

New US Energy Policy and International Steam Coal Markets– Analysing Short-term and Long-term Effects with COALMOD-World

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Overview

Until the change in the US administration in 2017, the coal industry was heavily feeling the fading perspective for coal. Steam coal production declined by around 28% between 2005 and 2016 (EIA 2017, 83). There were some cyclical factors involved, as well as external shocks like the recession during 2008 and 2009, but on a structural level, power generators have increasingly switched from steam coal to gas and renewables (IEA/OECD 2014, 195; EIA 2017, 13). This is largely on economic grounds and in particular, due to the boom in production of low-priced domestic shale gas and the availability of cheap renewable technologies as well as federal and state level promotion of wind and solar energy. Further important drivers were environmental policies that had an additional negative effect on the economics of coal-fired electricity generation. Under the umbrella of the Clean Air Act of 1970, the US Environmental Protection Agency (EPA) had introduced several regulations since 2011 that heavily influenced coal-fired power generation in the USA: inter alia, they regulated i) power plant emissions that contribute to ozone and/or fine particle pollution across state borders (Cross-State Air Pollution Rule, EPA 2017b); ii) mercury emissions and other hazardous air pollutants (Mercury and Air Toxics Standards (MATS), EPA 2017a); and iii) emissions of existing and new generation units (Carbon Pollution Standards, EPA 2016a, Clean Power Plan, 2016b). Given the aging coal-fired power plant fleet in the US (with 85% older than 30 years and 50% older than 40 years (Sussams and Grant 2015)), the environmental policies mentioned above led to power plants increasingly being decommissioned rather than refurbished (IEA/OECD 2014, 196) and only little additions of coal-fired power generation capacity (EIA 2015, 26).

The new US administration, however, has promised to stop the spiralling down of the US coal industry. As part of its new energy policy, the US administration works on withdrawing measures introduced in the Climate Action Plan. The Trump administration is committed to support clean coal technology and to soften emission standards for new coal-fired power plants. In his executive order (The White House 2017), the US President repealed rules that encouraged federal regulators to consider climate change in environmental reviews and enforced lower social cost of carbon for future assessments. Moreover, he lifted the moratorium on new coal mine leases, which his predecessor had introduced in 2016 (Warrick and Eilperin 2016). The executive order might be just the first attempt in rolling back Obama's climate policy more comprehensively. One possible scenario that would provide a long-term vision for the US coal industry is a strong financial and institutional support for Carbon Capture, Transport, and Storage (CCS) in coal-fired power plants. Another scenario that could come with new business opportunities is granting access to the Pacific coal market to low marginal production cost coal from Powder River Basin (PRB) by developing export ports at the US West coast, a development that has been opposed by environmental concerns for a long time (Power and Power 2013).

Each scenario will have a direct effect on the local coal production and consumption patterns but also on the international coal market, both in the short and in the long-term. We evaluate these effects with respect to market developments and their distributional implications.

Methods

We investigate the short-term and long-term effects that could arise from the new support for the US coal industry using a comprehensive model of the world steam coal market, COALMOD-World (Holz et al. 2016). It assesses effects on global steam coal trade, prices and CO₂ emissions from coal consumption as well as distributional implications of different policies. It features a detailed representation of both domestic and international steam coal supply, based on endogenously calculated Cost, Insurance, Freight (CIF), and prices that take into account scarcity rents. It features endogenous investment in production, land transport, and export capacity, as well as an endogenous mechanism assessing production cost increase due to resource depletion.

We assess three scenarios that differ in intensity and longevity of US coal industry support:

1. *No Clean Power Plan*: This scenario assumes that the Clean Power Plan is cancelled, resulting in retrofitting investments and live-time extensions for existing power plants in the US and resulting increase in domestic demand.

2. *Long-term support for coal-CCS*: This scenario assumes that the US administration additionally manages to formally establish a long-term and prominent role of the CCS technology with a share of 30% in its 2050 electricity mix. Therefore, domestic coal demand is permanently increased.
3. *US coal export via West Coast*: This scenario assumes that additionally to measures from scenario 1, the new administration manages to install significant US-Pacific Coast coal export capacities, allowing Powder River Basin coal to enter the world market.

For the analysis of these scenarios, we look at both implications for domestic US coal and the international coal market induced by these interventions. As other important players in the market, with China in the forefront, have declared to stick to their commitments for the Paris Agreement we consider a coal consumption path that is in line with a 2°C goal as baseline, and scenarios are policy shocks to this baseline.

Results

Our results suggest that the rollback of US environmental regulation will temporarily delay the decline of US coal, but will hardly affect international markets. A possible deployment of CCS could have major implications for the international market. However, if the support for CCS remains a national action, with no significant spillovers from the US to other regions, the long-term effect would be minor. Results suggest that some coal exports, formerly directed from South America

to Europe, would be now re-routed to supply coal-CCS to the US East Coast. In contrast, giving access to the Pacific market to PRB coal could induce significant shifts in the composition of suppliers to the Asian markets, especially in South Korea and Japan. However, due to high transportation costs, PRB coal cannot compete with cheap supplies, especially from Indonesia (see Figure 1).

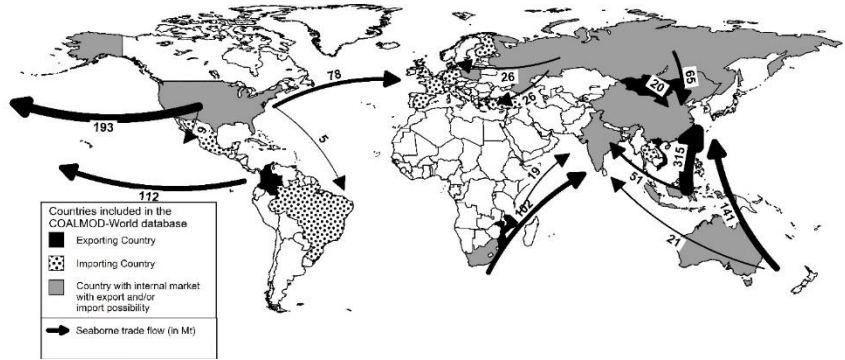


Figure 1: Stream coal trade in 2030 in the *US coal export via West Coast* scenario.

Conclusions

As the decline of the coal industry in the US is mainly driven by competition from gas and renewables rather than environmental regulation, revoking the policies introduced by the Obama administration, will not stop the industry’s spiraling down. To turn around the process, new major sources of demand would need to be created. Nevertheless, as long as the commitment to combat climate change remains strong from major economies around the world, unilateral US policies will not slow down the global decline of coal. However, if the new US energy policy serves as a role model for other large economies this would mean a major threat to keeping the 2°C goal within the range of achievable scenarios.

Selected References

- EIA, 2015. “Annual Energy Outlook 2015.” DOE/EIA-0383(2015). Washington, DC.
- . 2017. “Annual Energy Outlook 2017.” DOE/EIA-0383(2017). Washington, DC.
- EPA. 2015a. “Mercury and Air Toxics Standards (MATS) for Power Plants.” Overviews & Factsheets.
- . 2015b. “Air Transport | US EPA.” <http://www3.epa.gov/crossstaterule/>.
- . 2015c. “Carbon Pollution Standards for New, Modified and Reconstructed Power Plants.” Policies and Guidance.
- . 2015d. “Clean Power Plan for Existing Power Plants.” Policies and Guidance.
- Holz, Franziska, Clemens Haftendorn, Roman Mendelevitch, and Christian von Hirschhausen. 2016. “DIW Berlin: A Model of the International Steam Coal Market (COALMOD-World).” DIW Data Documentation 85. Berlin: DIW Berlin.
- IEA. 2014. World Energy Outlook 2014. World Energy Outlook. Paris, France: International Energy Agency, OECD Publishing.
- Power, Thomas Michael, and Donovan S. Power. 2013. “The Impact of Powder River Basin Coal Exports on Global Greenhouse Gas Emissions.” San Francisco, CA: Energy Foundation, 22.
- Sussams, L., and A. Grant. 2015. “The US Coal Crash – Evidence for Structural Change.” Carbon Tracker Initiative.
- The White House. 2017. “Presidential Executive Order on Promoting Energy Independence and Economic Growth.” Whitehouse.gov.
- Warrick, Joby, and Juliet Eilperin. 2016. “Obama Announces Moratorium on New Federal Coal Leases.” The Washington Post. January 15.
- Western Interstate Energy Board. 2015. “Coal Ports.” <http://westernenergyboard.org/topics/spotlight/coal-ports/>.