the domestic coal industry depends upon international demand.

2. *Importers*

   These states consume significant amounts of coal but produce little of their own. Their domestic production is insufficient to support their coal consumption and imports are essential to meet energy demand. Coal mining generally will not be an important industry in these states, but there will be actors in the power generation and utilities sectors that will depend on the continued use of coal for commercial success.

3. *Exporting Consumers*

   These states consume a significant amount of coal for domestic purposes, but also have excess production that flows into the international market. Coal is important for meeting domestic energy demand, but international demand is also important for the continued prosperity for their domestic coal producers.

4. *Importing Producers*

   These states produce a significant amount of coal for domestic use, but also have demand shortfalls that must be met with imports. Coal is important for meeting domestic energy demand and coal mining is likely to be an important domestic industry. While these states depend on the international market to meet all demand, domestic production plays a significant role in supplying coal to consumers.

Table 2, below, categorizes the ten major national coal markets by regime type. The designations, and their differentiations, depend, in part, on the ratio of production to

consumption. If production is more than double consumption, then the national market is identified under our analysis as an *Exporter*. For these states exports far outweigh domestic consumption. Examples of *Exporters* are Indonesia and Australia. If, on the other hand, consumption is more than double production, then the national market is categorized as an *Importer* due to the relative insignificance of domestic production compared to domestic demand. Examples of *Importers* are Korea and Japan.

If production is greater than consumption, but not to the extent of an *Exporter*, then the national market is categorized as an *Exporting Consumer* due to the significance of both production and consumption in that market. *Exporting Consumers* include the United States, Russia, and South Africa. Finally, if consumption is greater than production, then the national market is categorized as an *Importing Producer*. *Importing Producers* include China, India, and Germany.

Table 2. Major Coal Markets and Trading Regimes (BP, 2016; p.32-33)				
Country	*Trading Regime*	*Net Exports (2015)*	*Domestic Production (2015)*	*Domestic Consumption (2015)*
China (excluding Hong Kong)	*Importing Producer*	-93.4	1827.0 (47.7%)	1920.4 (50.0%)
India	*Importing Producer*	-123.3	283.9 (7.4%)	407.2 (10.6%)
United States	*Exporting Consumer*	58.9	455.2 (11.9%)	396.3 (10.3%)
Japan	*Importer*	-118.8	0.6 (0.0%)	119.4 (3.1%)
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South Africa	*Exporting Consumer*	57.9	142.9 (3.7%)	85.0 (2.2%)
Republic of Korea	*Importer*	-83.7	0.8 (0.0%)	84.5 (2.2%)
Indonesia	*Exporter*	160.8	241.1 (6.3%)	80.3 (2.1%)
Germany	*Importing Consumer*	-35.4	42.9 (1.1%)	78.3 (2.0%)
Australia	*Exporter*	228.4	275.0 (7.2%)	46.6 (1.2%)
Rest of World			**376.2 (9.8%)**	**533.2 (13.9%)**
World Total			**3830.1**	**3839.9**

We argue that the type of coal trading regime will materially affect the type of politics of coal. The trading regime is likely to impact the economic incentives and policies for dealing with environmental pressures to limit coal use. Whether a country exports or imports and what the ratio is over domestic production will affect, in our view, the type of policies that these governments, the coal industry, and their publics will find acceptable. We hypothesize that it will influence how much the public is likely to reduce coal use and the type of policies the government might choose to bolster its coal-related industries. Mining moratoriums, production quotas, plant closures, carbon pricing, and investing in coal energy abroad – all policies designed to lower coal use – may be more

or less economically and also politically acceptable based on the characterization of trading regime.

5. Policy Incentives and Trading Regimes

The presence of both coal production and consumption within an economy can generate a coalition in defence of the coal industry. As Vietor (1980; p.20-24) points out in his research, coal is tied to many interests in the political and economic setting of a country: finance, railroads, steel, and metals production. Such an array of interests can facilitate powerful political coalitions that can dissuade policymakers from vigorously implementing policies that might lead to the reduction in the use of coal. In Vietor's (1980) analysis, coal's political power comes from the wide assortment of players involved in the entire process of turning coal in the ground into energy and energy use in the grid.

For example, the Bureau of Labour in the United States in 2016 calculated coal mining to employ about 57,325 individuals (United States Department of Energy, 2017; p.40). However, this calculation failed to include those employed in supporting industries. The United States Department of Energy, which used a methodology that includes supporting industries, such as Professional Services and Construction, calculated that the total number of individuals employed in securing coal as a fuel source is actually 74,084, a figure 29 percent larger than the Bureau of Labour Statistics' calculation (United States Department of Energy, 2017; p.40). These varying employment numbers demonstrate that a substantial portion of the economic benefits from the coal industry are enjoyed by those not directly employed by coal mining firms. It is this employment breadth that makes policies aimed at reducing coal use so difficult to implement.

Additionally, the production of coal generates support in their local communities. Coal mines, like other mines, serve as a concentrated source of employment vital to the economic well-being of their surrounding community. Disruption of such industries lead to unemployment and have the potential to create political dissatisfaction within the local community. Whether one is a local representative seeking election or a local official trying to keep down political unrest, there exists an incentive to prevent the closure of coal mines. The concentration of coal deposits within certain geographical regions, like forestry and fishing, also create a regional interest in the survival and prosperity of the industry. There is a rich debate on how political systems aggregate these local interests to a national policy level, but coal production certainly creates a strong interest within their relevant communities for its continued survival as an industry. While outside the scope of this article, the more detailed structure of domestic markets on coal policy, such as political systems and the specific degree of geographic concentration in coal deposits and power generation, would make for interesting discussion.

When an economy possesses an integrated market of both domestic coal production and consumption, governments not only face pressure from coal miners and corporations, but also the related commercial affiliates and the communities the coal industry supports. If the strength of coal is built on this diverse coalition, then one efforts to reduce coal to find the greatest difficulties in economies that both produce and consume coal, and under conditions in which the coal industry is shrinking.

In an *Exporting Consumer* like the United States, employment is almost equally divided between the mining and power generation side. Fuel production for coal employed 74,084 people in March 2016 and coal power generation employed 86,035

(United States Department of Energy, 2017; p.40). The combination, then, of the fuel and power generation side of the coal industry would be more likely to wield strong political influence. Those employed in power generation benefit from coal consumption and those employed in coal production have an interest in keeping domestic coal generation going to maintain demand for their product. On the flip side, national markets that mainly import for consumption or mainly produce and export would be unlikely to have as broad a coalition of interests supporting the coal industry in the political process.

Moreover, policymakers will have a harder time reducing coal consumption when the industry is suffering. In Vietor's (1980; p.20-24) coal coalition, supporting industries like railroads, steel, and banking care about coal as clients or suppliers integral to their business success. However, for these situations, the largest concern is the prospects of bankruptcy, leading to loan defaults, sudden loss of a critical customer, or supply disruptions that can be calamitous to a supporting industry firm. They are much less concerned with the prospect of their clients or suppliers in the coal industry performing at record profit margins. As such, attempts to mitigate the growth of the coal industry would face much less resistance in comparison to policies that reduced absolute demand for coal, particularly if the coal industry is already under severe market pressure.

If our analysis of the four regime types is correct, *Exporting Consumers* and *Importing Producers* would have the strongest pressures against reducing coal use, while *Importers* and *Exporters* would, hypothetically, have a politically 'easier time' pursuing policies that moved a country away from coal use. The difficulties faced by these countries will be even greater if policies attempt to reduce absolute coal use or if the coal industry already faces market pressures.

6. Challenges to Domestic Coal Reduction

If the aforementioned incentive structures are indeed at play, then the most difficult cases for reducing domestic coal use lie with the countries that possess both substantive production and also consumption industries. *Exporting Consumers* and *Importing Produc*ers may have incentives to increase domestic consumption, not only through the existence of domestic interest groups in power generation, but also as a way to compensate the struggles of a declining mining sector. This may be particularly problematic since the bulk of coal consumption occurs in countries with such trading regimes. A quick examination of the record of *Exporting Consumers* and *Importing Producers* show just how deep these challenges are in preventing the reduction of coal use.

6.1 China – Steps Forward, Steps Back

China has taken ambitious steps to reduce its dependence on coal, but political and economic considerations, as we've suggested, make implementation of these policies at times difficult. Air pollution, or black soot, in China is a tremendous public concern. It is well understood by the public that the use of coal is the chief source of this very apparent public problem. The Chinese government has responded to these concerns with substantive policy moves. In 2014, China pledged that peak consumption of coal would occur by 2020 (Finamore, 2014). Incoming emissions standards in China will be more stringent than those in the United States and the European Union (Hart *et al.*, 2017). However, these efforts must contend with the strong economic interests tied to the coal industry. Although China managed to reduce its coal use from 2014 to 2016, this trend appears to have come to an end in 2017, at least. The Global Carbon Project predicted

that China will experience a three percent growth in coal use, though depending on how inventory is treated in calculations, the increase may actually be a one percent increment, not three (Evans, 2015). While this coal growth may be temporary, it nonetheless demonstrates just how resilient coal use can be.

In China, 'Coal is King'. From 2005 to 2012, 15-18 percent of China's GDP came from the coal industry and industries that use coal as a primary fuel or raw material (Heping *et al.*, 2014). The coal and steel industries employ about 12 million people - a not insignificant number.[1] In 2016, coal mining alone employed 5.2 million individuals in China (IBISWorld, 2017). In comparison, green power companies and the oil and gas industries employ 3.5 million and 2.6 million people respectively in 2015.[2] Efforts to roll-back coal production and use will therefore impose significant socioeconomic costs to select groups and interests in society.

In 2016, China announced its intention to close 4,300 of a total of 11,000 mines over the following three-year period, accounting for a production of 700 million tonnes out of a total capacity of 5.7 billion tonnes.[3] A move of this magnitude would likely involve the need to relocate 1 million employees.[4] To put that figure in perspective, the number of jobs likely to be lost through this policy is equivalent to about half of all jobs created in the United States in 2016.[5] The economic costs of coal reduction have led the government to reverse, or delay policies to lower coal production. China instituted a production quota

[1] Reuters, "China to cut 1.8m jobs in coal and steel sectors," *The Guardian,* February 29, 2016.
[2] Pilita Clark, "Green jobs grow as oil employment falls," *Financial Times,* May 25, 2016.
[3] Xinhua, "China to further cut coal capacity," *Shanghai Daily,* January 21, 2016.
[4] Ibid.
[5] Patrick Gillespie, "A record 75 straight months of job growth under Obama," *CNN,* January 6, 2017. United States Department of Labour, "Employment by Industry," *Bureau of Labour Statistics,* accessed August 18, 2017. https://www.bls.gov/charts/employment-situation/employment-levels-by-industry.htm

in April 2016, but the economic stress it placed on the coal industry led to a repeal of the policy only seven months later.[6]

Coal production has declined from 2014, but the reduction has not been free of social costs. In the mining sector, there was a sharp rise in protests and strikes in China during the latter half of 2015, peaking at 37 mass incidents nationwide during the month of January 2016.[7] It should be noted that any reduction of domestic consumption of coal will also negatively impact the already strained coal mining market in China, which could play a role in reducing the ambition of Chinese coal power generation reduction efforts. However, the incentives provided by the power generation sector alone appear to be enough to restrain Chinese efforts to reduce coal consumption.

Policies in the power generation sector did not experience as many policy setbacks, but unlike coal mining, coal power generation capacity is increasing. The Chinese government currently plans to cap coal generation capacity at 1100 GW by 2020, which is more that 100GW over the fossil fuel power generation capacity China had in 2015.[8] China has taken steps to achieve this target. For example, it has frozen power plant construction in 15 provinces announced in 2016 and in 2017. The Government has also moved to halt 100GW worth of coal projects to remain within its cap. Yet, there is still plenty of room for growth.[9] As of July 2017, CoalSwarm, a research network dedicated to developing information resources on coal, tracks nearly 153GW of coal power generation

[6] Jonny Sultoon and Prakash Sharma, "China's coal policy: a victim of its own success?" *Financial Times*, March 24, 2017.
Frederic Schaeffer, "The Dark Truths Inside China's Dying Coal Industry," *World Crunch*, June 25, 2017. y
[7] China Labour Bulletin, "Strike Map," *China Labour Bulletin*, accessed August 18, 2017.
[8] Aibing Guo, "China Says It's Going to Use More Coal, With Capacity Set to Grow 19%," *Bloomberg*, November 7, 2016.
[9] Reuters Staff, "China to halt construction on coal-fired power plants in 15 regions," *Reuters*, March 24, 2016.
Reuters Staff, "In latest move, China halts over 100 coal power projects," *Reuters*, January 17, 2017.

capacity that have either been announced, in pre-permit stage, or permitted, and over 147GW currently under construction (EndCoal, 2017). Considering such a grand scale of continued coal development, perhaps it is unsurprising that the decline of coal use in China may be reversed in 2017. Without substantially reducing capacity, coal use can be expected to rise along with energy demand. China currently has plans to construct 700 new power plants, 80 percent of these within its own borders.[10] Economic development incentives in the power generation industry provide encouragement to continue power plant construction.

The continued construction of coal power plants is not necessary to meet energy needs in China. According to the report from the Center for American Progress, Chinese coal power generation plants are all running at about the same utilization rate of 47.7 percent of total capacity (Hart *et al.*, 2017). Local governments have supported this additional coal capacity development, however, to maintain jobs and tax revenue within their districts (Hart *et al.*, 2017). This demonstrates that even while market forces in China have made coal power problematic, the industry continues to grow and persist in the country.

6.2 United States – Coal's Political Revenge

The United States has experienced a rather tumultuous journey in its efforts to reduce coal consumption in the past decade or so. Coal production declined throughout the Obama administration: coal's share of the energy profile has decreased. Production had declined by almost one fifth from 1,075 million short tonnes in 2009 to 897 million short tonnes in 2015 (United States Energy Information Administration, 2017a; United

[10] Hiroko Tabuchi, "As Beijing Joins Climate Fight, Chinese Companies Build Coal Plants," *New York Times,* July 1, 2017.

States Energy Information Administration, 2017b). Coal's prominence in the electricity generation space has shrunk and almost 50,000 jobs were shed in the coal industry from 2008-2012 (Haerer and Pratson, 2015). Combined particularly with the rapid rise of natural gas production and use, this has led coal in the United States to lose its role as the primary fuel for electricity generation. However, the recent political backlash to the commercial decline of the coal industry has led to a reversal of many policies antithetical to coal growth and contributed to the election of a seemingly pro-coal president. Data from the Global Carbon Project suggest that 2017 may be the first time in five years that the United States will experience an increase in its coal consumption (Hausfather, 2017). While market forces drove the decline of coal in the United States, the inability to appease political interests have led to policies to support the coal industry's continued survival.

Regulations were partially responsible for putting US coal plants - which are quite old and rather inefficient - out of business. There were numerous regulations instituted under the Obama administration that hampered the ability of the coal-fired fleet to compete against their cleaner natural gas competitors. Much of the massive decrease in coal generation capacity in 2015 was due to the implementation of the Mercury Air Toxic Standards (Dimsdale *et al.*, 2015; p.14). Other policies, such as the more stringent EPA air quality standards - the Cross-State Air Pollution Rule, the Cooling Water Intake Structures Rule, and the Coal Combustion Residuals Rule – all have raised the cost of generating electricity from coal (Sussams and Grant, 2015; p.26-27). Given market competition already faced from natural gas and renewables for coal, these regulations appeared to impact an already struggling coal industry.

Politically, the coal industry fought hard for continued survival. In 2015, the Obama administration enacted the Clean Power Plan, which the EPA estimated would have reduced carbon emissions 870 million tonnes when it became fully instituted in 2030 (United States Environmental Protection Agency, 2016). Such reduction would have been achieved through more stringent regulations on how much carbon dioxide power plants were permitted to emit and other standards that would eliminate inefficient power plants (United States Environmental Protection Agency, 2015). Given that most of the United States coal fleet is nearing retirement age, this policy would put significant pressure on the coal power generation sector, which would have knock-on effects for American coal demand and negatively impact the mining industry.[11] In response to the Obama administration regulatory efforts, twenty seven States, along with various companies and business groups, requested to have the plan blocked in the courts.[12] Their efforts succeeded with the United States Supreme Court reaching a 5-4 decision to halt the implementation of the policy.[13] The Trump administration has since implemented efforts to roll back coal restrictions including the Clean Power Plan.

Candidate Trump managed to secure his electoral victory in part by winning at least two crucial swing states - Ohio and Pennsylvania. A part of Trump's appeal to voters in these important states, in addition to Kentucky, West Virginia and the West, lay, it would appear, in his repeated electoral efforts to oppose coal's elimination and in

[11] Todd Woody, "Most coal-fired power plants in the US are nearing retirement age," *Quartz,* March 12, 2013.
[12] Lawrence Hurley and Valerie Volcovici, "U.S. Supreme Court Blocks Obama's Clean Power Plan," *Scientific American,* February 9, 2016.
[13] Ibid.

particular his oft repeated promise to "end the war on coal."[14] In the power generation sector, Trump, since being elected has issued an executive order to review the Clean Power Plan, and the EPA under Scott Pruitt has begun reviews of the "Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Generating Units," as well as withdrawing "Federal Plan Requirements for Greenhouse Gas Emissions From Electric Utility Generating Units Constructed on or Before January 8, 2014" (United States Environmental Protection Agency, 2017). On the mining front, the Trump administration lifted restrictions on coal-leasing, which will allow for the development of coal production on federal lands.[15] In 2017, coal production rose compared to the prior year (United States Energy Information Agency, 2017).

The Trump administration may be considered by some to be anomalous, but its political support of the coal industry reflects the lobbying efforts of coal interests over the past two decades. As the coal industry declined, its efforts to influence government increased. Coal mining contributions to congressional candidates and parties increased from $1.3 million in 1996 to over $13 million in 2016 (Center for Responsive Politics, 2017). Notwithstanding these efforts, however, there is little likelihood of a coal renaissance. Even staunch supporters of pro-coal policy like Robert Murray do not believe coal employment likely will rise.[16] Nonetheless, there is a strong interest in

[14] "Energy Independence," *President Elect Donald J. Trump,* accessed November 13th, 2016. https://www.greatagain.gov/policy/energy-independence.html
[15] Tim Devaney and Lydia Wheeler, "Overnight Regulation: Trump administration lifts Obama freeze on federal coal mining," *The Hill,* March 29, 2017.
[16] Dominic Rushe, "Top US coal boss Robert Murray: Trump 'can't bring mining jobs back'," *The Guardian,* March 27, 2017.

protecting what is left and efforts to further reduce coal use will have to contend with coal's political strength even as its economic competitiveness declines.

6.3 Germany – Continued Resilience

Of all the major coal markets, Germany arguably has made the most progress in reducing carbon emissions. From 1992 to 2010, Germany was one of only two of the top ten coal markets to reduce its aggregate emissions.[17] The other coal market to do so was Russia, which, considering the context of its dramatic economic decline in the 1990s, might not be the best example of a climate policy success story. After German reunification in 1990, and the conclusion of the Cold War, the integration of the East and West German markets and more readily available access to Russian resources led to a rise in use of natural gas. Natural gas also composed most of the newly constructed power generation capacity after liberalization of the electricity market in 1998 (Pahle, 2010). Natural gas dominated power plants commissioned from 2001 to 2008, but subsequent plants planned and under construction largely consisted of coal (Pahle, 2010; p3433). Considering Germany's status as an *Import Producer*, the political incentives to support the coal industry would, according to our hypotheses, be strong and influence policy development in a direction that led to the rise in coal power investment after 2008.

An examination of coal use in Germany in fact shows that there is no clear trend of decreasing coal consumption in Germany. From 2005 to 2015, the amount of coal consumed per annum in Germany has gone up and down, ranging from 86.7 million tons of oil equivalent at its high point in 2007 to 71.7 million tons of equivalent at its low point in 2009 (BP, 2016; p.32-33). Some of the drivers for the resurgence of coal

[17] The Guardian, "World carbon emissions: the league table of every country," *The Guardian,* June 21, 2012.

investment in Germany are market oriented. There is an expectation that the cost of gas will exceed that of coal in the medium-term (i.e., 2030) and there is a presumption of the ease of borrowing for German utilities (Pahle, 2010; p.3435-3436). Other factors are more policy oriented. Coal power had less stringent requirements than natural gas under the European Union Emissions Trading Scheme during phase I and II (2005-2012) (Pahle, 2010; p.3435). Hopes for the efficacy of Carbon Capture and Storage (CCS) technology, as well as improved efficiency of coal power, have also driven investment (Pahle, 2010; p.3437-3439). While fundamentally technological drivers, political interests in coal do affect the direction of research and development in the energy sector (Pahle, 2010; p.3440). The political imperative to sustain the coal industry helps to explain coal's resilience in Germany.

For Germany to successfully transition to cleaner energy, the political challenges must be resolved. The decline of coal can create negative socioeconomic impacts on political constituents. In 1992, there were more jobs in German lignite and hard coal mining than there were for the entire conventional energy sector in 2013.[18] The loss of these jobs over the years generates political resistance to energy policies that would eliminate coal use in Germany. In some instances, German policymakers have managed to eliminate coal capacity by compensating the coal industry. In 2015, a levy on carbon emissions from the oldest and most polluting power plants was scrapped due to opposition from industry.[19] In response, the German government offered compensation to

[18] Paul Hockenos, "Jobs won, jobs lost – how the Energiewende is transforming the labour market," *Clean Energy Wire*, March 30, 2015.
[19] Reuters, "Germany to mothball largest coal power plants to meet climate targets," *The Guardian*, July 2, 2015.

utility companies to mothball 2.7 GW of lignite power generation capacity.[20] The compensation costs 1.6 billion euros, but it will achieve the elimination of 13 percent of Germany's lignite power generation capacity (Steinmeier, 2016). Such policies may be expensive, but they present a solution to the political challenge coal interests would otherwise present to efforts to reduce coal use.

6.4 India – No Pushback Necessary

The Indian experience demonstrates that the political difficulties created by coalitions in *Importing Producers* and *Exporting Consumers* can be mitigated by positive market conditions for the coal industry. The examples of policy rollbacks and other difficulties in transitioning away from coal in China, the United States, and Germany all involve a coal industry in commercial decline.

In India, however, coal development is accelerating. Coal production has grown over 50 percent from 2005 to 2015 (BP, 2016; p.32-33). In 2017, India opened its coal-mining market to the private sector for the first time in four decades, a move that is expected to accelerate coal development previously restrained by India's slow-paced and bureaucratic regulatory environment.[21] The power generation market reflects similar trends. As of mid-2016, coal plants under development are projected to add 243 GW of energy generation capacity to India and would increase its coal power generation capacity by 123 percent (Shearer *et al.,* 2017; p.408). BP forecasts that India will experience an energy demand growth of 129 percent from 2015 to 2035. Given such tremendous demand for energy, it is clear why the Indian coal sector is expanding so aggressively.

[20] Ibid.
[21] Rajesh Kumar Singh, "India Opens Coal-Mining Market for First Time in Four Decades," *Bloomberg*, February 2, 2017.

Simultaneously, India is making a concerted effort to develop cleaner energies. In 2015, India set an ambitious target of increasing its renewable energy capacity by 175 GW for 2022 (Ministry of New and Renewable Energy, 2016). This target amounts to achieving a five-fold increase in their renewable energy generation capacity, a goal which the Indian government has laid out annual targets for achieving.[22] At the moment, the Indian government is exceeding its 2017 wind targets by 1.5 GW, while behind its 2017 target by 4.7 GW on solar.[23] India's current track record shows a strong commitment to delivering on a greener energy profile. However, the government support for clean energy in India does not immediately translate to a suppression of coal.

Development of renewables does not come at the detriment of coal interests. India's soaring energy demand means that even with the rising share of renewables within India's energy profile, there is still plenty of room for coal to grow in the future. Much of India still relies on biomass (e.g., fuel wood), which accounted for 24 percent of primary energy demand in 2013 (IEA, 2015; p.57). Clean energy will certainly become a much larger part of India's energy profile in the future, but it will first displace the demand for biomass before affecting coal. The result is a coal industry that will be getting a slightly smaller slice of a much bigger pie. Unlike in China, the United States, or Germany, the future of coal in India still looks bright, and a green shift does not imply corporate bankruptcy, or a loss of employment for the industry's workers. Without the threat of commercial decline, coal interests in India are unlikely to react to current moves to displace their future dominance in the market.

[22] Katherine Ross and Rhys Gerholdt, "Achieving India's Ambitious Renewable Energy Goals: A Progress Report," *World Resources Institute*, May 12, 2017.
[23] Ibid.

India's policy challenges will not come now, but in the future when its energy market matures. When Indian energy demand begins to plateau, and Indian climate commitments shift from growing its renewable sector to reducing the size of its fossil fuel industries, it is likely that any policies seeking to drive down coal demand will face significant opposition. As of 2015, coal extraction and power generation employed about 1.5 million people in India (IEA, 2015; p.144). While improvements in productivity in the future may whittle down this number, the coal industry is also a growing sector. Coal will likely remain a substantial employer when India does reach the point of needing to cut consumption to meet environmental needs. Solvency of the coal industry is not an issue at the moment, communities do not need to fear mass unemployment and supporting industries will not face shocks to their business. However, when the conditions for the coal market worsen, policies India implements to reduce coal use may find a similar fate to undertakings in the United States or China, whereupon certain political actors will be incentivized to protect the coal industry and resist coal's decline.

6.5 Steady Pursuit of Coal Use in Russia, and South Africa

Not all major coal markets are making moves to reduce their dependence on coal. Russia and South Africa continue to pursue expansion of the coal capacity in the short to medium term.

Russia remains in a particularly unique situation amongst the major coal markets as its energy and coal demand have seen substantial declines. These declines are not due to policy action but due to economic turmoil. The Russian GDP was $460 billion in 1992 but fell to less than $196 billion in 1999 (World Bank, 2017b). Carbon emissions per capita experienced a similar decline, going from about 14 metric tons per capita in 1992

to about 10 metric tons per capita in 1998 (World Bank, 2017b). Owing to this sharp decline in greenhouse gas emissions, it has been relatively easy for Russia to meet international commitments to climate change mitigation. Therefore, there is no real policy imperative to reduce coal use, which in Russia is the least used of the various fossil fuels. Coal in fact represents only 14 percent of the national energy profile (United States Energy Information Administration, 2016). Coal consumption in Russia has seen a few ups and downs since the mid-2000s, with no definitive consumption trend: neither increasing nor decreasing (BP, 2016; p.33). Mining of coal is largely located far from major population centers and much of domestic coal use is concentrated in Siberia (United States Energy Information Administration, 2016). Therefore, coal is not a particularly convenient fuel source for Russian population centers. Moreover, given that coal production in Russia has experienced a steady climb over the 2005-2015 period, the coal mining sector does not need to alleviate market pressures by increasing domestic demand (BP, 2016; p.32). The political economic pressure to use coal instead of more convenient hydrocarbons like gas is absent in Russia.

South Africa does not hold any direct policy to reduce coal consumption or production, and the coal market does not appear to face strong competition. The South African Department of Energy states that coal accounts for 77 percent of primary energy consumption and that this is not expected to change in the next two decades in part due to a lack of alternatives (Republic of South Africa Department of Energy, 2017). Coal consumption from the 2005-2015 period has fluctuated between a low of 80.1 Mtoe in 2005 to a high of 93.8 Mtoe in 2009 (BP, 2016; p.33). The drivers of this fluctuation fall largely in line with the ups and downs of South African energy demand over the period

(World Bank, 2017a). Coal production has experienced a steady climb over the past decade and stands as South Africa's top source of mining revenue (BP, 2016; p.32). In South African's Nationally Determined Contributions (NDCs) for the Paris Agreement, the state policy to improve South Africa's environment is to expand both renewables capacity and to improve the efficiency of coal power (United Nations, 2015). There is no real effort to reduce coal use, only to make it cleaner and more efficient. In past decades, there has been no real challenge in South Africa against coal power, which means there would be no visible backlash within the policymaking environment to assist the coal industry in response to decline.

However, South Africa is beginning to experience some energy oversupply difficulties. In 2017, there was speculation that Eksom (the electricity authority) might close five coal power plants, potentially leading to a loss of 30,000 jobs and additional economic difficulties for domestic coal producers.[24] The Zuma government has continued to push for adding 9600 MW in nuclear power generation. If completed, the nuclear capacity will add to the overcapacity problem in the energy market.[25] Should the market situation worsen for coal power in South Africa, coal interests are likely to push for policy concession that will protect them. Such policies may come at the expense of renewable energy sectors, or environmental regulations. There is still hope for the prospect of more climate change friendly energy policy however, as the push for nuclear power generation in South Africa is a policy in which the nuclear energy coalition triumphed at the expense of coal. Foreign commercial interests in Korea, Russia, and the

[24] ENCA, "Numsa fumes over Eskom plant closure plans," *ENCA,* March 17, 2017.
[25] David Fig, "Court ruling on Zuma's nuclear deal is a marker of South Africa's political health," *The Conversation*, April 28, 2017.
Amil Umraw, "Zuma: The Nuclear Deal Is Still Happening, Folks," *Huffington Post,* June 22, 2017.

United States along with powerful domestic entrepreneurs benefit from the continued development of nuclear energy even at a time when coal capacity is being made redundant.[26] It is possible that this broad set of commercially interested actors might overpower coalitions in support of the coal industry, whether by itself or in cooperation with others policy actors interested in a more air and climate-friendly energy profile for South Africa.

The coal industries in Russia and South Africa have not manifested their political clout as observed by national coal industries in markets such as China and the United States. Partially this is because, like India, the coal industry in Russia and South Africa do not face commercial difficulties. Without the need to protect jobs and corporate solvency, policymakers have no real incentive to extend special privileges to the coal industry. Other factors are also at play. Russia has no particular perceived need to reduce coal use, whereas it appears that at least for the moment certain South African policy coalitions have greater influence than coal.

7. The Political Economy Challenge of Coal

The decline in commercial viability of coal will not be enough to put coal use out of business. When the availability of cheap Middle Eastern oil flooded the global market in the 1950s, the United States and the United Kingdom instituted various protectionist measures to ensure the survival of its uncompetitive coal and domestic petroleum industries (Chick, 2017). The political questions of social welfare for communities and commercial interests dependent on coal ensured its survival.

[26] David Fig, "Court ruling on Zuma's nuclear deal is a marker of South Africa's political health," *The Conversation,* April 28, 2017.

Today, among the major markets that both produce and consume coal in significant quantities, those same political interests present a strong challenge to efforts reducing coal use. Both the United States and China implemented strategies designed to 'ramp down' coal production that later were reversed due to political forces. The Chinese and German cases demonstrate that even when coal cannot survive on its own, political interests may take steps to ensure that coal power generation remains viable even in hostile market conditions. Ultimately, policy must accommodate for the social repercussions of coal reduction and overcome the political challenge if major coal countries are to be successful in reducing their coal use.

8. Conclusion

In the effort to combat climate change, reducing and ultimately eliminating fossil fuels is a major goal. Of all the fossil fuels, coal, and subject to the still too speculative clean coal technology and storage, is first in line for elimination. Coal produces the most carbon dioxide of any of the fossil fuels. It is for that reason we turned our attention to the global use of coal.

While coal has become a more global commodity and market in the last decades, it remains restricted to 10 major markets. The characteristics of these domestic markets vary, and we have described four coal trading regimes These differences are important. We hypothesize in this article that the type of coal trading regime will materially affect the type of political and economic incentives and policies for dealing with environmental pressures to limit coal use.

In our analysis, we found that China, Germany, and the United States all experience policy reversals, in line with the hypotheses regarding the difficulties of reducing coal use in *Importing Producers* or *Exporting Consumers*. India showed that rising energy demand means its relatively prosperous coal industry does not really have a need to be protected through reversals of environmentally friendly policies. The Russian case is special in that dramatic decline in economic conditions have mostly fulfilled policy agendas for coal use reduction. South Africa's experience has been quite similar to India for most years, though recently it appears the presence of other powerful coalitions have led to a more antagonistic policy environment for coal.

We anticipate that reducing or eliminating coal use will be far more difficult politically than might be suggested by the current announcements. Those that are *Importing Producers* or *Exporting Consumers*, we expect will find it most difficult politically to reduce coal use, no matter what their national governments proclaim. And, unfortunately, the three largest users of coal, China, India and the United States are either *Importing Producers* or *Exporting Consumers*. While countries like India with growing energy demand may not face such strong political pressures to protect coal at the moment, they will eventually need to begin absolute consumption cuts within the energy to fulfill international commitments to climate change action and domestic demands on air quality. The South African case does show that coal may not always triumph against other energy coalitions, but the complexities of energy politics make it difficult for strong and stable counter-coalitions to form. Proponents of renewable energy in the body politic can also hold a strong aversion to nuclear energy and less carbon emitting fossil fuels like natural gas. External influences did play a strong role in South Africa's policy of nuclear at the

expense of coal, which suggests that the bigger countries can help emerging economies to adopt cleaner energy profiles. However, as we will discuss in our follow-up article, some of the world's largest providers of development assistance are also strongly incentivized to invest in the growth of the coal industry abroad.

It is much more likely that the interests of coal related communities and commercial entities will need to be addressed with some sort of compromise in coal reduction policy. The disappearance of coal mines might be less contested if strong investment flows into the afflicted communities. Policies such as financial compensation for plant closures like those in Germany may be the most effective tools to push through a less polluting energy profile, albeit it represents a rather costly strategy. Coal has shown itself to possess strong staying power throughout its history. It remains a political challenge for the global community and a threat to meeting the necessary reduction in carbon emissions.

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