Coal Phase-Out Implications for Steam Coal Producers: The Risk of Asset Stranding

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Overview

Significant transformation is occurring in the national energy systems of major coal-using economies, driven by a combination of changing market, technology, economic and policy conditions. At the same time, on the exporter side, investments are being undertaken or planned that would potentially significantly raise coal supply capacities. The inconsistency between these two phenomena has become a recurring issue within national and international policy debate. They potentially amplify risks of a "hard landing" for coal market investors, workers and other affected stakeholders. Indeed, lessons from past coal phase-out experiences suggest that once underway, coal markets can move very quickly – if unanticipated, often with negative consequences for stakeholders who struggle to catch up.

The drivers of coal phase-out vary between countries. They can obviously be related to environmental and climate concerns as was shown by the mediatised decision of France, Canada, the UK and a few more countries at the Bonn UN climate COP in fall 2017 to ban coal in their future energy systems. However, non-climate drivers of coal-phase out have also existed in several regions and continue to play a role today. For example, the increasing cost competitiveness and flexibility of renewables or the competition with cheap shale gas deteriorates the economics of coal electrification in more and more regions. This underlines that there is significant uncertainty regarding the future of coal in global energy systems and, hence, the future of the global steam coal market.

This paper sheds light on this issue by modelling the international steam coal market under a range of scenarios regarding the depth, speed, and drivers of transformation in global and regional energy systems. We include the perspective of stakeholders (resource owners and producers, governments, consumers) in our discussion because their support is needed for successful climate-policy driven coal phase-out policies.

Methods

We investigate the effect of regional or global coal phase-out policies by using a comprehensive model of the world steam coal market, COALMOD-World. It calculates global steam coal production, trade, and prices as well as CO_2 emissions from coal consumption. It features a detailed representation of domestic and international steam coal supply until 2050 and includes endogenous investment decisions in production, land transport, and export capacity, as well as an endogenous mechanism assessing production cost increase due to resource depletion (Holz et al. 2016).

We develop four scenarios to assess the effect of different coal phase-out strategies. Our scenarios are a mix of top-down global scenarios based on IEA (2018) data and bottom-up scenarios based on perspectives on the national energy system transformations in the main coal countries, as well as Nace (2018) data.

- *Global NDC*, based on IEA World Energy Outlook 2018 New Policies Scenario
- *Enhanced Coal Transformations (ECT) Scenario 1*, improving the NDC scenario with information on national transformation scenarios from major coal consuming countries (e.g. China, India, South Africa, and USA)
- *Global 2°C*, based on IEA World Energy Outlook 2018 Sustainable Development Scenario
- *Global 1.5°C*, based on bottom-up coal plant data from Nace (2018)

For the analysis of these scenarios, we look at the implications for domestic markets and for the international steam coal trade. In addition to analysing coal production, consumption and trade patterns, we investigate the differences in investment patterns and coal reserve utilization between the scenarios. This will allow us to identify situations in which investments in the coal value-chain are not economically viable and the share of non-utilization of coal reserves – and, by comparison with current investment plans, to identify risks of asset stranding.

Results

First results show that more stringent climate policies come with significantly lower coal demand. In other words, the *NDC scenario* is the scenario with the highest coal demand over time and the 1.5°*C scenario* has the lowest global coal demand, dropping to approximately 2000 million tons per year (Mtpa) in 2030, and going down to as

little as 100 Mtpa in 2050 from approx. 5500 Mtpa today. Interestingly, the *Enhanced Coal Transformation Scenarios* with bottom-up information on coal phase-out policies in major coal consuming countries also have significantly lower coal demand over time than the *NDC scenario*.

As expected, we find investments in the coal value chain closely related to the future demand prospects. Current steam coal markets suffer from significant bottlenecks in various places and segments, for example in the inland transportation in China from production regions to consumption regions. Moreover, the COALMOD-World model includes a mine-mortality mechanism which reflects that low-cost mines are depleted quickly and investments are needed to keep total production capacities at a constant level. We find more or less high investments in de-bottlenecking of transport and export capacities and mine mortality replacement in the different scenarios: the stronger the coal phase-out, the lower the total investments.

Reserve utilization and non-utilization not only differs between scenarios, but also between producing countries. Ambitious coal phase-out scenarios will have significant effects already within the next decade on coal exporters such as Australia, Colombia, Russia, or South Africa.

Conclusions

Global coal market modeling shows that there is a broad range of possible futures for coal producers depending on the ambition of climate policies. To close the gap between NDC and 1.5° scenarios, additional policies are needed. When designing transformation policies, governments need to take into account that stakeholders might oppose – even low-ambitious – climate policies because of the fear of losing market shares and foregoing revenues from reserves and capacities (asset stranding). In the global steam coal market, in particular resource owners and producers in South Africa, but also in Australia are subject to the risk of asset stranding.

Selected References

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