



Air Pollution & Climate Secretariat

Acid News

3. October 2016

Lignite power developments in Europe



In May this year more than 3500 activists from all over Europe shut down the opencast mine Welzow-Süd in the Lusatia lignite fields in Germany. On a normal day in the twelve German opencast mines three million tonnes of lignite and overburen soil are excavated. Photo: Tlim Wagner/ Flickr.com/CC BY

Several European countries are investing in lignite mining, despite the fact that the industry faces declining profit margins in competition with low-carbon energy production.

Lignite exhibits a thermal value of typically 10 MJ/kg, far less than hard coal, natural gas, or even firewood. Considerably more lignite must therefore be burned to produce the same amount of energy. With only about one-third carbon (atomic weight 12) in a tonne of lignite, about a tonne of CO₂ (44) is emitted together with high levels of mercury, particulate matter, and other contaminants.

Mining lignite in densely populated European countries brings extensive environmental detriments. Surface extraction strips away productive agricultural land, destroys rural communities, depletes groundwater tables for decades, and alters regional topography.

Acid runoff from exposed lignite seams also reduces pH levels in drainage lakes to as low as 2 units. Rivers may be polluted by brown iron ochre – ferrous hydroxide $\text{Fe}(\text{OH})_3$ – that precipitates from both abandoned and active mines.

Although reducing lignite dependency benefits the environment, its continuing usage alleviates the need for fossil fuel imports. Europe currently mines around 450 million tonnes (Mt) of lignite per year, which is about half of global production.

In 2015, Germany extracted 39 per cent (178 Mt) of total EU output from twelve opencast mines. (figure 1) Nearly three million tonnes of lignite and overburden soil (equivalent to the Great Pyramid of Giza in volume) are excavated per day. Lignite provides nearly one-fourth of German electricity and fulfils 12 per cent of overall energy demand (figure 2).

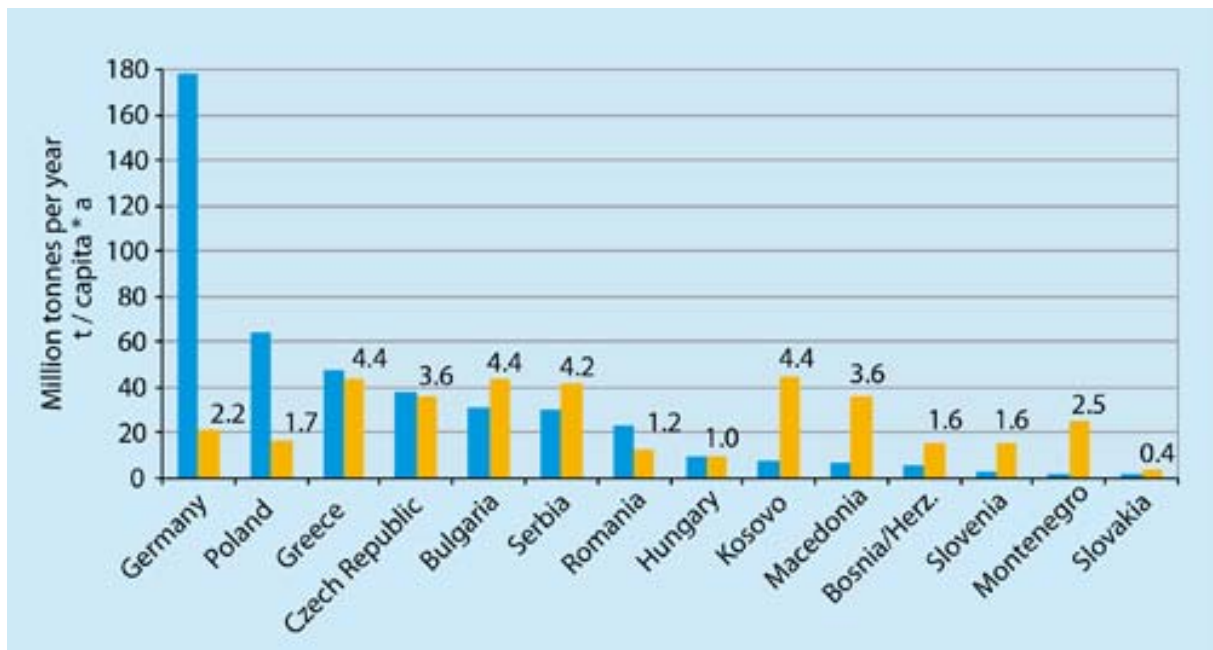


Figure 1. European lignite production, mining output total (blue) and per capita (yellow). Data from 2012-2015.

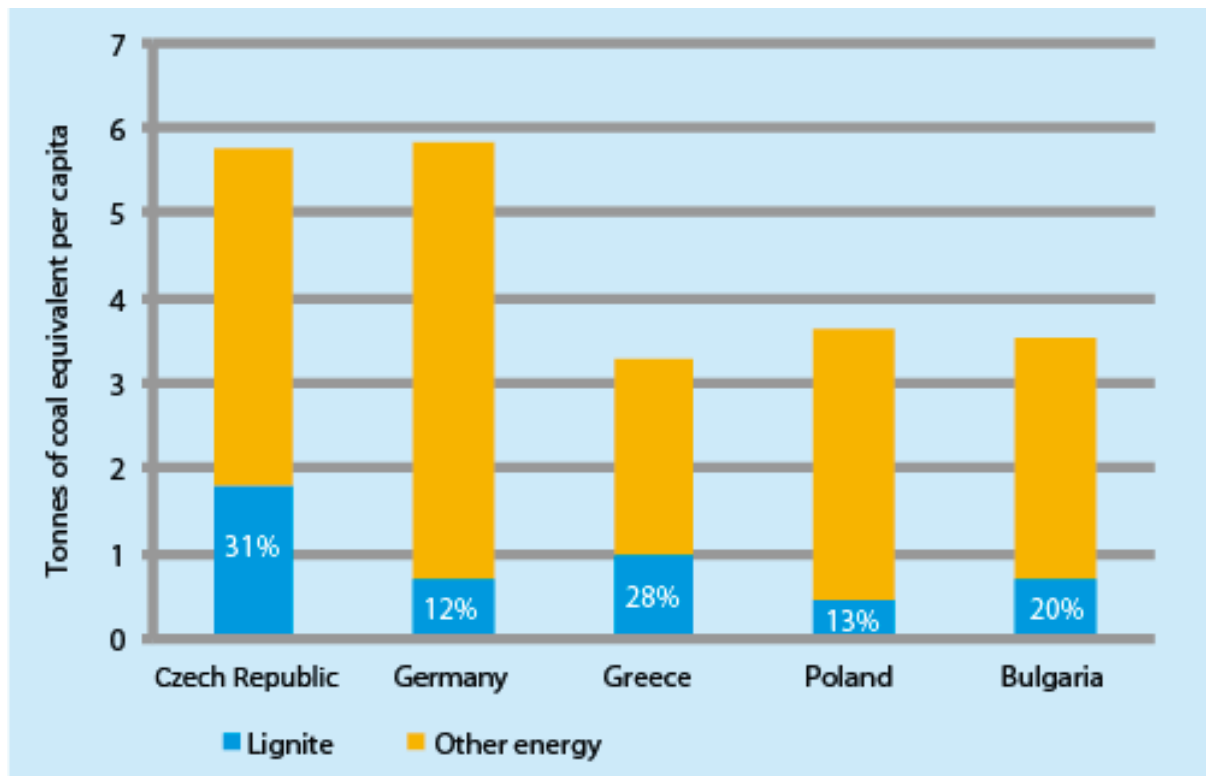


Figure 2. Lignite to primary energy demand in coal equivalents per capita.

Other national economies are even more dependent than Germany on lignite for grid power and heating services. The Czech Republic and particular southern EU countries extract up to twice the amount per inhabitant.

Poland relies primarily on hard coal but also on lignite for nearly 90 per cent of electrical power generation and 56 per cent of total energy services. Despite this market dominance, however, sales revenues have been declining in the coal sector.

To improve industry prospects, an advanced 500 MW lignite power plant is currently under construction at the 1,900 MW Turów mine-mouth site in the former Black Triangle region. Europe’s largest lignite power station with a capacity of 5,298 MW is located farther east at Belchatów. Poland’s “opencast mines in place” would enable lignite usage to continue until mid-century.

A new 100-square-kilometre opencast mining site has also been proposed by Polska Grupa Energetyczna (PGE) at Gubin-Brody near the eastern German Jänschwalde lignite power station. Three 830 MW generating plants with a design efficiency of 40 per cent would use 17 Mt of lignite annually. Serious environmental concerns prevail on both sides of the border, however, regarding 49 years of planned extraction at a depth of 140 m. In consequence, the required environmental licensing procedures have been suspended for an indefinite period.

The Czech Republic extracts soft lignite and dense hard brown coal in North Bohemia to cover nearly one-third of national energy demand, primarily for electricity and heating services. The Bílina surface mine near Litvínov is being expanded for the new 660 MW Ledvice lignite plant, revoking excavation limits imposed in 1991 by Parliamentary Resolution 444. Electricity exports could be increased in the future to western Germany, where nuclear power will be phased out by 2022. Lignite has been

occasionally imported, on the other hand, from nearby eastern German and Polish mines, notably to the 363 MWe Opatovice power and district heating plant.

In Bulgaria, the 660 MW AES Galabovo power plant began operation in 2011. Lignite production grew by 14 percent to 32.6 Mt, but later declined to 31.2 Mt/a in 2014. Additional generation capacities currently await approval in Kosovo near Pristina (2 x 300 MW) and in Serbia at Kolubaru (2 x 375 MW). Europe's largest lignite reserves outside of Poland and Germany are located in these two Balkan countries.

Greece had earlier used an annual six metric tons per inhabitant of particularly low-grade (3.8–9.6 MJ/kg) lignite to cover over a quarter of total energy demand. A recent report of Greece's power utility LAGIE, however, indicates a one-quarter demand reduction (48 Mt in 2014). Investments in lignite usage efficiency could contribute to reducing national indebtedness. A €793 million loan has recently been approved by the German KfW Bank for the enhanced-performance 660 MW Ptolemaida V lignite power plant, with equipment supplied by Mitsubishi Hitachi Power Europe.

With the exception of regions with substantial district heating networks, European lignite faces declining profit margins in competition with low-carbon energy. In a June 2016 study on the lignite industry, Green Budget Germany (FÖS Berlin) has questioned whether sufficient financial means will be available to cover the follow-up costs of mining operations. Public diligence is now essential to preclude the necessity of taxpayer bailouts resulting from corporate or political neglect of this issue.

Jeffrey H. Michel