German lignite thrives on policy ambivalence

Jeffrey Michel

Germany has justly become world famous for its Energiewende. What is less well known is that the German lignite industry is continuing to wreak its environmental havoc on a large scale. On the basis of current German energy policies, writes Jeffrey Michel, there is no "lignite Ausstieg" in sight.

Lippendorf power station (photo: dé.wé)

Before 1990, East Germany mined 300 million tonnes of lignite (brown coal) annually to cover 70 percent of all energy needs. Dozens of antiquated power stations and factories wreathed in sulphurous smoke generated 100 terawatt-hours (TWh) of electricity per year.

Today, a handful of modernized plants produce two thirds this amount from less than 80 million tonnes of lignite. Existing Vattenfall power stations at Jänschwalde (recently upgraded to 2,998 MW net electrical generation) and Boxberg (939 MW of original capacity expanded by 1,475 MW) have been supplemented by advanced dual-turbine designs at Schwarze Pumpe (1,500 MW) and Lippendorf (1,750 MW, fueled by the Czech-owned MIBRAG mining corporation).

These installations were originally intended for reindustrialization programs in the 1990's that have only partially materialized. Eastern Germany has therefore become an exporter of surplus electricity to other parts of Europe. The ongoing expansion of wind and solar generation increases this capacity, making the early retirement of lignite power plants conceivable – although still unlikely in the foreseeable future.

The Continuing Lure of Lignite

Germany currently imports 71% of its energy. The EU goals of greater supply security and reindustrialization imply a continuing need for lignite to preclude increased foreign dependency.

The Öko-Institut in Berlin calculates that lignite power generation is more competitive than coal or natural gas at ETS (EU Emissions Trading Scheme) allowance prices up to 40 € per tonne, six times current trading levels. Without significant greenhouse gas penalties, many capital investments in generation and transmission equipment have already been repaid.

Lignite is Germany's main domestic fossil fuel, with reserves sufficient for another two centuries at current usage rates. Ever since World War I, the lignite industry has been essential to the socio-economic development of North Rhine-Westphalia and the eastern mining states of Brandenburg, Saxony, and Saxony-Anhalt.

According to a 2012 study of the German Energy Agency (dena), achieving 80% renewable electricity by 2050 could provide only 24% of dependable grid supplies. Despite additional 9% power storage and 25% reduced demand, 60% fossil fuel capacity would still be required to supplement fluctuating solar and wind availability. These projections are not acknowledged by renewable energy advocates. However, the advantages of lignite as a backup energy source have become more difficult to question with newly developed power plants capable of variable operation equivalent to gas generation.

Demographic Backlash

Countryside that is ravaged by lignite surface mining loses its intrinsic value. Fertile agricultural regions such as Western Saxony, the former "vegetable storehouse of the city of Leipzig", have been biologically destabilized, divested of geological wealth, and subsequently left to cope with post-industrial obscurity.

> ***Lignite surface mining displaces the most people of any enterprise in the Western World***

Due to a water content exceeding 50%, lignite possesses a lower heating value than wood pellets. To generate one fourth of Germany's electrical power, therefore, a half-million tonnes of lignite per day must be extracted in surface mines from below five times the amount of overburden (topsoil and sand). The inherent environmental detriments and social disruption affecting hundreds of square kilometers of upturned landscape will persist well into the 22nd century.

Lignite power generation is endorsed under the assumption that no other energy source can provide comparable economic benefits. However, the costs of endangered human health, hydrological imbalances, communal isolation, and real estate devaluation are not included in power bills. Population densities have never returned to pre-mining levels.

Ignored Human Rights and Historic Heritages

Lignite surface mining displaces the most people of any enterprise in the Western World, even though a small fraction of power industry revenues would be adequate for preserving areas of human settlement. Instead, private property rights are invalidated by provisions of the German Mining Act that originated in the Third Reich. All inhabited regions specified in mining licenses can be destroyed to maximize lignite extraction. The two latest permits granted to Vattenfall foresee the compulsory resettlement of 2,400 people living in Sorbian villages near the Polish border.

Ten additional communities could soon be dismembered by MIBRAG for serving the plants at Schkopau (owned by Eon and EP Energy, a subsidiary of EPH, the Czech owners of MIBRAG) and Lippendorf (owned by Vattenfall) as well as a proposed 680 MW power station near its existing Profen mine. The DOW chemical facility at Schkopau, which is equipped with a 980 MW (900 MW electrical) combined heat and power plant, is the largest industrial complex in Saxony-Anhalt with 2,300 employees. The Profen mine was originally intended to supply this facility with up to six million tonnes of lignite annually until 2035. However, Profen now also delivers lignite by rail to the recently acquired Buschhaus power plant near the Volkswagen factory in Lower Saxony and to two plants in the Czech Republic.

With the early depletion of current lignite resources perceived, MIBRAG is mapping out a new 349 million tonne mine near the city of Lützen. Included in the path of possible devastation is the 12th century church at Röcken, the birthplace and gravesite of the philosopher Friedrich Nietzsche. MIBRAG has already provided a 600,000 € grant for the archaeological excavation of a nearby battlefield from the 30 Years' War, where the Swedish king Gustav II Adolphus was mortally wounded in 1632. Mining destruction of such irreplaceable historic sites remains lawful despite the negligible contribution provided to German energy security.

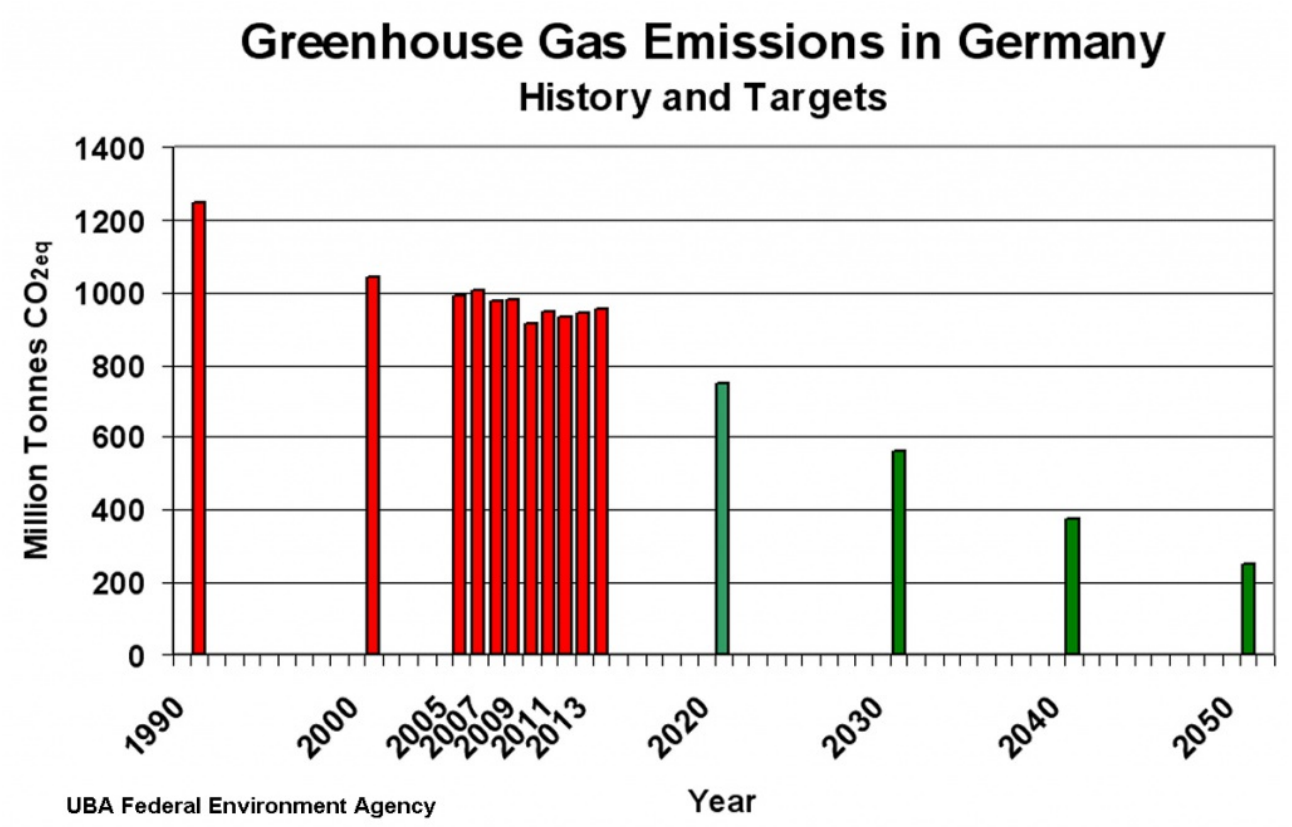
The futility of establishing substitute enterprises above licensed seams of lignite reinforces the political claim that there is no alternative to mining. Under this circumstance, many inhabitants prefer immediate financial compensation for confiscated property over perpetually unsuccessful legal challenges.

To expedite negotiations with any unwilling lignite victims, both Vattenfall and MIBRAG installed former Stasi agents – spies of the detested East German secret police – after 1990 as the chief corporate executives responsible for organizing compulsory mining resettlement. Even following the retirement of these Stalinist raptors, their proficiency in infiltration and coerced expropriations will remain enduring corporate legacies.

Patchwork Air Quality Standards

German lignite plants comply with existing regulations for sulphur dioxide and particulate effluents. However, the residual pollutants tolerated from these large emission sources still result in statistically relevant detriments of human health. Without the activated carbon filters employed as standard equipment in the USA, furthermore, each lignite power station emits up to a half-tonne of toxic mercury per year. A megawatt-hour (MWh) of electricity generated in a lignite power plant also adds a tonne of carbon dioxide (CO_2) to the atmosphere.

Carbon dioxide levels ascribed to coal and lignite power generation began rising in 2011, when eight nuclear reactors were decommissioned by legislated mandate following the Japanese Fukushima catastrophe. Germany's remaining nine nuclear power plants will now be retired between 2015 and 2022.



Renewable energy generation cannot compensate for this capacity loss in the same time frame. Germany's 40% emissions reduction target for 2020 may consequently stall at 33% without additional fossil fuel restrictions. A "Climate Action Program 2020" has been presented for 40% target achievement by the Federal Environmental Ministry BMU. Reductions of carbon dioxide, which constitutes 87% of all German greenhouse gas emissions, would be particularly effective in the lignite sector due to the lowest resulting decline of electricity output.

Prospects for Eastern German Lignite Phase-Out

Since extractive industries intrude into natural environments throughout the world, no unequivocal case can be made on that basis for discontinuing lignite usage. The greatest social and ecological disruptions per kilowatt-hour in Europe, however, nevertheless constitute a compelling reason for implementing alternative energy strategies.

> ***The two-track energy policy of funding both a renewables revolution and a lignite industry has resulted in some of the most expensive energy services in the world***

Mining opponents have been heartened by recurrent denunciations of Vattenfall's German lignite operations in Sweden. A change of ownership, however, would provide no specific benefits to eastern Germany or to the global climate.

The environmental organization BUND (Friends of the Earth Germany) has proposed legislation for shutting down Germany's 24 oldest lignite power plants mainly in North Rhine-Westphalia between 2016 and 2019. By decommissioning this least efficient half of the lignite power industry, up to 88 Mt/a of CO_2 emissions could be avoided to meet the 2020 greenhouse gas target of 749 Mt. However, additional coal-fired plants, notably the Vattenfall Moorburg power station in Hamburg (8.5 Mt/a CO_2), will have meanwhile entered service. Furthermore, lignite power generation in eastern Germany might be increased to compensate for capacity losses elsewhere.

As nuclear reactors continue to be deactivated, therefore, renewable energy generation affords no immediate prospect for replacing lignite power.

- According to the German Energy Agency, 4,600 kilometers of additional high-voltage transmission lines are needed by the year 2024 for unimpeded renewable energy deployment. To date, less than 500 km have been completed.
- Depending on meteorological conditions, wind and solar generation vacillates between excess and insufficient availability. Until economical mass storage technologies can be developed, the grid battery company Younicos AG has calculated an average maximum renewable energy penetration of only 30% in Germany, or 40% in an integrated European transmission network.
- The Bavarian government has declared its disapproval of lignite power from eastern Germany for replacing five local nuclear reactors being retired by 2022. High-voltage transmission lines could therefore bypass the mining regions altogether to connect with wind farms at the North Sea, one of which is being co-financed by Vattenfall and the Munich utility corporation SWM. Even when such complex ventures are finally completed, however, lignite would only be circumvented rather than dismissed from the market.

On the other hand, renewable energies have critically reduced operating revenues at many lignite power stations. An unprecedented negative balance sheet presented in western Germany by RWE AG for the year 2013 verifies the growing commercial risks of fossil fuel usage.

If companies like Vattenfall and MIBRAG run up against the same problems as RWE, they would find it difficult to justify taking out new mining licences. The problem in East Germany, however, is that there is little alternative to the large coal power plants outside of the Stadtwerke.

The two-track German energy policy of funding both a renewables revolution and a lignite industry has resulted in some of the most expensive energy services in the world. Perhaps if German businesses and consumers begin to challenge the economic rationale of generating surplus electricity not required by an innovative industrial country, the demise of lignite power plants would become more likely than the dissolution of the internationally exemplary renewable energy sector.

Editor's Note

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