

Oei, Pao-Yu et al.

Article

Climate protection and a new operator: The Eastern German lignite industry is changing

DIW Economic Bulletin

Provided in Cooperation with:

German Institute for Economic Research (DIW Berlin)

Suggested Citation: Oei, Pao-Yu et al. (2017) : Climate protection and a new operator: The Eastern German lignite industry is changing, DIW Economic Bulletin, ISSN 2192-7219, Deutsches Institut für Wirtschaftsforschung (DIW), Berlin, Vol. 7, Iss. 6/7, pp. 63-73

This Version is available at:

<https://hdl.handle.net/10419/155375>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Climate protection and a new operator: the eastern German lignite industry is changing

By Pao-Yu Oei, Hanna Brauers, Claudia Kemfert, Christian von Hirschhausen, Dorothea Schäfer, and Sophie Schmalz

According to the German federal government's climate protection targets, there will be a continuous reduction of lignite-based electricity well before 2030. Simulations show that the currently authorized lignite mines in eastern Germany would not be fully depleted if the climate protection targets for 2030 were complied with. This makes planning for new mines or the expansion of existing ones superfluous. For the planning security of all the actors involved, policy makers should bindingly exclude permits for additional surface mines.

In terms of the follow-up costs of lignite mining, the issue is whether or not the companies' provisions are high enough and insolvency-proof. In this context, the new ownership structures in the eastern German lignite industry, after Vattenfall's sale of its lignite division to Czech Energetický a Průmyslový Holding (EPH), have become a matter of importance. Simulations show that only under optimistic assumptions, the current provisions of 1.5 billion euros for the Lusatian lignite region are sufficient to cover recultivation costs. However, alternative scenarios show significant shortfalls. For this reason, policy makers should work toward independent, transparent cost estimates.

Additional measures should be considered as required, such as the creation of a public sector fund to permanently protect the general public against being forced to take on the costs of recultivation. This is also an important theme for the government's new Commission on Growth, Structural Change, and Regional Development (*Kommission Wachstum, Strukturwandel und Regionalentwicklung*). Individual federal states also have key roles to play in the creation of a dependable roadmap for a coal phase-out. For example, the government of Brandenburg is now in the process of revising its energy strategy for 2030 (*Energiestrategie 2030*).

In November 2016, the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC) went into effect. The world community obligated itself to restricting the increase in the global average temperature to at most 2 °C, and ideally to only 1.5 °C, above pre-industrial levels.¹ In missing these targets serious consequences of global warming loom large.² Achieving the targets will be a major international endeavor.³ To do their part in limiting climate change, both European and German climate policies must be sufficiently ambitious.⁴

In Germany, lignite-based electricity is currently responsible for a particularly high proportion of energy-related greenhouse gas emissions. The lignite industry is thus a key actor in German climate protection activities. In this report we shed light on the current state of the eastern German lignite industry. The strip mines and power plants in the coal-mining regions Central Germany and Lusatia (*Lausitzer Revier*) are currently of special interest, as the ownership structures there have recently seen substantial changes. This issue of the *Economic Bulletin* examines the new ownership structures in detail. In focus is LEAG,⁵ which in 2016 absorbed the power plants and strip mines of Vattenfall. We also show the relationship between the remaining quantity of lignite in eastern Germany and the German climate protection targets. The operating company provisions for recultivating the strip mines after mining has stopped is an issue we examine

¹ See UNFCCC, "Paris Agreement," United Nations Framework Convention on Climate Change (2015). Available online (accessed January 18, 2016, this is the case for all other online sources in this article, except when stated).

² See Intergovernmental Panel on Climate Change (IPCC), "Climate Change 2014 Synthesis Report—Summary for Policy-makers," (2014). Available online.

³ See William D. Nordhaus, "Projections and Uncertainties about Climate Change in an Era of Minimal Climate Policies" (discussion Paper no. 2057, Cowles Foundation, 2016): 1–43.

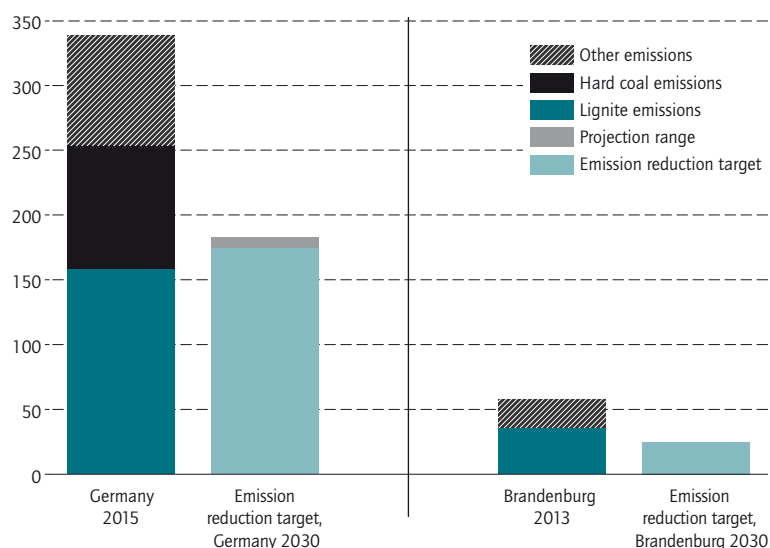
⁴ See Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (*Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit*, BMUB), "Klimaschutzplan 2050 – Klimaschutzpolitische Grundsätze und Ziele der Bundesregierung," BMUB (2016); also see Climate Action Tracker, "EU-Rating," (2016). Available online.

⁵ LEAG is a joint brand of the Lausitz Energie Bergbau AG and the Lausitz Energie Kraftwerke AG.

Figure 1

Annual emissions and emission reduction targets of the energy sector

In million tons CO₂ equivalent



Sources: Own graph based on: Renewable Energies Agency "Bundesländer-Übersicht zu Erneuerbaren Energien," (2016), available online; BMUB, "Klimaschutzplan 2050." The Ministry for Economic Affairs and Energy, Brandenburg, "Energiesstrategie 2030 des Landes Brandenburg." Potsdam (2012), available online. German Federal Environmental Agency (Umweltbundesamt, UBA), "Entwicklung der spezifischen Kohlendioxid-Emissionen des deutschen Strommix in den Jahren 1990 bis 2015." (Climate Change 26/2016), available online.

© DIW Berlin 2017

The emission reduction targets imply a significant reduction of coal-based electricity generation.

in detail. Further, we discuss how they could be safeguarded on a permanent basis.⁶

German government's Climate Action Plan implies phase-out of coal-based electricity generation

The federal government adopted the national "Klimaschutzplan 2050" (Climate Action Plan 2050) as a strategy for fulfilling its international climate protection obligations.⁷ In addition to the target for the overall economy, it specifies detailed emission reduction targets for the different economic sectors to be met by 2030. In the energy industry, it calls for cutting today's emission levels in half by 2030, allowing for 175–183 million tons of CO₂-equivalent emissions. The emissions of lignite- and hard coal-based electricity production in

2015 significantly exceeded this emission target. Therefore, coal-based electricity production must be greatly reduced by 2030.

Looking at the activities required to meet the federal states' emissions targets for 2030, the picture is similar for the state of Brandenburg (see Figure 1). At the state level, the national climate targets still have to be implemented. This warrants the creation of an according state strategy or its adjustment. The Brandenburg government's energy strategy for 2030 is currently being revised and will presumably be ready for publication in the second quarter of 2017. A reduction in lignite-based electricity will play an important role in the strategy.

The carbon reduction targets for 2030 imply significant changes for the energy industry and in particular a sharp reduction in highly carbon-intensive lignite-based electricity. However, these targets are only at the lower margin of a pathway seemingly able to achieve a largely carbon-neutral (decarbonized) German economy by 2050.

In recent years, there have been discussions on a number of regulatory and market-based climate protection instruments for reducing coal-based electricity in Germany, including carbon emission limit values and a "climate protection fee" (*Klimabeitrag*).⁸ Ultimately, in 2016 the federal government decided to implement a "Coal Reserve" (also called "standby mode for backup purposes", *Sicherheitsbereitschaft*) to deactivate selected coal-fired power plants but hold them in reserve in case of emergency demand.⁹ But according to the federal government's 2016 climate protection report, Germany will not meet the climate protection goals it set for 2020. One reason is the almost unchangingly high level of carbon emitted by coal-based electricity generation.¹⁰ As part of the "Coal Reserve," power plant operators have already agreed to save an extra 1.5 million tons of CO₂ if they miss the 2020 targets. If this level of carbon savings proves insufficient, further coal industry measures may be necessary to comply with the target of a 40-percent CO₂ reduction by 2020 in comparison to 1990 levels.

⁸ See Pao-Yu Oei et al., "Auswirkungen von CO₂-Grenzwerten für fossile Kraftwerke auf den Strommarkt und Klimaschutz," *DIW Berlin Politikberatung kompakt* 104 (2015); Pao-Yu Oei et al., "Effektive CO₂-Minderung im Stromsektor: Klima, Preis- und Beschäftigungseffekte des Klimabeitrags und alternativer Instrumente." Study commissioned by the European Climate Foundation (ECF) and the Heinrich Böll Foundation (2015); and Pao-Yu Oei et al., "Braunkohle-ausstieg – Gestaltungsoptionen im Rahmen der Energiewende," *DIW Berlin Politikberatung kompakt* 84 (2014).

⁹ See Pao-Yu Oei et al., "'Kohlereserve' vs. CO₂-Grenzwerte in der Stromwirtschaft – Ein modellbasierter Vergleich," *Energiewirtschaftliche Tagesfragen* 66 (1/2) (2016): 57–60.

¹⁰ See BMUB "Klimaschutzbericht 2016 – Zum Aktionsprogramm Klimaschutz 2020 der Bundesregierung," 2016. Available online.

⁶ Some of the information in this *Economic Bulletin* is based on information acquired as part of the ongoing research project, "Klimaschutz und Kohleausstieg: Politische Strategien und Maßnahmen bis 2030 und darüber hinaus," for the German Federal Environmental Agency (Umweltbundesamt, UBA) and BMUB.

⁷ See BMUB, "Klimaschutzplan 2050."

Currently approved mines adequate for lignite-based electricity generation beyond 2030

This section provides updates on earlier calculations regarding the operating times of lignite mines and power plants.¹¹ We distributed the required reduction in lignite-based electricity production over all surface mines and power plants, accounting for both cost optimization and existing local transport infrastructure. Decisive changes in comparison to former calculations are compliance with the political emission reduction targets for 2030 of the Climate Action Plan 2050 and the implementation of the “Coal Reserve.”¹² Based on our assumptions about the operating times of power plants (Table 1) and other parameters (Table 2), we calculated the remaining amounts to be extracted from the approved mines by 2030, considering various maximum available carbon budgets.

The remaining amount of carbon or coal budget for the lignite industry will depend on a variety of variables. Based on a study by the Oeko-Institut and BET Aachen for the Federal Environmental Agency (*Umweltbundesamt*, UBA),¹³ we established the range of the amounts of coal that could still be used in line with the sector targets for the energy industry in 2030 contained in the Climate Action Plan (Figure 2).

A further scenario maps the “trend scenario” that the Oeko-Institut and Prognos created for the WWF¹⁴ to define the sectoral carbon budget that would comply with the 2°C target. In that degree Celsius scenario, significantly more lignite would remain in the mines than in all the UBA scenarios outlined above (Figure 2). It shows that the carbon emitted by burning lignite in the UBA scenarios is in line with the sector target of the Climate Action Plan 2050, but surpasses the budget of the international 2°C target.

¹¹ Clemens Gerbaulet et al., “Abnehmende Bedeutung der Braunkohleerzeugung: weder neue Kraftwerke noch Tagebaue benötigt,” *DIW Wochenbericht* no. 48 (2012).

¹² Only the major power plants are presented here. In the Jänschwalde power plant, block F will enter the “Coal Reserve” on October 1, 2018, and block E will be added one year later. Each of the two will be shut down completely, four years after being transferred to the reserve. It is assumed that the pending renegotiations between the operators and the federal government directed toward attaining the climate protection targets will also lead to the shutdown of blocks C and D in 2020. Due to the high fixed costs of the Jänschwalde site, another assumption is that the latter two blocks and the strip mine, which will be almost completely depleted of coal by then, will all be shut down when the “Coal Reserve” expires on September 30, 2023.

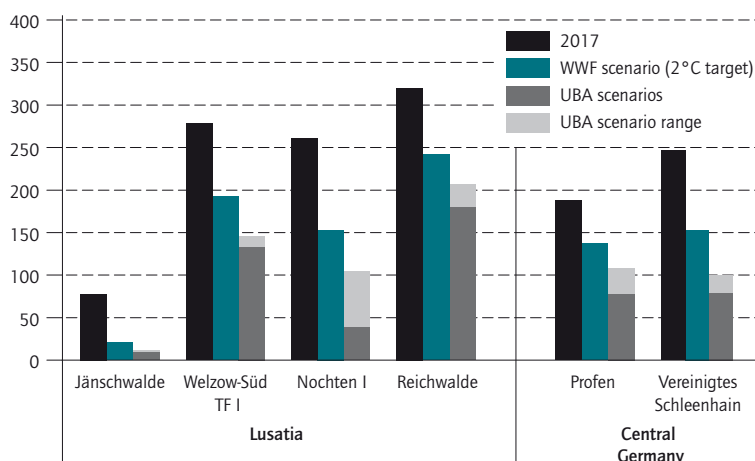
¹³ German Federal Environmental Agency, “Klimaschutz im Stromsektor 2030 – Vergleich von Instrumenten zur Emissionsminderung – Endbericht,” *Climate Change 02* (2017), (Study created by the Oeko-Institut and the Büro für Energiewirtschaft und technische Planung GmbH (BET Aachen)).

¹⁴ WWF Deutschland, “Zukunft Stromsystem – Kohleausstieg 2035 – Vom Ziel her denken,” (2017; Study created by Oeko-Institut and Prognos).

Figure 2

Remaining amounts of lignite in approved mines in Lusatia and Central Germany by 2030

In million tons



The figure shows the approved amounts of lignite to be extracted in the mines in 2017 and in different climate protection scenarios. The WWF scenario defines a sectoral carbon budget level that complies with the 2°C target. The scenarios of the Federal Environmental Agency (Umweltbundesamt, UBA) represent compliance with the sector targets for 2030 of the ‘Climate Action Plan 2050’. The hatched area represents the UBA scenario range.

Sources: Own calculations based on WWF Deutschland, “Zukunft Stromsystem”; and German Federal Environmental Agency, “Klimaschutz im Stromsektor”.

© DIW Berlin 2017

The amounts of lignite to be extracted that are already approved are only partially required in the climate protection scenarios.

Climate target compliance would not fully deplete approved mines by 2030

In both scenarios presented, all mines would still contain significant residual amounts of coal, the removal of which was already authorized. Therefore, all of the new strip mines planned and expansion plans for existing ones are superfluous. For the Lusatia region, this means that Nochten 2, Welzow Süd Teilfeld II, Jänschwalde Nord, Bagenz-Ost, and Spremberg Ost do not need to be developed (see Box 1). In the Central German lignite region, the Vereinigtes Schleenhain strip mine does not need to be expanded, which also means that the village of Pödelwitz does not need to be destroyed.

New commission to design the coal phase-out

Compliance with the agreed upon sector targets in the Climate Action Plan 2050 implies a complete phase-out of coal between 2030 and 2050. When determining an optimal roadmap for the phase-out in individual regions, their later recultivation is a key issue.¹⁵

¹⁵ Before a new surface mine can be opened, the operator must present a feasible plan for the follow-up use of the tract that assumes all of the coal will

Table 1

Assumptions on operating times of lignite power plants in Lusatia and Central Germany

Power plant	Net Capacity (megawatts)	Commissioning	Shutdown year (if not operating in 2030)	Operator
Lusatia				
Klingenberg	164	1981	2017 conversion into gas-fired power plant	Vattenfall
Boxberg Q	857	2000	2030 in operation	LEAG
Boxberg R	640	2012	2030 in operation	LEAG
Boxberg N	489	1979	2024	LEAG
Boxberg P	489	1980	2025	LEAG
Cottbus HKW	74	1999	2030 in operation	Stadtwerke Cottbus
Schwarze Pumpe A	750	1997	2030 in operation	LEAG
Schwarze Pumpe B	750	1998	2030 in operation	LEAG
Jänschwalde F	465	1989	2018 (Coal Reserve)	LEAG
Jänschwalde E	465	1987	2019 (Coal Reserve)	LEAG
Jänschwalde D	465	1985	2020 (Shutdown to comply with 2020 targets)	LEAG
Jänschwalde C	465	1984	2020 (Shutdown to comply with 2020 targets)	LEAG
Jänschwalde B	465	1982	2023 (Shutdown of entire site)	LEAG
Jänschwalde A	465	1981	2023 (Shutdown of entire site)	LEAG
Central Germany				
Schkopau A	450	1996	2030 in operation	Saale Energie (EPH)
Schkopau B	450	1996	2030 in operation	Uniper
Lippendorf R	875	2000	2030 in operation	LEAG
Lippendorf S	875	1999	2030 in operation	EnBW
Chemnitz Nord II HKW C	91	1990	2030 in operation	Stadtwerke Chemnitz
Chemnitz Nord II HKW B	57	1988	2030 in operation	Stadtwerke Chemnitz

The power plant Buschhaus (Mibrag; EPH) has been in the "Coal Reserve" since October 1st 2016 and will be shut down in 2020.

Sources: Own depiction, based on own assumptions and data of BNetzA.

© DIW Berlin 2017

The majority of power plants is owned by subsidiary companies of EPH or LEAG, respectively.

If all involved parties (political parties, civil society, academia, unions and companies) could develop a coal phase-out roadmap together, its level of societal acceptance would likely be increased. Given this context, the new Commission on Growth, Structural Change, and Regional Development (*Kommission Wachstum, Strukturwandel und Regionalentwicklung*) announced in the Climate Action Plan 2050 will have a key role to play. Along with its other duties, at the beginning of 2018 the commission will be tasked with drafting a coal phase-out roadmap that considers the impending societal changes in the lignite regions.¹⁶ The commission has another key task: safeguarding the financing of the lignite industry's follow-up costs.

be extracted from the mine. Therefore, partial extraction from strip mines is considered non-compliance with the previously agreed upon lignite plans and trigger additional authorization and verification procedures. For this reason, prohibiting the partial development of new surface mines is an effective instrument for preventing stranded investments.

16 For more on the possible effects of a lignite phase-out in eastern Germany, see Simon Franke et al., "Arbeitsplätze in der ostdeutschen Braunkohle: Strukturwandel im Interesse der Beschäftigten frühzeitig einleiten," *DIW Wochenbericht* no. 6+7 (2017).

Follow-up costs unknown; calculations of provisions murky

The operators of lignite surface mines are obligated to pay for the cost of recultivation after their mines are depleted. Each company implicated must build up sufficient provisions. This is stipulated in Section 55 of the German Federal Mining Act (*Bundesberggesetz*, BBergG);¹⁷ embedded in this section is the polluter pays principle. However, its practical implementation at present includes risks that could entail negative consequences for the general public. The mine operators themselves are responsible for estimating the future follow-up costs of recultivating the depleted mines, and it is difficult for the public to reconstruct or evaluate the sums they determine.¹⁸ The amount of money the surface mine operators hold as mining-related provisions is hence based on their own estimates.

17 See "Bundesberggesetz" (BBergG; German Federal Mining Act), as of November 30, 2016.

18 See Rupert Wronski et al., "Finanzielle Vorsorge im Braunkohlebereich Optionen zur Sicherung der Braunkohlerückstellungen und zur Umsetzung des Verursacherprinzips," (Potsdam/Berlin: Forum Ökologisch-Soziale Marktwirtschaft e.V. and IASS Potsdam Institute for Advanced Sustainability Studies e.V., 2016), 16 et seq.

Box 1

Overview of planned surface mine expansion in eastern Germany

Surface mine expansion has been planned for the Lusatia and Central German lignite regions, but the plans are at entirely different stages. In the Lusatia region, they involve the Nochten 2, Welzow Süd TF II, Jänschwalde Nord, Bagenz-Ost and Spremberg Ost surface mines. In the Central German coal region, the expansion of the surface mine Vereinigtes Schleenhain is being discussed.¹

The lignite mining expansion plan (*Braunkohlenplan*, referred to as "expansion plan" here) for Nochten 2 has already been approved and Vattenfall also applied for the required general operating plan. Preparations for resettling the approximately 1,500 residents of Rohne, Mulknitz, Schleife, Mühlrose, and Trebendorf, however, were halted in 2015. LEAG could reactivate the plan as long as it does not come into conflict with the current policy.

For the Welzow Süd TF II expansion, around 800 residents from Proschim and part of Welzow would have to be resettled, which has been approved in an expansion plan. The previous owner

Vattenfall, however, has not applied for the needed general operating plan for this new surface mine.

The mining site Jänschwalde Nord was supposed to supply a new lignite power plant with a carbon capture system at the Jänschwalde site. However, the power plant was canceled. The expansion of this surface mine would have meant resettlement of around 900 people living in the villages of Grabko, Kerkwitz, and Atterwasch. The expansion plan for this surface mine has not been approved yet, nor have the operators applied for an operational plan.

Bagenz-Ost and Spremberg Ost in Brandenburg are two more surface mines in the preliminary planning phase. The original idea was to have both of them begin extracting lignite in the 2030s. But the process for the expansion plan has not been initiated for either of them.

The village of Pödelwitz is planned for removal to allow for the expansion of the Vereinigtes Schleenhain mine in the Central German coal region. This will enable surface mine operator, MIBRAG, to extract around 20 million extra tons of coal and save the cost of the dust- and sound-proofing systems it would have incurred if the village were bypassed as originally planned.

¹ See Pao-Yu Oei et al., „Braunkohleausstieg – Gestaltungsoptionen im Rahmen der Energiewende," DIW Berlin (2014), Politikberatung kompakt 84; also see Grüne Liga Umweltgruppe Cottbus, „Drohende Tagebaue," (2017). Available online.

After the acquisition of Mitteldeutsche Braunkohlgesellschaft (MIBRAG) in 2010, the new owner, EPH, liquidated mining-related provisions of around 135 million euros and transferred the money to the "other retained earnings" section of the financial statement.¹⁹ In 2016, the German lignite economy's mining-related provisions amounted to slightly more than four billion euros. RWE's share of the total was 2.4 billion euros, Vattenfall/LEAG's was 1.5 billion euros, and MIBRAG's was 0.14 billion euros.²⁰

Mining-related provisions are carried as obligations in the liabilities column of corporate balance sheets. The companies can invest them further until payment is due.

¹⁹ The company referred to the 2009 German Accounting Law Reform Act (*Bilanzrechtsmodernisierungsgesetz*, BilMoG), which revalued the reserve, indicating that the reserve had not been "liquidated upon request of shareholder EPH, as claimed." Although both RWE and Vattenfall also showed reductions in mining-related reserves during the same period (15 percent for the former and 21 percent for the latter), they were significantly lower than that of MIBRAG (56 percent). See Wronski et al., *Finanzielle Vorsorge*, 22 et seq. and Mitteldeutscher Rundfunk (MDR), "Stellungnahme EPH" broadcast on September 22, 2016. Available online.

²⁰ Information as provided by the company in the *Federal Gazette* (*Bundesanzeiger*).

Table 2

Additional assumptions to calculate remaining amounts of lignite

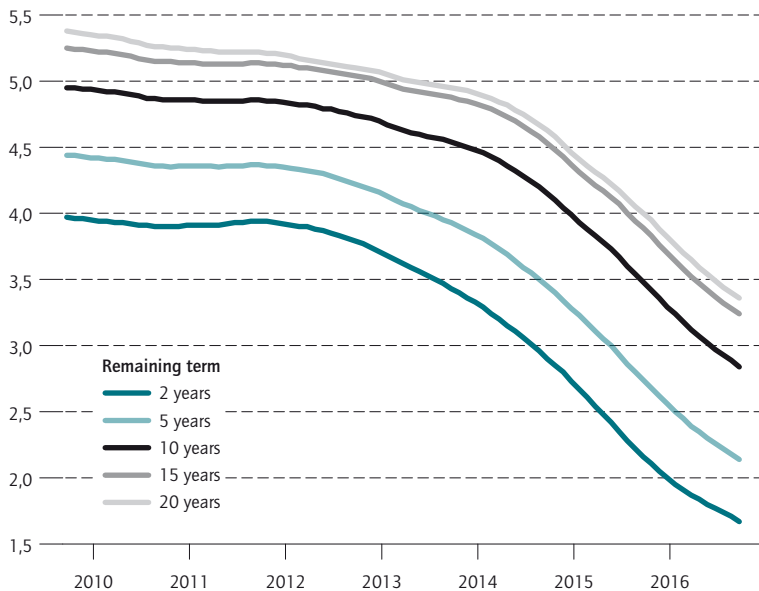
Remaining amounts of lignite for Lusatia and Central Germany for 2017–2030:	WWF scenario: Cumulated lignite consumption of the 'Trend scenario', which is in accordance with the 2°C target. UBA scenarios: cumulated lignite consumption for a linear reduction from 2017 onwards and in compliance with the 'Climate Action Plan 2050' sector targets for the year 2030 for different electricity market developments in six scenarios. Basic assumption that Lusatia and Central Germany together, according to their capacities in 2017, represent half of Germany's total lignite emission reductions.
Utilization of power plants:	The full load hours are being reduced from around 7500 in 2017 with a yearly proportional factor, such that the resulting amount of CO ₂ from electricity production in 2017–2030 does not exceed the lignite budget for the region. On average, there are 4.500 full load hours.
Share of lignite from the strip mine Reichwalde:	The share of lignite from the strip mine Reichwalde may not exceed 25 percent for the power plant Schwarze Pumpe and 35 percent for the power plant Boxberg.

Source: Own depiction.

Figure 3

Development of discount rates from 2010 to 2016 for different remaining terms

In percent



7-year averages are depicted.

Source: Bundesbank (available online).

© DIW Berlin 2017

Discount rates decreased for all remaining terms, thereby provisions have to increase.

When the value of the assets the companies are carrying (e.g., investment in surface mining and coal- or gas-fired power plants) depreciates, the provisions also become less valuable. If the companies become insolvent, they may lose their provisions completely. This shows that the current mining-related provisions of German lignite mine operators are not insolvency-proof.

Varying estimates of the provisions required in the Lusatia lignite region

Mining-related company provisions should be equivalent to the present value of the future burden of payment caused by the obligation to recultivate depleted mines. Rising real cost estimates for the future recultivation of mining regions could increase the present value required, as could higher inflation rates, lower discount rates and/or shorter remaining service lives. The present value would decrease if any of these variables developed in the opposite manner. In recent years, the discount rates for all remaining terms have continuously fallen (Figure 3). As a consequence, the provisions should be raised due to interest rates.

The actual costs of recultivating eastern German lignite strip mines are uncertain. In the following section, we present rough estimations of the provisions that would be required in fiscal year 2016 to cover the cost of recultivating the lignite strip mines in the Lusatia lignite region for three scenarios with varying initial costs per hectare. For reasons of simplification, we assume that in the period from 2018 to 2040, an area of equal size will be recultivated each year and prices will change at a constant rate over time. The rate of price changes could also be negative if technical progress in recultivation or economies of scale/specialization overcompensate for inflation. In the case of low price increases and the resulting dominant discount factor, a longer recultivation period than assumed here (i.e., parts of the costs due after 2040) would reduce the required provisions. When the rates of price increase are high, the opposite effect will take hold, driving up the required provisions in 2016.

In the first scenario, we assumed average recultivation costs of 162,000 euros per hectare with 2015 as the baseline year.²¹ These values stem from the cost data of *Lausitzer und Mitteldeutsche Bergbau-Verwaltungsgesellschaft mbH* (LMBV) and reflect the cost of cleaning up the contamination from GDR surface mines. In comparison, the average costs for the mines that still exist today could be lower. For this reason, we assume recultivation costs of 75 percent of the LMBV value in the second scenario, and in the third one we set the level at 50 percent (Figure 4).

The three scenarios showed that for the Lusatia lignite region, the current provisions of 1.5 billion euros could only be adequate under specific conditions. This applies in particular to the third scenario, in which today's specific costs are only half of the historical LMBV value. And in the other scenarios, the provisions could be adequate if the rate of price increase is highly negative—due to technical progress and low inflation, for example. However, if we make less optimistic assumptions i.e., higher rates of price increase, if technical progress does not compensate for the general inflation in this sector, or more stringent regulatory requirements are applied to recultivation, shortfalls are the result. A further drop in the discount rate would push the present value curve upward in the direction of larger shortfalls as well. The new operator of the Lusatian mines must make up these shortfalls in the near future and transfer them to its provisions.

²¹ See Gerard Wynn and Javier Julve, "A Foundation-Based Framework for Phasing Out German Lignite in Lausitz," (Cleveland: Institute for Energy Economics and Financial Analysis (IEEFA)), 2016, 31.

LEAG, the successor to Vattenfall's lignite division

Vattenfall GmbH sold its German lignite division to Czech energy group EPH and PPF Investments (PPF-I), its financial partner, in September 2016. Since October of last year, the former Vattenfall lignite division has done business under the name of LEAG. Through various parent companies, both EPH and PPF-I own 50 percent of LEAG (Box 2).²² The Swedish government agreed to the sale, and after the EU Cartel Authority checked for any competition concerns the EU Commission also gave its stamp of approval.²³ Vattenfall saw considerable risks in the lignite business and decided to sell.²⁴ The Czech consortium of buyers was the last remaining bidder. According to Vattenfall, EPH acquired 1.6 billion euros in cash resources plus liabilities and provisions in the amount of approximately 1.9 billion euros.²⁵ Provisions for mining operations, other environment-related provisions and provisions for pensions amounted to 1.7 billion euros.²⁶ Of these, around 1.5 billion euros can be attributed to mining-related provisions.²⁷ The Czech consortium is not allowed to pay any dividends, liquidate its provisions or conduct similar transactions until three years after the sale. And it must honor the existing collective bargaining agreements, which prohibit layoffs until 2020.²⁸

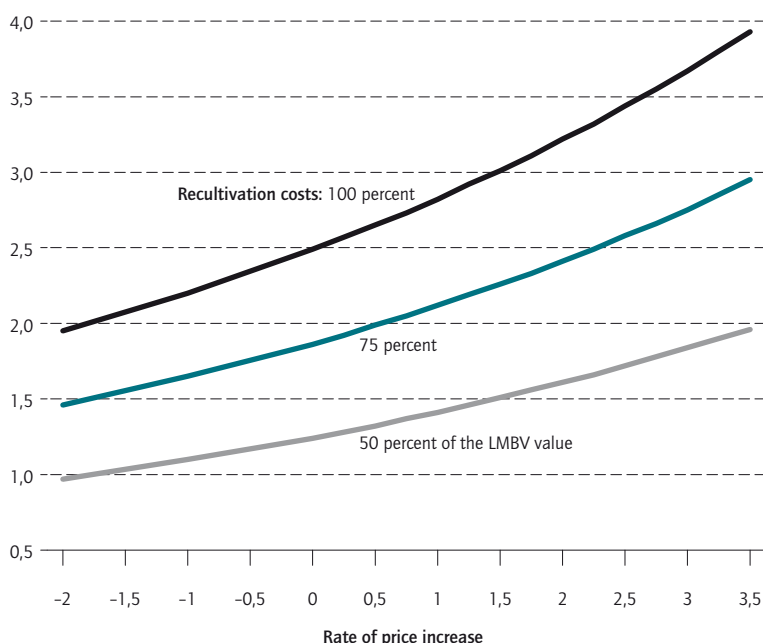
Provisions at risk due to new operator

The state and federal climate protection targets outlined above have a marked influence on the business model of EPH, which owns virtually all of the eastern German lignite industry through various subsidiaries. The company is currently expanding its conventional electricity production business by buying up lignite and gas-fired power plants in different European countries.²⁹ However, low electricity prices and sharply falling carbon budgets

Figure 4

Required amount of provisions for the Lusatia lignite region in 2016 under different assumptions

In billion euros



Specific recultivation costs relative to data from the Lausitzer und Mitteldeutsche Bergbau-Verwaltungsgesellschaft (LMBV). The rate of price increase can be negative for example because of technological progress in recultivation. A remaining term 2018–2040 and a discount rate of a 7-year average with valuation date end of 2016 for a remaining term of 23 years are assumed. Possible deficits would have to be earned in the coming years.

Source: Own calculations based on Gerard Wynn and Javier Julve, "A Foundation-Based Framework for Phasing Out German Lignite in Lausitz."

© DIW Berlin 2017

Current provisions are sufficient only under optimistic assumptions regarding recultivation costs and price increases.

are threatening to progressively limit the full-load hours of the power plant fleet of Europe's third-largest carbon emitter. If the power plants' value depreciates accordingly, there is a risk that some of the subsidiaries will simply not have the required provisions to draw upon.

If companies are not financially able to make adequate provisions, their parent company is responsible for paying all recultivation costs due later—insofar as a control and profit transfer agreement exists. Under certain circumstances, parent companies can evade responsibility for the follow-up costs by terminating the contracts before the event or restructure under corporate law.³⁰ Their annual reports do not conclusively indicate

²² See LEAG, "Dr. Helmar Rendez übernimmt Vorstandsvorsitz des neuen Energieunternehmens," press release, October 11, 2016.

²³ EU Commission, "Mergers: Commission clears acquisition of Vattenfall Europe Generation and Vattenfall Europe Mining by EPH and PPF Investments," press release, September 22, 2016.

²⁴ See Vattenfall GmbH, "Vattenfall to sell German lignite operations," press release, April 18, 2016.

²⁵ See Vattenfall GmbH, press release, April 18, 2016.

²⁶ See Vattenfall GmbH, "Interim report January-June 2016". Available online.

²⁷ See Federal Bulletin, "Lausitz Energie Bergbau AG (vormals: Vattenfall Europe Mining Aktiengesellschaft) Cottbus Jahresabschluss zum Geschäftsjahr vom 01.01.2016 bis zum 31.05.2016," (report, Bundesministerium der Justiz und für Verbraucherschutz, Berlin, 2017). Available online.

²⁸ See Vattenfall GmbH, press release, April 18, 2016.

²⁹ See Greenpeace, "Update: Schwarzbuch EPH – Bilanz nach 100 Tagen LEAG," (Greenpeace, Berlin, 2017), available online; and Greenpeace "Schwarzbuch EPH – Wie ein windiger Investor Politik und Wirtschaft zum Narren hält," (Greenpeace, Berlin, 2016). Available online.

³⁰ Also see German Stock Corporation Act (*Aktiengesetz*, AktG) Section 303, version May 10, 2016.

Box 2

Corporate structure of the eastern German lignite industry**The founding of LEAG**

LEAG developed from the former lignite division of Vattenfall. It has around 8,000 employees, an installed power plant output of approximately 8,000 megawatts (MW), and extracts around 60 million tons of lignite from its surface mines each year.¹ It consists of Lausitz Energie Kraftwerke AG (LE-K), which manages the power plant division (formerly part of Vattenfall Europe Generation AG) and Lausitz Energie Bergbau AG (LE-B), which is responsible for the surface mining division (formerly Vattenfall Europe Mining AG).² Holding company Lausitz Energie Verwaltung GmbH (LE-V), which has around 20 employees and is headquartered in Cottbus, is the parent company that owns 80 percent of the two companies.³ According to information provided by EPH, the remaining 20 percent is equally in the hands of two companies: EPPE Germany, a special purpose vehicle of EPH with headquarters in Prague, Czech Republic and Gemcol Ltd., a special purpose vehicle of PPF-I headquartered in Nicosia, Cyprus (see Figure 5).⁴

LE-V is run by members of the joint executive board of the two LEAG companies LE-B and LE-K. LEAG Holding a.s., which is headquartered in Prague and owns 50 percent each of the two special purpose vehicles, is its sole shareholder.⁵

EPH is now Europe's third-largest carbon emitter

EPH (*Energetický a Průmyslový Holding*) is a private energy supplier based in Brno, Czech Republic. It was founded in 2009 by J&T, the Czech financial group.⁶ The publicly traded company is active on a variety of stages of the energy supply value chain. In addition to lignite mining and hard coal- and lignite-based elec-

tricity production, it is also involved in the transport and sale of electricity, district heating and natural gas in various countries. And its business includes the Transgas Pipeline, which runs from Ukraine through Slovakia, the Czech Republic and Austria to Germany.⁷ EPH has been active in Germany since 2009, when it absorbed MIBRAG. Since 2012, it has held shares in the Schkopau power plant through Saale Energie GmbH and in 2013, EPH purchased the Helmstedt lignite region near Braunschweig from E.ON. It contains the Buschhaus power plant and the Helmstedt surface mine.

EPH CEO Daniel Kretinsky plans to raise his share of ownership from the current 37.17 percent to 94 percent in 2017.⁸ With the restructuring of the company, the remaining six percent of the shares would go to still unknown EPH managers.⁹ This makes EPH very different from many other coal-fired power plant operators in Germany (e.g., RWE, EnBW, Vattenfall, and Steag), which are all companies with government-owned shares.

PPF Investments—the invisible investor

PPF Investments (PPF-I) is a private equity group based in Jersey. Tomas Brzobohaty, a Czech citizen, is its majority stockholder.¹⁰ According to EPH, the Dutch PPF Group (PPF-G), which belongs to the Czech national Petr Kellner,¹¹ is holding financial resources at the ready for PPF-I in the Vattenfall deal. However, PPF-G is not a PPF-I shareholder.¹² Upon selling its lignite division, Vattenfall published a compliance statement in which Petr Kellner was designated as the ultimate owner of PPF. When asked whether it meant PPF-I or PPF-G, neither PPF-I nor Vattenfall did provide an answer.¹³

¹ See LEAG, press release, October 11, 2016

² The transport and freight forwarding company Schwarze Pumpe mbH (TSS GmbH) and the planning and service company GMB GmbH are also wholly owned subsidiaries.

³ See e-mail correspondence with Daniel Castvaj, EPH (available upon request).

⁴ See e-mail correspondence with Daniel Castvaj, EPH and Stefan Schröter, "Komplizierte Strukturen für die Lausitzer Braunkohle," (Online report in German only, Leipzig, November 2016). Available online.

⁵ See e-mail correspondence with Daniel Castvaj, EPH.

⁶ See EPH, "Annual Report 2015," (2015): 31. Available online.

⁷ See EPH, "EPH has completed the transaction for the purchase of Vattenfall's German lignite activities," press release September 30, 2016.

⁸ Kretinsky will hold 53 percent of the shares via EP Investment S.à.r.l. and 47 percent via EP Investment 2 S.à.r.l., which are headquartered in Luxembourg. See EPH, "EPH expects a change in its shareholder structure," press release October 17, 2016.

⁹ See e-mail correspondence with Daniel Castvaj, EPH

¹⁰ See PPF Investments, homepage (2017). Available online.

¹¹ See PPF Group N.V., "Annual Report 2015," (2015): 12. Available online.

¹² See e-mail correspondence with Daniel Castvaj, EPH

¹³ See Vattenfall, press release, April 18, 2016, Compliance Statement.

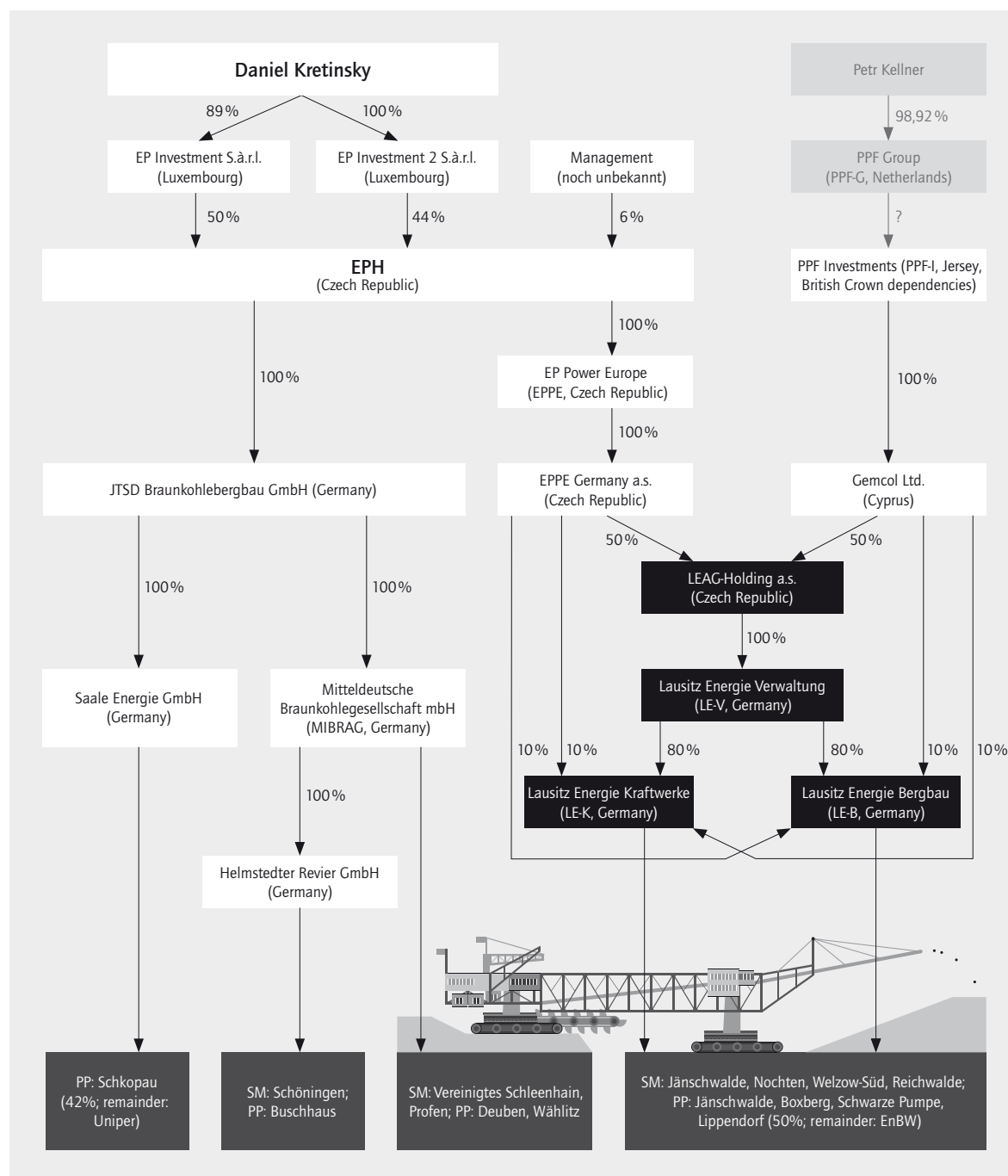
which EPH companies have controlling and profit transfer agreements with each other. And due to the many subsidiary companies involved, the extent to which EPH is directly or indirectly liable for financing the obligations of subsidiaries MIBRAG or LEAG in case of insolvency is not clear. Furthermore, it could be difficult to enforce

corporate liability in the case of international corporate structures such as those of LEAG's parent companies.³¹

³¹ See Wronski et al., *Finanzielle Vorsorge*, 34 et seq.

Figure 5

Corporate structure of the eastern German lignite industry



SM: Surface mines.

PP: Power plants.

Source: Own graph based on: e-mail correspondence with Daniel Castvaj; EPH; EPH press release October 17, 2016; PPF Group, "Annual Report 2015"; PPF Investments, homepage; Greenpeace "Update: Schwarzbuch EPH"; Information provided by the company JTSD in the Federal Gazette (Bundesanzeiger) 2014 and 2015.

The corporate structure raises the question to what extent parent companies can be held liable for possible insolvency of subsidiary companies.

Various options for assuring the provisions

A variety of measures can conceivably ensure that the polluter pays indeed for the follow-up costs of the lignite industry and rein in the risk to public budgets. In the following section, we have listed some possible measures in order of ascending degree of intervention. Some of the measures can be implemented in tandem.³²

Independent cost appraisals

To increase transparency and public control over the cost estimates and needed provisions, the federal government could commission an independent entity to carry out a cost appraisal (with the involvement of state governments as required). As in the case of the nuclear power industry, this would be the first step toward independent verification of the amount of provisions required.³³ Depending on the outcome, the necessity of further measures could be evaluated.

Act on follow-up liability

To ensure that the relevant parent company remains liable for the long-term follow-up costs in the case of insolvency or the restructuring of mine-operating companies, the German federal government could implement an “Act on follow-up liability” (*Nachhaftungsgesetz*). There is also a precedent for this in the German nuclear power industry.³⁴

Security as per the German Federal Mining Act

According to Section 56 of the German Federal Mining Act,³⁵ demanding security that is immune to mine operator insolvency is left to the discretion of the relevant mining authorities. Security can be provided in the form of an insurance policy, bank guarantee or a binding letter of comfort from the parent company. However, whether or not previously authorized surface mines can be subject to providing security must still be verified from a legal point of view.

³² See Wronski et al., *Finanzielle Vorsorge*.

³³ See Resolution of the German Bundesrat, “Gesetz zur Neuordnung der Verantwortung in der kerntechnischen Entsorgung,” *Drucksache* 768/16 (Deutscher Bundesrat, Berlin, 2016, available online), Article 7: Transparency Act regarding nuclear power plant shutdown (*Gesetz zur Transparenz über die Kosten der Stilllegung und des Rückbaus der Kernkraftwerke sowie der Verpackung radioaktiver Abfälle*).

³⁴ See Resolution of the German Bundesrat, “Gesetz zur Neuordnung,” Article 8 “Follow-up liability act” (*Gesetz zur Nachhaftung für Abbau- und Entsorgungskosten im Kernenergiebereich*).

³⁵ See “German Federal Mining Act.”

Public fund or private foundation

A private foundation analogous to the RAG Foundation for Germany’s hard coal mines could also be established to safeguard lignite surface mine provisions, for example. The extent to which this type of solution is deemed necessary would greatly depend on the design of the financing concept. Alternatively, a public fund could be set up, and the government would be responsible for raising the money for it from mine-operating companies. Of all the measures on the list, this represents the highest degree of intervention. However, it could help protect the public from having to pay for the long-term follow-up costs of lignite mining and at the same time, provide high levels of insolvency protection and transparency.³⁶

Conclusions and implications for energy policy

According to the long-term climate protection targets of the German federal government, the energy sector must achieve significant emission reductions in the coming years. This implies a rapid phase-out of lignite-based electricity, which has already begun with the implementation of the “Coal Reserve” and should proceed accordingly. The pathway to phase-out needs to be structured.

Simulations show that if the targets in the Climate Action Plan 2050 were complied with, the strip mines currently approved in eastern Germany would not be fully depleted by 2030. This makes planning for new mines or the expansion of existing ones in the states of Brandenburg and Saxony superfluous. For the planning security of all the actors involved, policy makers should stop granting permits for additional surface mines. In the interests of local residents, mine employees and last but not least, power plant and surface mine operators, this should happen as soon as possible. Being currently in the middle of revising its own energy strategy for 2030, the government of the state of Brandenburg needs to take political action now. Brandenburg should—in collaboration with the state government of Saxony—not miss the opportunity to develop a reliable roadmap for the upcoming coal phase-out in the Lusatia lignite region.

It is also important to assure an adequate level of finances for the follow-up costs of lignite mining. Two key questions must be answered: are the companies’ provisions high enough, and are they immune to insolvency? In this context, the new ownership structures in the eastern German lignite industry have become a matter of importance. The Czech company EPH took over the lignite division of Vattenfall GmbH. The new owner’s business model and corporate structure indicate a need to

³⁶ See Wronski et al., *Finanzielle Vorsorge*.

question the extent to which provisions for recultivation costs can be permanently safeguarded.

The level of provisions required depends, for example, on the assumptions made about price increase rates. The current provisions of 1.5 billion euros for the Lusatia region are only sufficient to cover recultivation costs under optimistic assumptions. However, alternative scenarios show significant shortfalls. Commissioning independent cost appraisals and disclosing the current cost estimates would be the first steps toward increasing transparency—policy makers should take the initiative here.

Depending on the results, additional measures could be implemented as required. Establishing a public fund similar to the one for the nuclear industry comes with a relatively high level of intervention but also appears to be

a particularly effective measure. Set up accordingly, this measure would permanently protect taxpayers against being forced to take on the costs of recultivation.

The pros and cons of the various measures conceivable should be discussed among all involved parties, and policy makers should be entrusted with making the decision in the public interest. Outlined in the Climate Action Plan 2050 and planned for the beginning of 2018, the new Commission for “Growth, Structural Change and Regional Development” could ideally provide the framework for the discussion. The success of the commission hereby depends on its composition, mandate and terms of service. The commission must also consider the social consequences of the lignite phase-out in Germany, which is inevitable in view of the urgency of climate protection.

Pao-Yu Oei is a guest researcher in the Department Energy, Transportation, Environment at DIW Berlin | poei@diw.de

Hanna Brauers is a working student in the Department Energy, Transportation, Environment at DIW Berlin | hbrauers@diw.de

Claudia Kemfert is head of the department energy, transportation, environment of DIW Berlin | ckemfert@diw.de

Christian von Hirschhausen is Research Director for International Infrastructure Policy and Industrial Economics at DIW Berlin | chirschhausen@diw.de

Dorothea Schäfer is Research Director, Financial Markets at DIW Berlin | dschaefer@diw.de

Sophie Schmalz is a working student in the Department Energy, Transportation, Environment at DIW Berlin | sschmalz@diw.de

JEL: Q48, Q52, L71, L94, G31, G34

Keywords: Coal, lignite, climate policy, Germany, liabilities, energy transition



DIW Berlin – Deutsches Institut
für Wirtschaftsforschung e. V.
Mohrenstraße 58, 10117 Berlin
T +49 30 897 89 -0
F +49 30 897 89 -200

Publishers

Prof. Dr. Tomaso Duso
Dr. Ferdinand Fichtner
Prof. Marcel Fratzscher, Ph.D.
Prof. Dr. Peter Haan
Prof. Dr. Claudia Kemfert
Dr. Kati Krähnert
Prof. Dr. Lukas Menkhoff
Prof. Karsten Neuhoff, Ph.D.
Prof. Dr. Jürgen Schupp
Prof. Dr. C. Katharina Spieß
Prof. Dr. Gert G. Wagner

Reviewer

Dr. Stefan Bach
Dr. Jörn Richstein

Editors in chief

Dr. Gritje Hartmann
Dr. Wolf/Peter Schill

Editorial staff

Renate Bogdanovic
Dr. Franziska Bremus
Prof. Dr. Christian Dreger
Sebastian Kollmann
Ilka Müller
Mathilde Richter
Miranda Siegel
Dr. Alexander Zerrahn

Layout and Composition

eScriptum GmbH & Co KG, Berlin

Sale and distribution

DIW Berlin
ISSN 2192-7219

Reprint and further distribution—including excerpts—with complete reference and consignment of a specimen copy to DIW Berlin's Communications Department (kundenservice@diw.berlin) only.
Printed on 100% recycled paper.