E3G

REPORT NOVEMBER 2015

VATTENFALL'S LIGNITE BUSINESS

A RISKY BET FOR INVESTORS

JULIAN SCHWARTZKOPFF & SABRINA SCHULZ

This work was commissioned by Klima-Allianz Germany. Klima-Allianz is a broad coalition of more than 100 organisations working to strengthen and promote climate policy in Germany.

About E3G

E3G is an independent, non-profit European organisation operating in the public interest to accelerate the global transition to sustainable development. E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change. E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere.
www.e3g.org

Berlin office
Neue Promenade 6
Berlin, 10178 – Germany
Tel: +49 (0) 30 2887 3405

Brussels office
Rue de la Science 23
1040 Brussels, Belgium
Tel: +32 (0)28 93 92 12

London office
47 Great Guildford Street
London SE1 0ES, UK
Tel: +44 (0)20 7593 2020
Fax: +44 (0)20 7633 9032

Washington DC office
1250 24th Street NW
Suite 300
Washington DC , WA 20037
United States
Tel: +1 202 466 0573

Acknowledgements: We thank Stefanie Langkamp, Simon Wolff, René Schuster, Tobias Austrup, Susanne Neubronner, Christian Schaible and Dave Jones for valuable input and comments.

Copyright

REPORT NOVEMBER 2015

VATTENFALL'S LIGNITE BUSINESS
A RISKY BET FOR INVESTORS

JULIAN SCHWARTZKOPFF & SABRINA SCHULZ

CONTENTS

EXECUTIVE SUMMARY

Vattenfall is currently looking for a buyer for its East German lignite assets. However, any potential investor faces a high risk that they will find themselves forced to wind down Vattenfall's lignite business before earning back their investment. A confluence of political, economic and legal risks puts the future profitability of German lignite in question. The time window in which Vattenfall's lignite plants can still be run profitably is closing quickly – so quickly that investors would likely be unable to recoup their costs.

Political risks

The regulatory outlook for lignite ranges from uncertain to downright hostile. Beyond 2020, further legislative action to reduce lignite power capacity is virtually assured, as Germany will take additional measures in the power sector to reach its long-term climate targets. Further regulation on lignite will very likely be enacted even before 2020. The European Commission could still strike down the capacity reserve deal that utilities managed to win for a gradual scaling back of their lignite plants this year. Or the lignite issue could get caught up in the 2017 parliamentary election amid a 2018 review clause included in the deal. The introduction of a capacity market, which could have thrown a lifeline to Germany's ailing coal power plants, has been resolutely rejected by the government this year. Germany has already embarked on path to phase out coal, with emissions reductions accelerating significantly beyond 2020.

Economic risks

The *Energiewende* is fundamentally transforming Germany's power sector, making it ever harder for fossil fuels to compete. Baseload power prices have plunged from already low levels to below €30/MWh. A gas glut of record proportions combined with current overcapacity and the continuing rise of renewables will ensure that power prices do not increase again anytime soon. At the same time, efforts to reform the European emissions trading system are set to raise CO_2 costs substantially until 2020, possibly to €20/t CO_2 and above. New pollution limits in 2021 and rehabilitation costs, which could have been underestimated significantly, will require additional expenses. Taken together, these trends are set to erode profit margins from lignite power to the point of unprofitability.

Legal risks

Under German law, the future owner of Vattenfall's lignite assets will be liable for a variety of environmental damages and other mining-related legal costs. The legal standing of environmental groups and local residents to bring cases has recently been strengthened in judgements of the German Constitutional Court and the European Court of Justice, which opens up the possibility of an increased number of lawsuits in the future, on top of those that are already pending. In addition, the potential lignite mines Welzow-Süd II and Nochten 2, which are being sold as part of the Vattenfall package, might never see the light of day as lawsuits have already been brought against them. Prospective buyers will therefore not only buy the lignite assets, but also a slew of pending and potential lawsuits.

INTRODUCTION

Vattenfall announced its intention to divest its German lignite business back in October 2014, in order to improve its CO_2 emissions performance. On 22 September 2015, Vattenfall ran an advert in the Financial Times, formally opening the bidding process. The portfolio for sale includes the lignite-fired power plants Jänschwalde, Boxberg, Lippendorf and Schwarze Pumpe, along with the associated opencast mines as well as ten hydropower plants located close to the lignite plants. Statements of interest could be submitted to Citibank, which manages the sale, by 6 October. So far, only the German Steag, as well as the Czech companies EPH, ČEZ and Czech Coal are known to have submitted bids.[1] Vattenfall aims to find a buyer by mid-2016. However, the deal is riskier than it might look.

With its half-year report for 2015, Vattenfall already announced a write-down of €1.9bn (SEK 17.8bn) on its lignite power plants and mines due to "poorer production margins [...] and higher business risk".[2] This massive write-down was conducted in respone to regulatory developments, i.e. the energy transition putting pressure on profit margins, an updated plan for recultivation of lignite mines, as well as the German government's first legislative moves against lignite. This illustrates the considerable effect that the regulatory framework has on the value of lignite assets.

While this might make the sale seem like an attractive business opportunity, it is unlikely that the devaluation took into account the full extent of the risks relating to lignite power generation in Germany today. Consultancy Energy Brainpool has conducted an economic analyis of the lignite business on offer and determined its net present value at €468m.[3] This assessment was based on parameters specified by Greenpeace, including plant closure dates to 2030 and a sharp rise in CO_2 prices. This represents a low-end estimate of the value of the portfolio, essentially putting a number on what it would be worth with a foreseeable increase in climate policy ambition. An analyst at Landesbank Baden-Wurttemberg, on the other hand, estimated the value of the lignite business at €2-3bn.[4] This represents a high-end estimate based on the current economic and political situation.

However, several factors are working against the long-term profitability of the lignite business. Indeed, the situation looks worse than last year, when a report by the German Institute for Economic Research highlighted serious risks to Vattenfall's lignite portfolio.[5] 'Business as usual' will not be a good guide to the future as Germany's energy transition progresses, moving away from coal and fundamentally reinventing the electricity market along the way.

[1] Greenpeace Nordic also submitted a statement of interest, but was subsequently rejected by Citibank as a potential buyer.
[2] Vattenfall (2015) **Interim Report January–June 2015**
[3] Energy Brainpool (2015) **Economic analysis of Vattenfall's lignite power plants offered for sale**
[4] Boomberg (2015) **Greenpeace says can find cash to buy Vattenfall coal assets**, 6 October 2015
[5] DIW (2014) **Risks of Vattenfall's German Lignite Mining and Power Operations - Technical, Economic, and Legal Considerations**, Politikberatung kompakt 87

POLITICAL RISKS

1) European and domestic climate commitments require a lignite phase-out

Climate science dictates that a large share of the world's known fossil fuel reserves can never be burned, if we want to avoid dangerous climate change. Scientists at University College London have calculated that 80% of all currently available coal reserves need to stay underground if the world is to have a reasonable chance of limiting global warming to 2°C above the pre-industrial average.[6] Germany places great importance on being a climate policy leader, and has sought to base its actions on climate science. This was demonstrated at this year's G7 summit, where Chancellor Angela Merkel was successful in securing a recognition that fossil fuels have no future in the power sector in the joint statement.[7]

Germany has adopted a commitment to remove CO_2 emissions from its economy almost completely by 2050.[8] The country aims for an emissions reduction of 80-95% compared to 1990 by 2050. The EU has adopted the same goal in its Energy Roadmap 2050.[9] According to a number of studies, Germany needs to phase out coal by 2040 at the latest to achieve this, with lignite going even earlier.[10] This is because the mitigation potentials in other sectors such as transport, industry or agriculture are either limited or very costly. It is clear that coal power generation does not have a future in a low-carbon economy. This means that there is a significant risk that any new investments into coal power generation from now on will be unable to recoup their costs and essentially become stranded assets.

Germany's emissions reduction pathway to 2050 is ambitious. The agreed goals are to reduce greenhouse gas emissions by 40% by 2020 and 55% by 2030, against a 1990 baseline. These targets were agreed by the conservative-liberal coalition, which was in power during the last parliamentary term, with the "Energy Concept 2010".[11] They were substantiated and confirmed in the "Climate Action Programme 2020"[12] adopted by the current government in December 2014. Table 1 gives an overview of Germany's various energy and climate targets.

[6] Briggs (2015) **Most fossil fuels 'unburnable' under 2C climate target**, BBC article from 7 January 2015
[7] Reuters (2015) **G7 leaders bid 'Auf Wiedersehen' to carbon fuels**, 8 June 2015
[8] German Federal Government (2010) **Energiekonzept für eine umweltschonende, zuverlässige und bezahlbare Energieversorgung**
[9] European Commission (2011) **Energy Roadmap 2050**, COMM/2011/0885
[10] See page 11 for sources, see also E3G (2015) **G7 coal phase out: Germany – A review for Oxfam**
[11] German Federal Government (2010) **Energiekonzept für eine umweltschonende, zuverlässige und bezahlbare Energieversorgung**
[12] German Environment Ministry (2012) **The German Government's Climate Action Programme 2020**, Cabinet decision of 3 December 2014

Table 1: Overview of Germany's climate and energy targets

	Reduction of nuclear energy	Share of Renewable Energy		Reduction GHG-Emissions	Reduction of Energy Demand			
		Gross final energy	Electricity Production		Primary Energy	Domestic Heat	Final Energy Transport	Electricity Demand
2015 2017 2019	-47% -56% -60%							
2020		18%	35%	-40%	-20%	-20%	-10%	-10%
2021 2022 2025	-80% -100%		40-45%					
2030 2035		30%	50% 55-60%	-55%				
2040		45%	65%	-70%				
2050		60%	80%	-80% bis 95%	-50%	-80%	-40%	-25%
Basis	2010	-	-	1990	2008	2008	2005	2008

Source: *DIW (2014)* ***Gestaltungsoptionen im Rahmen des Braunkohleausstiegs***

These goals are unanimously supported by all major parties. In their election manifestos for the 2013 parliamentary election, the Christian Democrats (CDU)[13] and Social Decmocrats (SPD)[14] explicitly held up the 2020 goal, with the SPD calling for even stronger targets after that. The official goals are also enshrined in the CDU-SPD coalition agreement that forms the basis of the current government's policymaking.[15] The smaller Liberal Democrats (FDP)[16] supported the targets in their election campaign as well, despite being traditionally reticent on climate policy. The Left (DIE LINKE)[17] and Green (Bündnis 90/Grüne)[18] parties, both of which have a realistic chance to be a junior partner in a future governing coalition, called for even more stringent emissions reductions in their manifestos.

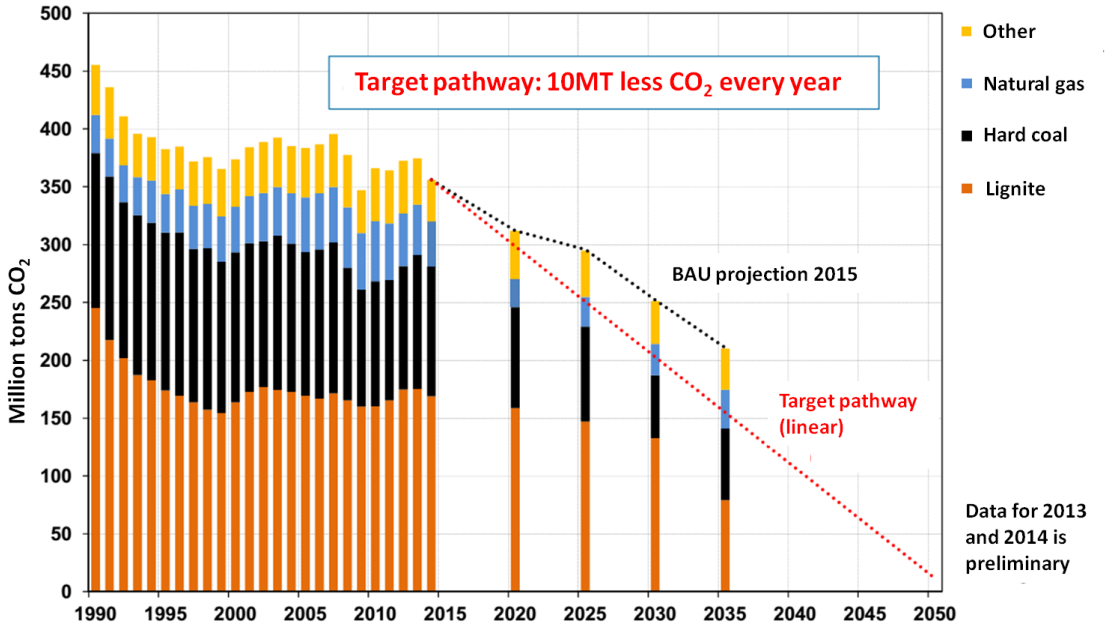
Figure 1 shows graphically what Germany's climate targets mean for its emissions balance over time. As can be seen, the targets leave very little room for lignite beyond 2030. Assuming a linear reduction trajectory, current lignite emissions would equal all of the permissible power sector emissions by around 2035. Considering that Germany plans to rely increasingly on gas-powered electricity generation to complement renewables, it is clear that lignite will have to be phased out substantially before this date.

This is because lignite produces a disproportionately large share of Germany's CO_2 emissions compared with its contribution to the energy sector. It produces over half of German power sector emissions while only providing 26% of electricity

[13] **CDU election manifesto 2013**
[14] **SPD election manifesto 2013**
[15] **CDU-SPD coalition agreement**
[16] **FDP election manifesto 2013**
[17] **DIE LINKE election manifesto** 2013
[18] **Bündnis 90/Grüne election manifesto 2013**

generation.[19] This is about 18% of Germany's total CO_2 emissions.[20] Since the power sector produces most of the CO_2 emissions while also having the largest technological mitigation potential, it is expected by the government to deliver steeper emissions reductions than other sectors.[21] This is part of the rationale behind the *Energiewende*, Germany's flagship energy policy and it clearly entails the need to phase out coal and lignite in particular. Investors should thus be aware that the window in which lignite power generation can still operate in Germany is small.

Figure 1: German power sector CO_2 emissions and reduction pathway



Source: *Institute for Applied Ecology presentation at* ***parliamentary hearing*** *on 15/09/2015, based on official data*

2) The German lignite phase-out has already started this year

Apart from Germany's ambitious climate targets which will impact the future value of any lignite investments, the regulatory and political context for lignite has become decidedly more unfavourable in 2015. The political debate on Germany's transition away from coal developed increased dynamism during 2015 with a proposal from the Economics Ministry to introduce a climate levy to reduce CO_2 emissions from the most carbon-intensive coal plants. This law aimed to impose financial penalties on the oldest coal and especially lignite plants. The measure was calculated to reduce German CO_2 emissions by 22 million tons until 2020, which would have closed the gap towards achieving Germany's 2020 climate targets.

The proposed climate levy was eventually scrapped due to opposition from energy utilities, the trade union IG BCE and local politicians. Instead, the government adopted a package of measures where 2.7 GW of lignite capacity will be put into a "climate

[19] Based on 2014 data from Federal Network Agency and Federal Environment Agency
[20] See **Energiekonzept 2010** and **Climate Action Programme 2020**

reserve" in four chunks of 900 MW per year between 2017 and 2020.[22] The lignite units will receive compensation for staying on standby to provide backup capacity and will be shut down after four years. This will also affect Vattenfall's power plants. Two Jänschwalde lignite units will be transferred into the reserve in 2018 and 2019 to be be shut down in 2022 and 2023.[23]

While energy utilities managed to avert the climate levy on lignite, the reserve marks the first time that the German government has explicitly legislated to reduce lignite power generation. The political battle around the measures has fuelled the German debate on a coal phase-out. It showed that there is practically no disagreement about the necessity of transitioning out of coal and lignite in particular. Differences in opinion only relate to whether to do it sooner or later. During the course of this year's debate, several influential voices have publicly stated their positions: [24]

> German Environment Minister Barbara Hendricks (SPD) has been calling for a coal phase-out by 2040-2045 in media appearances.[25] She has recently repeated this call, adding that Germany should immediately start tackling the coal issue after the COP21 in Paris.[26]

> The German Advisory Council on the Environment (SRU), the government's scientific advisory body for environmental questions, published 10 theses on the future of coal in Germany in June this year.[27] In this, they called for a complete coal phase-out by 2040.

> In a recently held consultation on the upcoming Climate Action Roadmap 2050, a coal phase-out law was a central measure proposed both by associations and by Germany's federal states.[28]

> Even though Energy Minister Sigmar Gabriel has been careful not to talk about a coal phase-out in public, he has recently stated in a speech at the BDEW, the association of German utilities, that emissions reductions from the power sector would have to accelerate drastically after 2020, as a reduction of 200Mt CO_2 is required by 2030.[29] As Figure 1 shows, this is not possible without phasing out lignite.

> Trade union IG BCE chairman Michael Vassiliadis has conceded in a recent interview that a coal phase-out by 2040 would be economically feasible.[30]

[22] German Federal Government (2015) **Entwurf eines Gesetzes zur Weiterentwicklung des Strommarktes (Strommarktgesetz)**
[23] FAZ (2015) **Teilausstieg aus der Braunkohle besiegelt**, 24 october 2015
[24] International pressure is increasing as well, with the **UK committing to a 2025 coal phase-out** and the **Netherlands** reportedly also considering to end coal power generation.
[25] Die Welt (2015) **Der verbissene Kampf um die Kohle muss aufhören**, 3 July 2015
[26] Berliner Zeitung (2015) **Bundesregierung will Ausstieg aus Kohleverstromung fix machen**, 25 November 2015
[27] SRU (2015) **10 Thesen zur Zukunft der Kohle bis 2040**
[28] German Environment Ministry (2015) **Zusammenstellung aller Maßnahmenvorschläge der Bundesländer, Kommunen und Verbände für den Klimaschutzplan 2050**
[29] Sigmar Gabriel (2015) **Herausforderung Energiewende: "Die Stunde der Überschriften ist vorbei"**, speech at BDEW Congress 2015, 30 June 2015
[30] **Interview with Michael Vassiliadis**, Die Zeit, 24 April 2015

These public statements broadly reflect a consensus in the scientific community that coal needs to be phased out by 2040 at the latest, with lignite going even earlier. Several studies have independently modelled pathways for a decarbonised energy system in Germany. The German Aerospace Center[31], the German Advisory Council on the Environment[32], the Federal Environment Agency[33], the energy consultancy enervis[34] and the German Institue for Economic Research[35] have all found in their studies that coal will be practically phased out by 2040 and that there will be a considerable drop in capacity before 2030. Lignite is generally reduced earlier and more substantially in these studies than hard coal.

Table 2: Proposals to reduce power sector emissions

Instrument	Effect	Possible advantages	Possible shortcomings	Proposed by
ETS reform	Price signal through the introduction of a market stability reserve (MSR), 900 million backloading allowances directly in MSR, start of MSR in 2017 instead of 2021	EU-wide instrument; thus, no cross-border effects	Structural reforms uncertain from today's perspective; the extent of the impact is unpredictable	German government (2014)
Min. CO_2 price ("floor")	CO_2 certificates would become more expensive	Investment security for investors	Feasible prices probably too low to result in a switch from coal towards natural gas	Bündnis 90/the Green Party (2014)
Minimum efficiency level	Closure of inefficient power plants	More efficient utilization of raw materials	Open cycle gas turbines (OCGT) would also be affected; complex test and measurement processes	Bündnis 90/the Green Party (2009)
Flexibility requirements	Closure or singling out of inflexible power plants	Better integration of fluctuating renewable energy sources	Combined cycle gas turbines (CCGT) might also be affected	Öko-Institut/LBD/Raue (2012)
Coal phase-out law	Maximum production or emissions allowances	Fixed coal phase-out plan & schedule	Auctioning difficult to predict	Greenpeace (2012), DIE LINKE (2014)
Emissions performance standard (specifically for new plants and retrofits)	Restrictions for new plants and retrofits (without CO_2 capture)	Prevention of CO_2- intensive investments	Minor short-term reduction in emissions	IASS (2014)
Emissions performance standard (cap for existing plants)	Reduce load factor for older coal-fired power plants that have been written off	Maintenance of generation capacities, e.g., by shifting into a strategic reserve	Negative impact on economic efficiency of power plants; effect on energy efficiency unclear	IASS (2014)
Capacity instruments	Incentives to develop lower-carbon conventional capacities	Support to natural gas plants, move coal plants into strategic reserve	Danger of micro-management, difficulties to identify concrete technical parameters to ensure lower-carbon output	Öko-Institut/LBD/Raue (2012)

Source: *DIW (2014)* ***Gestaltungsoptionen im Rahmen des Braunkohleausstiegs***

A debate about appropriate national instruments to accompany the coal and lignite phase-out is already taking place. The CDU-SPD governing coalition, the opposition parties (BÜNDNIS 90/Die Grünen and DIE LINKE) as well as various NGOs and think tanks have proposed measures to reduce power plant emissions. Table 2 provides an overview of these proposals. The proposed regulations would impact Vattenfall's lignite plants in different ways. Some would limit the load factor while others would increase CO_2 costs or lead to an abrupt closure of power plants that don't meet certain criteria.

[31] Joachim Nitsch (2013) **„Szenario 2013" – eine Weiterentwicklung des Leitszenarios 2011**. Deutsches Zentrum für Luft- und Raumfahrt (DLR), Stuttgart, Deutschland

[32] German Advisory Council on the Environment (2011): **Sondergutachten: Wege zur 100 % erneuerbaren Stromversorgung**

[33] Federal Environment Agency (2010): **Energieziel 2050 – 100% Strom aus erneuerbaren Quellen**

[34] Hilmes, U., Herrmann, N., (2014): **Der „ideale Kraftwerkspark" der Zukunft; Flexibel, klimafreundlich, kosteneffizient – Maßstab für einen optimierten Entwicklungspfad der Energieversorgung bis 2040**; Energiewirtschaftliche Untersuchung. enervis energy advisors GmbH, Berlin.

[35] DIW (2014) **Braunkohleausstieg - Gestaltungsoptionen im Rahmen der Energiewende** (No. 84), Politikberatung kompakt

3) Further action on lignite is very likely

While the political and regulatory environment have already become more negative for lignite in 2015, future legislative action is virtually assured. This is because Germany is not on track to meet its climate targets. The political deal to close the gap towards Germany's 2020 targets with the climate reserve as well as additional efforts on energy efficiency and cogeneration has supposedly put the country on a path to close the emissions gap to 2020. However, the recently published fourth official monitoring report on the energy transition raises serious doubts whether these additional efforts will actually materialise.[36] To achieve the 2030 targets, Germany will have to drastically increase climate policy ambition after 2020 to deliver savings of about 200 million tons of CO_2.[37]

It is highly unlikely that the government will accept Germany failing its climate and energy targets, since the Energiewende remains overwhelmingly popular with the German public, as poll after poll has shown, with support ranging form 57% to 89% of respondents.[38] Coal, on the other hand is viewed very unfavourably. A recent poll found that only 5% of Germans are in favour of using coal power in the future.[39] Lignite produces a disproportionately large share of Germany's power sector emissions and the government expects electricity production to deliver steeper emissions reductions than other sectors.[40] As a result, a significant decrease in lignite-fired power generation will almost certainly be one of the principal policies to be adopted.

While the official German government position is that the climate reserve provides a stable regulatory framework until 2020, there are two scenarios in which lignite could already face further regulation before 2020.

First, uncertainty arises from the fact that the climate reserve might still be struck down by the European Commission as impermissible state aid. The European Commission has indeed already stated that it classifies the climate reserve as state aid.[41] As a result, it will have to sign off on the measure before it can become law in Germany. The reserve will further be subject to detailed scrutiny under the Commission's sectoral investigation into capacity mechanisms that was started this year.[42]

While it is possible that the German government can reach a compromise with the Commission on the climate reserve, there is a distinct possibility that the reserve

[36] BMWi (2015) **Die Energie der Zukunft – Vierter Monitoring-Bericht zur Energiewende**
[37] Sigmar Gabriel (2015) **Herausforderung Energiewende: "Die Stunde der Überschriften ist vorbei"**, speech at BDEW Congress 2015, 30 June 2015
[38] WiWo (2014) **Allensbach-Umfrage: Hohe Zustimmung für Energiewende**, 14 June 2015; BDEW (2015) **BDEW-Umfrage: Große Mehrheit unterstützt die Energiewende - Umsetzung wird kritisch beurteilt**, 11 February 2014; Innovationsforum Energiewende (2015) **Deutscher Energie-Kompass 2014: Das Stimmungsbarometer der Energiewende**
[39] Zeit (2015) **Allensbach-Umfrage: Kohle unbeliebter als Atomkraft**, 16 September 2015
[40] See **Klimaschutzplan 2050** and Energy Minister Gabriel's **recent remarks** at the BDEW
[41] FAZ (2015) **EU stellt deutschen Braunkohlekompromiss in Frage**, 14 September 2015
[42] European Commission (2015) **State Aid: sector inquiry into capacity mechanisms – frequently asked questions**, press release, 29 April 2015

could be struck down. A recent opinion by the German Parliament's legal service found that the proposed climate reserve is incompatible with EU state aid law.[43] A separate legal opinion commissioned by Greenpeace comes to the same conclusion.[44] Investors could therefore face a major renegotiation of the deal that might impact on the very substance of the measure.

The reserve is also facing legal challenges from within Germany. Trianel, a joint venture of several municipal utilities, is currently preparing a lawsuit against the climate reserve before the European Court of Justice on the grounds that it distorts competition in the power sector and hampers the introduction of clean energy technologies.[45] If the climate reserve is struck down, it is likely that the German government will adopt alternative measures to reduce lignite power generation rather than miss its 2020 climate targets. The government might even go back to the originally proposed climate levy. This would fundamentally alter the market outlook for lignite as it would effectively fine plants for emitting above a certain threshold.

The second scenario in which Germany could adopt additional measures before 2020 stems from a review clause in Germany's proposed electrictiy market bill.[46] The clause stipulates that the progress on emissions reductions through the climate reserve will be reviewed in 2018, with additional measures being required if it is found to be insufficient. Even if the climate reserve passes the test of EU law, further action is thus very likely to follow in 2018. This is because the climate reserve only specifically aims at a reduction of 11 out of 12.5 million tons of CO_2 to be achieved in the power sector until 2020. Agreement on how to reach the additional reduction of 1.5 million tons of CO_2 has effectively been postponed until that point. The Environment Ministry, which is traditionally less favourably inclined towards energy companies than the Energy Ministry, will have a leading role in conducting this review.

As the assessment will take place shortly after the next parliamentary elections, it is likely to again open up the coal phase-out debate. This debate will take place in a different political context and under a different government, which introduces an element of considerable uncertainty. For any investor, it will therefore be highly difficult to assess how further measures adopted in this context will affect Vattenfall's lignite portfolio.

Beyond 2020, action on a coal phase-out is likely to accelerate drastically. Assuming a linear reduction trajectory of power sector emissions starting with 300 million tons in 2020, CO_2 emissions from electricity generation will need to be reduced by about 10 million tons per year beyond 2020 (see Figure 2).[47] In other words, this requires measures that deliver emissions reductions equal to those achieved by phasing out 2.7 GW of lignite capacity with the climate reserve every year after 2020.

[43] Deutscher Bundestag (2015) **Der Vorschlag zur Einführung einer Kapazitätsreserve im Lichte des EU-Beihilferechts**
[44] Greenpeace (2015) **Klimareserve aus Braunkohlekraftwerken Eine juristische und energiewirtschaftliche Analyse**
[45] Rheinische Post (2015) **Stadtwerke wollen gegen Braunkohle-Reserve klagen**, 4 November 2015
[46] Art. 13g (8) in **Draft Electricity Market Law**, agreed by the Cabinet on 4 November 2015
[47] Charlotte Loreck, Oeko-Institut, presentation at **parliamentary hearing** organised by DIE LINKE

This level of emissions reductions in such a short timeframe can only be achieved by drastically reducing coal power generation. Any of the measures detailed in Table 1 could conceivably be enacted in the coming years, which would significantly reduce the value of Vattenfall's lignite portfolio.

4) Capacity markets will not come

Prior to 2015, many observers had thought that the introduction of capacity markets might still throw a lifeline to Germany's ailing coal industry. This is because capacity markets involve payments to energy companies to maintain a certain amount of dispatchable capacity, regardless of the power price at any given moment. This would have allowed older fossil-fueled plants to compete despite the downward pressure that ever-higher shares of renewable energy exert on baseload power prices.

In recent years, introducing a capacity market in Germany had been openly, if controversially, discussed. Germany's new electricity market law puts an end to this idea.[48] It only includes provisions for a capacity reserve which is quite small and clearly separate from the market. It is also mainly intended for gas power plants. This follows a thorough consultation process in which scientific expertise and stakeholder contributions where collected and evaluated.

In March 2015, the Energy Ministry had presented a green paper for consultation which explicitly asked stakeholders the "fundamental policy question" whether security of supply in Germany's future electricity market should be ensured through a capacity market or a capacity reserve.[49] In the consultation process the idea of a capacity market was overwhelmingly rejected, except by utilities and related groups like the trade union IG BCE.[50] Following this, the electricity market white paper published in July 2015 also explicitly rejected the idea of introducing a capacity market in Germany.[51] Earlier, two separate studies commissioned by the Energy Ministry had advised against capacity markets on the basis that they distorted electricity markets, raised prices for consumers and were unnecessary to provide security of supply.[52]

The introduction of capacity markets had long been a central demand of utilities, who had argued that it was necessary to safeguard security of supply. However, current indications are that Germany will not have a security of supply problem going forward, given the continued growth in renewables, current overcapacities and the possibility of electricity trading to make up shortfalls. The new electrictiy market law will set the regulatory framework for the German electricity market for the foreseeable future and it includes neither a capacity market nor any kind of review provision to introduce one. Investors should not buy Vattenfall's lignite assets on the assumption that they could benefit from a future capacity market scheme.

[48] **Draft Electricity Market Law**, agreed by the Cabinet on 4 November 2015
[49] BMWi (2015) **Green paper: An electricity market for Germany's energy transition**
[50] The responses to the consultation are available **here**
[51] BMWi (2015) **White paper: An electricity market for Germany's energy transition**
[52] Frontier Economics/Consentec (2014) **Folgenabschätzung Kapazitätsmechanismen (Impact Assessment)**; r2b (2014) **Leitstudie Strommarkt: Funktionsfähigkeit EOM & Impact-Analyse Kapazitätsmechanismen**

ECONOMIC RISKS

1) Carbon prices will rise because of ETS reform

A substantial reform of the EU's Emissions Trading System (ETS) is currently underway. The explicit aim is to raise CO_2 prices, which would significantly reduce the profitability of lignite power. The EU has recently approved the Market Stability Reserve (MSR), which will enter into force in 2019 and automatically withdraw emission allowances from the market if the total number of allowances exceeds a certain threshold.[53] The MSR is expected to substantially tighten the surplus in the market, and most analysts forecast that carbon prices will rise accordingly.

Another Commission proposal to reform the ETS after 2020 is currently going through the legislative process.[54] Among other things, this would significantly increase the linear reduction factor (LRF) by which the number of certificates are reduced each year from the current 1.74% to 2.2%. This tightening of the ETS cap had already been agreed by EU leaders when adopting the climate and energy package 2030 in October 2014[55] and is likely to increase the cost of certificates under the ETS, which has the biggest impact on the most carbon-intensive forms of electricity generation.

Further reforms to restrict the availability of EUAs would likely result in further increases in the CO_2 price. This could happen through a variety of proposals. The 2030 EU GHG target is "at least 40%", and there is a strong possibility this could be negotiated to be higher than 40%, constricting supply in the carbon market. This might be through cancelling permits in the MSR, or by ratcheting up the limit in the future. Also, the non-ETS sectors may end up needing to buy permits from the ETS to comply, raising demand even further.

These developments have already led several market analysts, including Bloomberg New Energy Finance and Point Carbon to significantly raise their ETS price forecasts. Beside the reform efforts, these observers also cite less industrial selling of surplus certificates and favourable clean dark spreads due to low hard coal prices as bullish factors.[56] Table 3 presents a current overview of EUA price forecasts. Recent estimates for 2020 range from €10.22 to €30, with the average at €19.05.

[53] Council of the EU (2015) **Greenhouse gas emissions: creation of a market stability reserve approved**, press release, 18 September 2015
[54] European Commission (2015) **Proposal for a directive to enhance cost-effective emission reductions and low-carbon investments**, COM(2015) 337
[55] European Council (2014) **Conclusions on 2030 Climate and Energy Policy Framework**
[56] Carbon Pulse (2015) **Poll: Analysts raise EU carbon price estimates, big jump for 2018-2020**, 9 October 2015

Table 3: Overview of current EUA price forecasts

Forecaster	End 2015	End 2016	End 2017	End 2018	End 2019	End 2020
BNEF	9.00	n/a	14.00	n/a	n/a	30.00
Commerzbank	9.00	9.00	9.50	n/a	n/a	n/a
Consus	8.25	8.40	8.80	9.40	11.70	12.10
Energy Aspects	8.50	10.50	12.00	14.00	18.00	21.00
ICIS-Tschach	9.50	12.70	15.90	19.20	27.20	29.50
Markedskraft	7.50	8.50	n/a	n/a	n/a	n/a
Nomisma Energia	8.10	9.20	9.90	11.20	12.50	14.60
Point Carbon	8.90	11.80	14.90	17.10	18.00	19.00
Societe Generale	8.81	9.00	9.23	9.52	9.85	10.22
Vertis	8.50	10.30	n/a	n/a	n/a	n/a
Virtuse	8.70	10.10	11.50	13.00	14.40	15.80
Average	**8.60**	**10.00**	**12.05**	**13.35**	**15.95**	**19.05**
Median	**8.70**	**9.80**	**11.75**	**13.00**	**14.40**	**17.40**
Previous poll	8.50	9.90	11.05	11.40	12.80	16.85
% change	+1.2%	+1%	+9%	+17.1%	+24.6%	+13.1%

Source: *Carbon Pulse*

Table 4: Specific emissions of Vattenfall's power plant fleet

Power plant	Unit	g CO_2/KWh
Boxberg	Boxberg R	0.964
Boxberg	Boxberg Q	0.964
Boxberg	Boxberg P	1.159
Boxberg	Boxberg N	1.159
Jaenschwalde	Jaenschwalde F	1.163
Jaenschwalde	Jaenschwalde E	1.163
Jaenschwalde	Jaenschwalde D	1.163
Jaenschwalde	Jaenschwalde C	1.163
Jaenschwalde	Jaenschwalde B	1.163
Jaenschwalde	Jaenschwalde A	1.163
Lippendorf	Lippendorf R	0.949
Schwarze Pumpe	Schwarze Pumpe B	0.983
Schwarze Pumpe	Schwarze Pumpe A	0.983

Source: ***IZES*** *(2015)*

The emissions intensity of Vattenfall's lignite power plants indicates how vulnerable individual units are to higher EUA prices. As can be seen in Table 4, most Vattenfall units have a carbon intensity of around 1.15 t CO_2/MWh. This is almost twice the marginal carbon intensity of German power, which is estimated around 0.65 t CO_2/MWh.[57] This means a higher carbon price would raise costs by twice as much as revenues for Vattenfall's lignite plants. For every €1 EUA price increase, lignite will lose €0.5/MWh.

Higher EUA prices will therefore have an increasing on the profitability of Vattenfall's lignite plants. If carbon prices doubled to €16/t CO_2 on Vattenfall's current production of 55TWh, this would reduce profits by €220m per year.

It would be virtually impossible for potential buyers of Vattenfall's lignite plants to make a profit under those conditions – even if drastic cost-cutting measures are enacted. As power generation in Germany is not granted free allocation under the ETS (unlike in Eastern Europe) this will furthermore serve to erode the cost advantage that lignite currently has over other fossil fuels such as hard coal and gas in the German market.

2) Electricity prices are set to fall further in the medium term

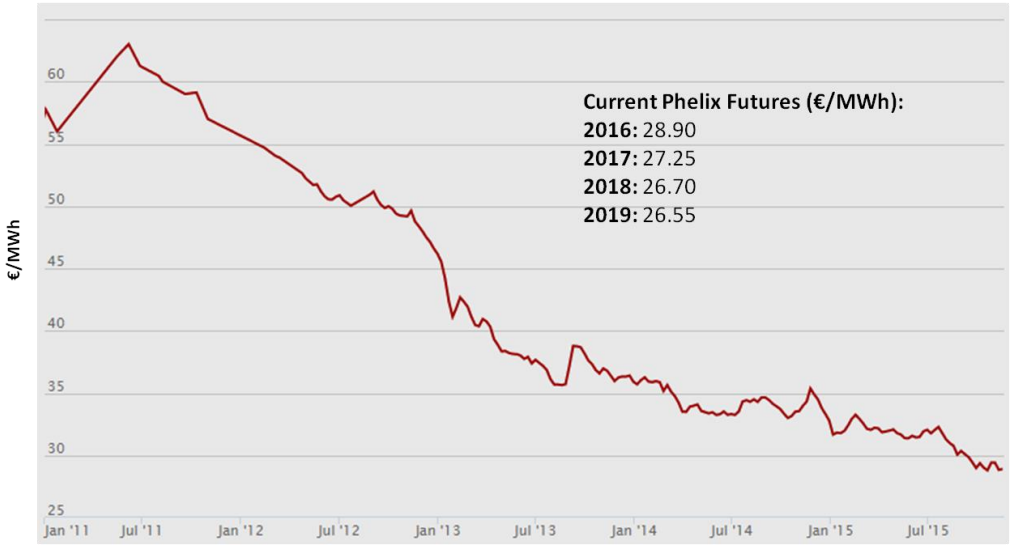
The *Energiewende* is fundamentally transforming Germany's power sector, making it ever harder for fossil fuels to compete. Baseload electricity prices have been falling since 2011 and are currently below €30/MWh.[58] All indications are that prices will continue to fall.

In recent years, power prices have dropped substantially, casting shadows on the market outlook for lignite and other fossil fuels. Figure 4 shows the development of baseload electricity prices since 2011. They have fallen precipitously by 55% since their peak in July 2011. In the last 3 months alone, the forward electricity price for 2019 fell from €31.60 to €26.85.[59]

The drop in baseload electricity prices and the growing malaise of traditional power generation in Germany has been fuelled by a number of factors. Last year, renewables surpassed lignite for the first time as Germany's predominant electricity source.[60] This trend is only set to go on as renewable energy continues to enjoy policy support. Early next year, the German government is set to pass an electricity market law designed to prepare the power system for an increasingly large share of renewable energy.[61]

[57] This estimate is based on a based on a reasonable mix of mostly efficient hard coal, as well as some gas, renewables and lignite.
[58] **Phelix Base Year Future price**, November 2015
[59] Checked on 16 November 2015
[60] **http://www.agora-energiewende.de/fileadmin/downloads/publikationen/CountryProfiles/Agora_CP_Germany_web.pdf**
[61] **Draft Electricity Market Law**, agreed by the Cabinet on 4 November 2015

Figure 4: Development of power prices in Germany since 2011



Source: *EEX*, *Phelix Base Year Futures*

Fossil fuels have been finding it increasingly difficult to compete with subsidised renewable energy, which is operating at near-zero marginal cost and is prioritised in the merit order. At the same time, there are considerable overcapacities of about 10 GW in Germany.[62] This is not likely to change until 2017.[63] Taking into account cross-border electricity trading, overcapacities are even larger. There is about 60 GW of overcapacity in the electricity trading area that Germany has access to.[64]

Rapidly falling installation costs for renewable energy have been another key factor. This trend has historically been underestimated in virtually all major energy forecasts such as the IEA's World Energy Outlook.[65] The future growth of renewables is likely still being underestimated today.[66] Advances in the area of energy storage present another potentially disruptive technological development. Citibank predicts that the costs of battery storage will decline sufficiently by 2020/2021 to pose "very significant – and in cases terminal – challenges" to energy companies.[67] This is because renewable energy generation coupled with cheap storage provides a viable alternative to baseload power generation.

Negative power prices on spot markets are a related problem that will become increasingly important in the future. Negative price hours have been occurring increasingly often in Germany. While negative power prices were only registered during 97 hours in 2013, this is set to rise to 1,200 hours (or 14% of the entire year) by

[62] BMWi (2014): **Ein Strommarkt für die Energiewende, Diskussionspapier des Bundesministeriums für Wirtschaft und Energie (Grünbuch)**
[63] BMWi (2014) **Leistungsbilanzbericht 2014**
[64] ENTSO-E (2014) **Scenario Outlook and Adequacy Forecast**. This region includes Germany, its neighbours and Italy.
[65] Carbon Tracker (2015) **Lost in Transition: How the energy sector is missing potential demand destruction**
[66] Metayer et al. (2015) **The projections for the future and quality in the past of the World Energy Outlook for solar PV and other renewable energy technologies**
[67] Citigroup (2014) **Energy Storage: Game Changer for Utilities, Tech & Commodities**

2022 in a business-as-usual scenario.[68] Negative power prices are especially difficult for lignite as they arise from inflexible baseload power generation, which usually does not shut down completely in times of high renewable energy production.

In 2013, for instance, lignite power stations continued to run at 40-50% of capacity even when renewables supplied 65% of electricity. Scaling back production even further would have meant shutting down, and restarting a lignite unit is costly (and becomes more costly the longer it has been switched off).[69] In essence, keeping a lignite power station running under negative prices means losing money, but it is still cheaper than switching it off and back on again. This inability to respond to price signals is a serious competitive disadvantage of inflexible base load power generation such as lignite.

Power prices are likely to fall further at least until the current overcapacities are reduced. Negative price hours might develop from a nuisance to a serious cost. Technological advances in clean energy technologies and storage will continue to chip away at the profitability of conventional power generation. In the current challenging environment it is questionable whether lignite plants will remain profitable long enough to earn back the money for the initial investment.

3) European gas prices are collapsing

Another factor that is likely to impact coal power generation is the sharp fall in gas prices that is currently being observed. Gas prices have fallen by 25% since their peak in March 2015,[70] following a collapse in international prices for Liquefied Natural Gas (LNG). According to energy consulting group Wood McKenzie, this trend is likely to continue for some years.[71] This is because the LNG market is structurally oversupplied for the foreseeable future and the cost of developing gas is falling.

The falling gas price should stop or significantly slow the mothballing of gas plants in Germany, which makes a future resurgence in electricity prices due to a sudden capacity shortfall much less likely. It will also help alleviate any future security of supply problem that Germany might have as a result of nuclear power and coal being phased out. It is thus another factor working against the introduction of a capacity market in Germany.

Lower gas prices furthermore improve the relative position of gas in the merit order. Gas-fired power generation is still more expensive than using lignite, however. In the short term, this is thus unlikely to lead to a major fuel switch from coal to gas. Taken together with rising prices for emissions certificates under the ETS, however, it brings the day closer when gas will have cost advantage over lignite. This would severely curtail the load factor of lignite, thereby decreasing power generation revenues relative to the fixed costs of running a power plant.

[68] Agora Energiewende (2014) **Negative Strompreise: Ursachen und Wirkungen**
[69] Intertek Aptech (2012) **Power Plant Cycling Costs**
[70] EEX **natural gas spot market data**, 30/10/2015
[71] Fuel Fix (2015) **LNG oversupply likely to burden spot prices**, 27/10/2015

In addition, the regulatory outlook for gas is much more favourable than for lignite. For the medium term, it is the declared intention of the German government to achieve a power mix that relies on flexible conventional generation such as gas rather than inflexible base load generation such as lignite to supplement variable renewable energy supply. This is explicitly stated in the proposed power market law which is set to be passed early next year.[72]

As the share of renewable energy in the electricity mix rises, lignite power plants might thus find it increasingly difficult to compete with more flexible and increasingly cheap gas-fired power generation. Investors should carefully consider what impact these gas market trends have on the future profitability of Vattenfall's lignite assets.

4) New pollution limits under the EU Industrial Emissions Directive will require retrofits after 2021

Additional cost burdens for lignite power plants will also arise from the EU Industrial Emissions Directive (IED), which sets limits on how much pollution a power plant is allowed to emit.[73] Pollution limits under the IED will be tightened significantly, most likely by 2021.

The stricter limits relate to environmental performance benchmarks of large combustion plants which are currently being revised. The new reference document (LCP BREF) is set to be adopted by the responsible committee by 2017 at the latest.[74] As the new standards have to be implemented with a maximum deadline of four years, this would mean effective compliance by 2021. The coming limits will require several of Vattenfall's lignite power plants to invest in pollution abatement equipment to retain their operating permits, specifically for sulphur dioxide (SO_2), nitrogen oxide (NO_x) and dust particles. Mercury emissions will also be subjected to dedicated limits and continuous monitoring requirements for the first time.[75]

Even though German coal power plants have generally lower pollutant concentrations compared to the EU average, some of Vattenfall's lignite plants will be affected by the new limits (see Table 5). All of Vattenfall's lignite plants are significantly above the SO_2 limit set by the LCP BREF and will thus likely require retrofits. Only Jänschwalde exceeds the permissible NO_x emissions by a wide margin, but Boxberg and Lippendorf would likely also require pollution abatement to meet the new performance benchmarks. Lippendorf would probably require mercury abatement as well since its lignite has a particularly high mercury content.

[72] **Draft Electricity Market Law**, agreed by the Cabinet on 4 November 2015
[73] **Directive 2010/75/EU** on industrial emissions
[74] JRC (2013) **Best Available Techniques Reference Document for the Large Combustion Plants Directive**, formal draft
[75] Environment Minister Barbara Hendricks has already announced that Germany is prepared to go for even stricter mercury limits than prescribed by the IED when it comes to the implementation.

Table 5: New IED limits and emissions performance of Vattenfall's power plants

Power plant	2013 emissions (mg/Nm^3)	% of 2021 limit
NO_x (>2021 limit=150 mg/Nm^3)*		
Jänschwalde	224	221%
Schwarze Pumpe	132	88%
Lippendorf	188	125%
Boxberg	205	136%
SO_2 (>2021 limit= 130 mg/Nm^3)*		
Jänschwalde	252	194%
Schwarze Pumpe	222	170%
Lippendorf	288	221%
Boxberg	205	157%

* revised LCP BREF has not yet adopted

Source: *E-PTR*

Pollution abatement measures will not be cheap. NO_x abatement will be particularly costly. According to an assessment by Vattenfall, primary measures allow no further reduction of NO_x emissions from its lignite plants, which means that selective non-catalytic reduction (SNCR) or more expensive selective catalytic reduction (SCR) would have to be installed.[76] As the Vattenfall assessment also reveals, SNCR is not an option for any of its plants either because of their boiler size or reasons relating to their structural layout.

The company has estimated that a SCR-retrofit for Boxberg would cost at least €46.9m in capital expenditure and €4m in yearly operating expenses. At the Schwarze Pumpe power plant, installing SCR would cost at least €82m up front and €14.2m in operational costs per year. Costs for retrofitting the Jänschwalde power plant with SNCR have been put at €20.3m in capital expenses and €7.2m in yearly operating costs, but Vattenfall stresses that SNCR is not an option for the plant. Jänschwalde would therefore likely need more expensive SCR technology as well.[77]

Much will depend on how the permit levels are applied at the local level. The new LCP BREF standards recognise that even lower NO_x levels of <85mg/Nm^3 can be achieved by the use of SCR for existing plants. This gives local NGOs an opening to force the application of the lower NO_x limit in potential court cases. The current German air pollution law already requires SCR for new lignite plants that went into operation after 2014 due to the maximum 100mg/Nm^3 emission limit value on NO_x. As the technical feasibility of SCR is well established, the technical case for evading this requirement is weak.

It should be noted that the cost estimates above relate only to NO_x abatement. Complying with new limits will require higher abatement efficiencies with additional

[76] Vattenfall (2013) Transposition of the IED into German law - NOx ELV 100 mg/m^3 for existing combustion plants
[77] Ibid.

costs for SO_2 and new techniques to be implemented for mercury. Water release limits have also been tightened on specific pollutants. These costs will most likely accrue in the 2017-2021 period, in addition to higher certificate prices under the ETS. In the cases of some lignite units, this might even render continued operation unprofitable.[78]

The particularity of the German legal system is that the new EU standards are implemented through general binding rules.[79] These will have to be revised and adapted to the new requirements, providing for additional legal risks of further tightening through NGO interventions. In principle, the IED allows member states to set stricter limits for any pollutant. There is already political will to tighten the mercury limits significantly.

Since the new limits still have to be adopted and implemented, they will not yet have been priced in with the recent devaluation of Vattenfall's lignite business. Investors should thus be aware that pollution abatement investments within the triple-digit millions will potentially be required to retain operating permits for Vattenfall's lignite fleet after 2021.

5) Higher-than-expected land remediation costs may have to be paid

The German Federal Mining Law establishes responsibility and liability of mining companies to clean up and restore all areas used for mining. The buyer of Vattenfall's lignite assets will be responsible for the rehabilitation of all opencast mines that the company currently operates. German Accounting Law stipulates that financial reserves must be built up to cope with ongoing and future remediation costs. These are indicated as liabilities in company balance sheets.

While it is difficult to estimate the full extent of the follow-up costs, the costs of remediating lignite mines from the former German Democratic Republic (GDR) gives a rough indication of the scale involved. From 1992 to 2017, these costs will amount to about €12.9bn for remediating of an area of 120.000 ha.[80] Restoring Vattenfall's 23.000ha[81] of opencast mines will certainly be less expensive. Vattenfall has so far indicated cumulated liabilities of €1.1bn for remediation in its accounts. However, recent studies have raised concerns that the indicated liabilities will be insufficient to clean up all the mining-related damages.[82]

Everything hinges on the accuracy of the models which assess remediation costs and associated liabilities. If remediation measures turn out to be more expensive than assumed, the new buyer would have to cover the additional cost. The 2010 Accounting Law Modernisation Act presents another challenge. It introduced

[78] Stricter pollution limits have been a key driver of accelerated coal plant retirements in the US; see E3G (2015**) G7 coal phase out: United States – A review for Oxfam**
[79] **13. Bundesimmissionsschutzverordnung**, current version
[80] Bund-Länder-Geschäftsstelle für die Braunkohlesanierung (StuBA)
[81] Green Budget Economy (2014) **Kostenrisiken für die Gesellschaft durch den deutschen Braunkohletagebau**
[82] Green Budget Economy (2015) **Gesellschaftliche Kosten der Braunkohle**

mandatory discounting for these financial provisions if they are held for longer than a year. The discount factor in 2013 ranged from 3.34% to 4.95% for liabilities held for 20 years. While this aims to more accurately assess the present value of the reserves by taking future interest into account, the discount factor has likely been set too high. If real interest rates on the balance-sheet provisions are lower than assumed, i.e. if the business is not as profitable as expected, there is a risk that the provisions turn out to be insufficient.

Insufficient assets for ongoing remediation expenses can be offset with profits from current operations while the Vattenfall mines and power plants are still running. When they are shut down, however, the financial risks for a potential buyer of Vattenfall's lignite become serious. This is because shutting down does not exempt mining companies from having to pay the follow-up costs.

The German government has recently introduced a law changing the rules regarding liability for nuclear decommissioning and clean-up costs, partly in response to E.On's plans to spin off its nuclear power plants into a new company.[83] This law stipulates that parent companies have unlimited liability for their subsidiaries, even if those have been spun off. It is likely that a similar law will be adopted for lignite if a buyer tried to shirk these liabilities, making it impossible to avoid remediation costs via corporate restructuring.

[83] BReg (2015) **Entwurf eines Gesetzes zur Nachhaftung für Rückbau- und Entsorgungskosten im Kernenergiebereich**

LEGAL RISKS

Lignite mining causes environmental damages which are costly to clean up or mitigate. In Germany, liability for mining-related damages is a contentious issue and controversial cases often end up in court. Mining-related environmental damages usually fall under provisions of the EU Habitats Directive[84] or the Water Framework Directive (WFD).[85] The legal standing of citizens and associations, i.e. the right to bring such suits, has been strengthened considerably by recent judgements of the German Constitutional Court[86] and the European Court of Justice.[87]

Potential buyers of Vattenfall's lignite portfolio should be aware that a number of lawsuits against Vattenfall's lignite business are already pending or are likely to be brought in the future. Their outcomes are uncertain at best and they will at the very least entail administrative costs, legal fees and operational delays.

1) The creation of new opencast mines Welzow-Süd II and Nochten 2 is being contested

Mining plans for the creation of the new opencast mines Welzow-Süd II and Nochten 2 have already been adopted. However, it is not clear that mining permits will actually be granted as environmental groups and local residents affected by relocation have already brought actions against this expansion in the respective administrative courts. The Higher Administrative Court of Saxony has rejected the action in the first instance on the grounds of insufficient standing to bring a claim.[88] However, this initial verdict will not be upheld, given a recent decision by the Federal Administrative Court.[89] A protracted judicial examination of the justification for the claims will now have to be conducted. The claimants have also produced a legal opinion against the proposed mining plan for Nochten 2, which is currently under consideration by the regulator.[90] If permission is granted, this opinion could form the basis of a further suit against the operator. Investors should be aware that the development of Welzow-Süd II and Nochten 2 could still be stopped by those legal actions.

2) Lignite exports are legally dubious

Exporting lignite mined in Germany to the Czech Republic, as is reportedly being planned by CEZ and EPH, has been found to violate German law by a recent legal opinion commisioned by Klima-Allianz.[91] This is because lignite mining permits require that a particular mine be in the public interest to justify the land cession, environmental damages and relocation of residents involved. According to the legal

[84] Council Directive **92/43/EEC**
[85] Directive **2000/60/EC**
[86] Judgement **BvR 3139/08** and associated **press release**
[87] Judgement **C-137/14**
[88] Judgement **1 C 26/14**
[89] Judgement **4 CN6.14**
[90] **Response and objections** against Vattenfall's operating plan for Nochten, submitted by BUND Saxony, Greenpeace Germany, Umweltgruppe Cottbus e.V. and Bündnis Strukturwandel jetzt – kein Nochten, 18 February 2015.
[91] Verheyen (2015) **Verwendungsbeschränkungen von Braunkohle aus laufenden und neuen Tagebauen auf Grundlage von Raumordnungs- bzw. Bergrecht: Die Notwendigkeit des Ausschlusses von Braunkohleexporten**, Rechtsgutachten im Auftrag der Klima-Allianz

opinion, this necesitates that the lignite of a given mine be earmarked for specific power plants in the operational plans overseen by state-level regulators. This has so far been neglected by the competent authorities in Saxony and Saxony-Anhalt, who did not prohibit lignite exports from EPH-owned mine Vereinigtes Schleenhain to the Czech Republic.

However, if Czech investors resume exports, it is possible that the operational plans for those mines will obligate operators to burn all coal produced by the mines in the connected German lignite plants. If state-level regulators do not act, exports from existing mines can be contested by local residents and environmental groups. Lignite exports are already being challenged in the political arena.[92] The question of exports has also been caught up in the legal proceedings involving Nochten 2 and Welzow-Süd II, introducing an additional complication.

3) Liability for water pollution resulting from Vatfenfall's lignite mines

The WFD offers strong legal protection for water bodies and watercourses, as does the German Water Act, which allows extensive additional obligations to be imposed on operators retroactively, even in the case of opencast mines that have already been authorised.

Environmental organisations have repeatedly demanded that Vattenfall adopt techniques to limit iron ochre pollution of the Spree river and sulphate pollution of the Spree and the groundwater. Regulators have so far not required Vattenfall to adopt any measures, partly because of concerns that they would render lignite production at the affected sites uneconomic. Vattenfall itself has characterised the available techniques as "a considerable intervention into the production process" which could "possibly put into question the viability of the mine".[93] It is unclear whether the responsible authorities in Saxony and Brandenburg will be able to maintain their opposition to these measures in future legal disputes.

The issue of sulphate pollution has also become embroiled in local politics as Berlin's drinking water is measurably affected.[94] The Berlin Senate has become increasingly vocal in demanding that the issue be resolved.[95] At the recent joint planning conference between the local governments of Berlin and Brandenburg, lignite mining and sulphate pollution were the major issues discussed.[96] The involvement of Berlin in the dispute may entail that a potential investor will be forced to install costly measures to mitigate water pollution.

[92] See parliamentary questions that have been posed by the green Party in **Saxony** as well as by the left party in **Brandenburg** and at the **federal level**
[93] Vattenfall Europe Mining AG (2008) Möglichkeiten und Grenzen präventiver Maßnahmen gegen Kippenwasserversauerung im Kontext der Bewirtschaftungsplanung in vom Braunkohlenbergbau beeinflussten Grundwasserkörpern, passage translated by E3G
[94] LMBV (2015): **Gutachten zur Sulfatherkunft in der Spree**
[95] RBB (2015) **Lausitzer Tagebaue bringen Berliner Trinkwasser in Gefahr**, 22 April 2015
[96] RBB (2015) **Berlin und Brandenburg streiten weiter über Braunkohle**, 9 September 2015

A prospective buyer of Vattenfall's lignite assets will immediately have to deal with legal questions around the artifical lake to be created at the Cottbus-Nord opencast mine – the first such lake that a private company is liable for.[97] The local tourism industry has already voiced grave concerns that the Spreewald, a biosphere reserve under UNESCO protection, will be negatively impacted[98] and local NGOs have already submitted a detailed response to Vattenfall's proposal, demanding that the mine operator be legally responsible for pollution mitigation for decades to come and that strict sulphate limits be imposed.[99] Legal action might follow.

The Polish municipalities of Gubin and Brody, which lie in the impact zone of the Jänschwalde mine, are also preparing to sue Vattenfall over water pollution. Under the Polish Geological and Mining Law,[100] municipalities and their inhabitants can demand compensation for damages caused by mines on the German side. Polish law stipulates that affected groups should seek an out-of-court settlement before taking legal action. This settlement procedure is currently in preparation, with a legal case highly likely should it fail. The potential extent of the compensation claims is not yet foreseeable, but they are likely to be substantial.

4) Liability for violations of the Habitats directive

Under the EU Habitats directive, companies are required to pay for protective measures and provide compensation for environmental damages in Special Areas of Conservation (SAC). Two of these areas are affected by Vattenfall's mines, which may imply further costs for investors either in terms of protection measures or compensation.

SAC Pastlingsee, a bog of national importance, and SAC Laßzinswiesen are affected by sinking groundwater levels caused by mining at the Jänschwalde site. The State Environmental Agency of Brandenburg has publicly stated that it considered Vattenfall to be partially responsible when Pastlingssee had practically dried up this summer.[101] For Laßzinswiesen, Vattenfall had been required to install infiltration facilities to counteract desiccation. Even after an extension of these facilities was mandated in 2010,[102] monitoring reports have shown a further deterioration. In light of this, it is likely that the future owner of Vattenfall's lignite mines would have to pay for additional protection measures or even compensation.

5) Liability for mining-related infrastructure damages

Under Germany's Federal Mining Act,[103] mining-related damages to roads and buildings, such as those caused by subsidence, have to be paid for by the responsible mining company. There is currently a debate in Germany on whether to reverse the

[97] The flooding of the lignite mines from the GDR era was handled by the government-owned Lausitzer und Mitteldeutsche Bergbau-Verwaltungsgesellschaft (LMBV).
[98] Lausitzer Rundschau (2014) **Spreewald fürchtet Folgen des Ostsees**, 27 August 2015
[99] **Response and objections** to Vattenfall's plan by Umweltgruppe Cottbus e.V.
[100] **Polish Geological and Mining Law**, adopted 9 June 2011
[101] Lausitzer Rundschau (2015) **Landesumweltamt: Tagebau womöglich schuld am Fischsterben**, 22 July 2015
[102] Erlaubnisbescheid zum Einleiten von gehobenem Grubenwasser in Gewässer (Gräben) in den Jänschwalder Laßzinswiesen, Landesamt für Bergbau, Geologie und Rohstoffe, 05.11.2010
[103] **Federal Mining Law**

burden of proof to the disadvantage of mining companies. This could lead to a significant increase in damage reports as well as the associated legal costs and administrative burdens. The Saarland Green party has, for instance, recently launched an initiative to change the burden of proof provisions in the Federal Mining Act[104] and environmental organisations have also long demanded this.[105]

Legal risks also arise from the further expansion of the Jänschwalde mining area, as it requires the federal road Bundesstraße 112 to be moved west. The necessary construction work is primarily paid for by the operator. A lawsuit against the plan submitted by Vattenfall is already pending with the Higher Administrative Court of Berlin-Brandenburg, which could lead to delays and cost increases.[106] In addition to this, local politicians have in October 2015 called on the Federal Audit Office to assess whether taxpayers can be expected to pay the higher required maintenance costs for the new road or whether these should be the responsibility of the mine operator.[107]

[104] Saarbrücker Zeitung (2015) **Saar-Grüne fordern mehr Rechte für Bürger nach Bergschäden**, 22 June 2015
[105] See e.g. BUND **Bergschäden durch Braunkohle**
[106] **http://www.kein-tagebau.de/index.php/de/aktive-tagebaue/jaenschwalde**
[107] Grüne Liga (2015) **Ortsvorsteher schalten Bundesrechnungshof zu Straßenverlegung für Braunkohletagebau ein,** press release, 19 October 2015