

# The European Energy System in an Age of Globalization

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by

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## Introduction

This chapter places the rise and fall of the European coal industry into a broader global-historical perspective. I will try to zoom out and think through the history of energy in Europe. I do this not so much by starting from the traditional, nation-centred perspective, but rather by targeting the genuinely transnational character of the European energy system in the making. The analysis focuses partly on transnational connections within Europe itself, and partly on the connections between Europe and its “far reaches” in energy<sup>1</sup> – that is, Europe’s energy links with the non-European world.

Let us start by taking a look at an intriguing oil painting by the Flemish-German artist Frans Hogenberg (1535-1590). It depicts a proud walled town in southern Germany, Schwäbisch Hall. In the sixteenth century Schwäbisch Hall was an important hub in the European salt industry. Salt production was at that time known as one of the “fire industries”,<sup>2</sup> because in northern latitudes brine could only be evaporated through heating. Heat generation required fire, and to make a fire the salt industrialists used massive amounts of firewood. Firewood was at the time the most important energy source throughout continental Europe by far. By the time Hogenberg created his painting (ca. 1580), however, the copious use of firewood in the salt industry had given rise to far-reaching deforestation and thus depletion of the locally available fuel. The painting actually documents this fuel crisis: there is basically no forest left in the local surroundings. It has all disappeared or, to use a modern term, the fuel reserves have been depleted.

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<sup>1</sup> Hecht, Gabrielle. “Colonial Networks of Power: The Far Reaches of Systems”. *Annales Historiques de l’électricité* 2 (2004): 147-157; Högselius, Per, Arne Kaijser, and Erik van der Vleuten. *Europe’s Infrastructure Transition: Economy, War, Nature*. Basingstoke and New York: Palgrave Macmillan, 2016.

<sup>2</sup> Radkau, Joachim. *Nature and Power: A Global History of the Environment*. New York: Cambridge University Press, 2008.

Remarkably, however, the salt industry, to judge from the painting, does not seem to be all that bothered by the disappearance of the forests. From Hogenberg's painting we can see that the salt industrialists keep on working much like before, and that the salt industry continues to flourish. It seems as if the salt makers have found a way to cope with the local fuel crisis. If we look closer at the painting, we can see that they are able to continue evaporating the brine because they have managed to access excellent firewood resources from more distant forests, based on agreements with upstream localities. From these upstream sources, thousands of logs of firewood are transported downstream on the Kocher, the local stream. In Hogenberg's painting we can see how the logs arrive in Schwäbisch Hall's local harbour. In the historical annals of the city we can read about how the firewood usually arrived in large batches during certain times of the year. These days became festive days of celebrations in the town, there was great excitement, and a lot of beer, wine and food was consumed.<sup>3</sup>

This is now almost half a millennium ago, and the world has changed a lot. However, the legacy of Schwäbisch Hall's quest for access to remote sources of fuel is very much alive in our own age. One could even argue that Europe as a whole is in a similar position as Schwäbisch Hall was in the sixteenth century. Europe's local energy sources have been – or are about to be – depleted. Our fuel reserves have been burnt up. They have been consumed. They are gone. And as far as we speak of fossil fuels, they are gone forever. To be sure, not 100% is gone, but what we see now in terms of ongoing fuel extraction is an end-game, we are turning the last pages of Europe's fuel extraction book. All peaks in production lie in the past, and everybody who is still employed in non-renewable primary energy production in Europe works in a declining industry.

Half a century ago a country such as Germany was still able to produce impressive volumes of hard coal and even large volumes of oil and natural gas. Today basically nothing of this remains. Romania was once a world leading oil power and subsequently the country became a massive producer of natural gas as well. Today, however, almost nothing is left of these fossil fuel resources. Austria was, at one point, a major producer of both oil and gas; now there is nothing left. The situation is much the same in Italy, in France, in Spain – well, basically everywhere. Even the oil riches under the North Sea, which have functioned as a main guarantor of European energy security during the past 40 years, are being depleted at a rapid pace, with production now being less than half of what it was 15 or 20 years ago. And in the Netherlands, which in 1959 discovered the world's largest natural-gas field, production is now rapidly being phased out due to a tragic course of depletion which has recently given rise to a

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<sup>3</sup> Radkau, Joachim. 1997. "Das Rätsel der städtischen Brennholzversorgung im 'hölzernen Zeitalter'". In *Energie und Stadt in Europa: Von der vorindustriellen "Holznot" bis zur Ölkrise der 1970er Jahre*. Ed. Dieter Schott. Stuttgart: Franz Steiner Verlag, 56f.

series of strange earthquakes in the Groningen region.<sup>4</sup> Europe's energy resources have literally gone up in smoke. They have been squandered, and they will never reappear. They are gone forever.

Remarkably, however, Europe's energy users have hardly been affected at all by this radical race to depletion. On the contrary, European energy consumption is today higher than ever and there has been a tremendous growth in fuel use during the past 200 years. Just like Schwäbisch Hall's salt industry in the sixteenth century, Europe has been able to continue burning copious amounts of fuel much like before – and even scale up consumption in ways that few people would have thought possible a few decades ago. How has this been possible? The explanation is simple: just like Schwäbisch Hall, Europe has managed to cope with local energy scarcity by tapping into fuel reserves located elsewhere – that is, reserves belonging to non-European regions of the world. These non-European energy sources have more than compensated for the depletion of Europe's internal fuel deposits.

For example, following the closure, in December 2018, of the last remaining German hard coal mines, Germany nowadays imports all of its hard coal needs. It also imports 89% of the natural gas that it burns, 96% of its oil and 100% of its uranium.<sup>5</sup> The trend is the same in virtually every European country. Britain, for example, closed down its last underground coal mine in 2015, while France exited the coal industry in 2004. In my own country, Sweden, domestic coal production was phased out already in the 1950s, and domestic uranium production came to an end in the 1960s. There is no production of fossil fuels in Sweden today. And yet Sweden boasts of a highly competitive steel industry which thrives thanks to imported coal and coke; my country has millions of car owners and lorry drivers who are able to fill up their petrol- and diesel-driven vehicles, and air planes who are able to take off and land in a multitude of Swedish airports thanks to imported jet fuel. Natural gas heats towns and supplies industries with process heat in Sweden's south and southwest, and nuclear power plants produce copious amounts of uranium-based energy for the benefit of Swedish households and energy-intensive industries.<sup>6</sup>

Most European countries, along with the most advanced nations in East and Southeast Asia are in more or less the same situation. They source their energy from remote locations, and the amounts of energy that they import are vast. The

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<sup>4</sup> See e.g. "Gas field earthquakes put Netherlands' biggest firms on extraction notice", *The Guardian*, 23 January 2018.

<sup>5</sup> Germany does not extract uranium domestically. For the evolution of oil and gas import dependence of EU member states, see Eurostat, "Energy production and imports", Statistics explained, July 2018, <https://ec.europa.eu/eurostat/statistics-explained/>.

<sup>6</sup> For a detailed analysis of Sweden's energy dependence history, see Kaijser, Arne, and Per Högselius, "Under the Damocles Sword: Managing Swedish Energy Dependence in the Twentieth Century", *Energy Policy* 126 (2019): 157-164.

only difference really, compared to Schwäbisch Hall in the sixteenth century, is that the arrival of our much-needed fuel does not inspire any celebrations or festivities. We do not cry out of joy when the gas arrives from Russia; we do not sing the praise of Saudi Arabia's petroleum when the supertanker is sighted at Marseilles; we do not gather to cheerfully watch the arrival of the coal ship from Colombia when it docks in the port of Hamburg; and there is no street party in La Hague on the French coast when the uranium oxides arrive from the Nigerien uranium mines in the Sahara desert. In fact, few people are aware that these shipments take place. And yet these flows are the very lifeblood of the European economy and of modern European life as we know it.

Before continuing, I should mention that there is one very important non-renewable energy source that goes against the overall pattern: lignite, or brown coal. Europe is a lignite superpower, producing over half of the world's lignite. Germany to this day remains the world's largest lignite producer. Russia, Turkey, Poland, Greece, the Czech Republic, Serbia, Bosnia and Herzegovina, Bulgaria, Romania, Albania and Hungary are also massive producers.<sup>7</sup> Europe's lignite resources have not been depleted, and as all other intra-European fossil fuels are disappearing, the strategic role of European lignite becomes ever more pronounced. It is an extremely dirty fuel, but historically this fact has been less important than the fact that it is a locally available fuel, thus stimulating its continuing excavation and combustion. Lignite's key role in most of the countries mentioned can be traced back to a quest for energy security and energy autarky, and so governments have championed the expansion of lignite mining regardless of the economic and ecological costs. Nowhere would lignite production be able to thrive without heavy government subsidies, because cheaper energy is readily available for pick up in the nearest seaport. Yet in 2018 lignite still remains the backbone of the energy systems in several European nations, and the current political trend of nationalism and protectionism is likely to make its phase-out in Europe very difficult, especially in Eastern Europe. It is not unlikely that many, if not most, of the lignite-dependent countries will feature, in 15-20 years, a bizarre energy mix of heavily polluting lignite combined with wonderfully clean wind and solar energy.

### **Energy colonialism and energy transnationalism**

Europe has, with lignite as the main exception, become almost totally dependent on imported energy. Another way to express this is that the European energy system has gone through a radical globalization process. Indeed, it is energy's globalization that largely defines the European energy system and its evolution over the past 150 years. Globalization can, of course, refer to many different

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<sup>7</sup> See e.g. Euracoal, "Coal in Europe 2017", European Association for Coal and Lignite, 2018, <https://euracoal.eu/info/euracoal-eu-statistics/>.

things, but let me here point to two particularly critical globalization phenomena in the energy domain: I will refer to these as *energy colonialism* and *energy transnationalism*. I will argue that it is in the interaction between these two historical processes that we must try and discern the underlying dynamics of Europe's long-term energy evolution.

## 1. Oil

Let us start by looking at oil. The modern petroleum industry was spearheaded by American entrepreneurs in the 1850s and 1860s, and pretty soon American kerosene, which was used for lighting, reached European markets. However, a number of European entrepreneurs early on set out to challenge the Americans. They did so by turning to colonial oil resources. The most important colonial oil regions were Russia's recently colonized Transcaucasian lands, the Dutch East Indies and the Middle East. Then, in the 1910s, oil started to be regarded as a strategically important energy source, mainly due to its role in propelling warships, tanks and airplanes, and as a result oil imports were increasingly identified as an issue for state agencies to look into.<sup>8</sup> European governments decided that they wanted control over both oil imports and domestic distribution. And so they set out to acquire their own oil fields in distant parts of the world. The result was a new, aggressive form of European oil colonialism.

Britain with its BP company led the way here, but France and other European nations were not far behind. After World War II this trend continued at an accelerated pace, with Italy, for example, becoming very active from around 1954 in regions such as Egypt and Iran, and Spain, which in cooperation with the larger international oil companies tried but failed to find oil in the Spanish Sahara. In the 1960s Germany entered the game through a company called Deminex.<sup>9</sup> More surprisingly, even smaller nations, including my own country, Sweden, tried to find oil in foreign territories.<sup>10</sup> Most amazingly, some of the countries behind the Iron Curtain also emerged as oil colonialists; this concerns not only the far-reaching involvement of the Soviet Union in third-world oil exploration projects, but also countries such as Bulgaria, which thanks to the friendship between its dictator Todor Zhivkov and his counterparts in Libya, Muammar al-Gaddafi, was able to tap into Libyan oil.<sup>11</sup>

So oil colonialism is definitely a major trait of both nineteenth- and twentieth-century European oil history. But acquiring crude oil was only one of many

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<sup>8</sup> Yergin, Daniel. *The Prize: The Epic Quest for Oil, Money and Power*. London: Simon & Schuster, 1991.

<sup>9</sup> Duffield, John S. *Fuels Paradise: Energy Security in Europe, Japan, and the United States*. Baltimore: Johns Hopkins University Press, 2015.

<sup>10</sup> Kaijser and Högselius, "Under the Damocles Sword".

<sup>11</sup> Tchalakov and Mitev, "Energy Dependence behind the Iron Curtain: The Bulgarian Experience", *Energy Policy* 126 (2019): 47-56.

challenges in putting the European oil supply system to work. Other tasks related to the need for refining, storing and distributing crude oil and refined oil products – and those activities did not come about in any automatic way. In terms of refineries, European governments strongly advocated that the oil must be refined domestically, not abroad. Some countries even created state-owned refining companies, which were then typically integrated with the exploration companies that were looking for oil in colonial regions. Italy's ENI is a case in point here; Spain's CAMPSA, a state import monopoly founded in 1927, is another. In any case oil refining became very much a national affair.<sup>12</sup>

Most of Europe's refineries were built along the coasts. At these locations imported crude oil from colonial regions was transformed into more valuable end products, which were then shipped to industrial users, filling stations, airports and so on by way of tanker, rail or truck. Subsequently refineries were also built in a number of landlocked locations in continental Europe. Let us look a bit more closely at these landlocked locations. The initial idea was that colonial crude oil could be unloaded in one or the other seaport and then transported by rail into Europe's interior regions, where it would first be refined and then distributed to users. But when oil consumption embarked on a path of very rapid, exponential growth in the 1950s, this ceased to be feasible, because the oil transports put such an enormous stress on the European railway network. Instead, oil companies along with other actors such as petrochemical companies, industrial groups and regional governments joined forces in constructing very large and, above all, very long *oil pipelines* from the seaports to major industrial centres in continental Europe, such as Ludwigshafen and Ingolstadt (in Germany) and Schwechat in Vienna's outskirts (in Austria). The most important oil pipelines in Western Europe went from Marseilles to Baden-Württemberg, from Rotterdam to the Ruhr, from Genoa to Ingolstadt and from Trieste to Ingolstadt and Vienna.<sup>13</sup>

Bavaria played a particularly interesting role here. Bavarian Minister of Economy Otto Schedl pursued a forceful strategy that aimed to make Bavaria independent in its energy supply from northern Germany and especially from the coal regions of the Ruhr, which he blamed for Bavaria's economic backwardness. Imported oil from North Africa and the Middle East became his main tool in this struggle. However, in order to access foreign oil without becoming dependent on northern Germany, he needed to forge cooperation not only with crude oil exporters in regions such as the Middle East, but also with actors in Italy, Austria and Switzerland, which emerged as transit countries. The construction of oil pipelines from the Italian seaports to Bavaria, taking the route

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<sup>12</sup> Högselius, Per, and Arne Kaijser. "Energy Dependence in Historical Perspective: The Geopolitics of Smaller Nations". *Energy Policy* 126 (2019).

<sup>13</sup> Högselius et al. *Europe's Infrastructure Transition*.

across the Alps, must be regarded as one of the most impressive feats in European oil history. But there are several other examples of landlocked regions that followed the same strategy, with actors forging cooperation with neighbouring European countries so as to enable imports of crude oil from faraway. Ludwigshafen, for example, accessed Middle Eastern oil not so much by way of Rotterdam or Hamburg, but rather through a cooperative venture with France, the cornerstone of which was the Central European Oil Pipeline from Marseilles. In Eastern Europe Czechoslovakia, Hungary, Poland and East Germany forged similar cooperation, albeit under a totally different political regime, with the Soviet Union, whose immense colonial oil riches they accessed through the Druzhba (“Friendship”) pipeline system.<sup>14</sup>

The point here is that oil pipeline construction in both Western and Eastern Europe became the basis for intense and fruitful cooperation between a large number of European countries. Or, somewhat differently expressed, the need to transfer colonial crude oil from European seaports into the continent’s interior – especially through oil pipeline construction – became the basis for a far-reaching European oil transnationalism. This transnationalism was dynamically co-produced with rapidly growing and ever more aggressive extractive activities in Europe’s colonial or quasi-colonial peripheries.

## **2. Natural gas**

Shifting our focus from oil to natural gas, the interaction between energy colonialism and energy transnationalism becomes more complex. It took much longer for natural gas to become a globalized fuel, mainly because gas was so much more difficult to transport over long distances as compared to transporting coal or oil. In the twenty-first century there is still no truly globalized market for natural gas.

The breakthrough for natural gas as a fuel in Europe is, ironically as it may seem these days, directly linked to attempts to strengthen European energy independence. Natural gas was spearheaded in Europe by a number of countries and regions that did not possess any large domestic coal deposits, especially France, Italy, Austria and Bavaria. Actors in these regions early on promoted investments in natural gas as a way to overcome their looming coal import dependence. Their enthusiasm for natural gas was initially linked to the discovery of substantial domestic gas deposits. Natural gas, extracted from these local wells, quickly became a very popular fuel. As a matter of fact, natural gas became so popular among users that overall demand very quickly outpaced anything that the locally available sources were able to satisfy. In this situation the gas companies faced a delicate strategic choice: either they would have to

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<sup>14</sup> Ibid.

disappoint their gas customers by telling them that, unfortunately, they had no more gas to offer, implying that the customers would have to switch back to coal or oil – or, they could try and meet the growing demand for natural gas by seeking access to foreign supplies. All gas companies in Europe chose the latter path, thus paving the way for a transition from domestic supplies to import dependence.<sup>15</sup>

But from where should the gas be sourced? Who could possibly supply Europe with more natural gas to compensate for the local supplies that were being depleted? The first large-scale project to be seriously discussed in this context targeted the European colonial periphery in North Africa, where an immense new gas field had been discovered at Hassi R'Mel, deep inside the Sahara desert. The idea was to build a gas pipeline from this deposit through the desert and onwards across the Mediterranean into continental Europe. This idea became immensely popular not only in France, whose geologists had discovered the gas field, but also in Italy, Spain, Austria, Bavaria and even Britain. British to-be-importers of the fuel thought that they could receive Saharan gas by way of transfer through Spain and France. Austria, in the same way, envisioned cooperation with Italy and Bavaria with Spain and France or with Italy and Austria, for accessing Hassi R'Mel gas. And so the quest for Saharan gas was not merely a vision of European energy colonialism; it also became a vision of European energy transnationalism, centring on far-reaching cooperation between a number of European countries to make the new natural gas system come about.<sup>16</sup>

Precisely at this time, however, further very important natural gas discoveries were made in Europe itself: in the Netherlands. The Groningen natural gas field there turned out to be so immense that it seemed impossible for the Netherlands itself to make use of all the gas. For this reason the Netherlands concluded agreements with Belgium, France and Germany for large-scale gas exports.<sup>17</sup> This cooperation became another cornerstone in the emerging European gas transnationalism.

But further and even more significant gas fields were being discovered in the Russian colonial periphery: in northwestern Siberia. The gas discoveries there in the early 1960s made headlines in Western media, and several West European gas companies started to consider the possibility of importing Siberian natural

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<sup>15</sup> Högselius, Per, Anna Åberg and Arne Kaijser. "Natural Gas in Cold War Europe: The Making of a Critical Infrastructure". In *The Making of Europe's Critical Infrastructure: Common Connections and Shared Vulnerabilities*, edited by Per Högselius, Anique Hommels, Arne Kaijser and Erik van der Vleuten, 27-61. Basingstoke and New York: Palgrave Macmillan.

<sup>16</sup> Ibid.

<sup>17</sup> Kaijser, Arne. "Striking Bonanza: The Establishment of a Natural Gas Regime in the Netherlands", In *Governing Large Technical Systems*, edited by Olivier Coutard, 38-57. London: Routledge, 1999.



gas. And so by the early 1970s Western Europe was sourcing most of its gas from two colonial peripheries: Algeria and Siberia. Together with the gas from the Netherlands, these colonial gas streams made the European gas market highly competitive. In spite of the fact that Europe had very little indigenous gas – save the Groningen field and the smaller French field at Lacq – the competitive dynamics enabled the gas importers to source colonial gas from faraway sources at highly favourable prices. Moreover, the gas transnationalism that was becoming evident already in the early Algerian and Dutch visions became increasingly pronounced because the long-distance pipelines from Siberia, from the Sahara and later on from other gas exporting countries forced Western Europe's nations and regions to cooperate with each other in the construction of sprawling long-distance pipeline grids. Especially the construction of gas pipelines from Siberia to Western Europe contributed to a process of European integration in natural gas.<sup>18</sup>

### 3. Uranium

Uranium is another key fuel in the European energy system. It is the most internationalized energy source in the European fuel economy. 98% of the uranium that nuclear operators use is imported from non-European uranium mines, mainly from Russia's colonial peripheries, from the steppe lands of Central Asia, from first nations' territories in Canada, from former French and British colonies in Africa and from Australia. From a technical point of view, some of Europe's uranium needs could, theoretically, be covered through intra-European rather than colonial sources. From an economic and environmental point of view, however, governments and companies do not consider this feasible. For this reason virtually all European countries, in their official statistics, indicate that there are no uranium resources on their territories. The resources are not depleted in a physical sense; yet from an institutional, economic and environmental point of view they do not exist.

Nuclear power plants can do little with uranium ore as such. The ore needs to go through various refinement processes, which are strongly internationalized. By the 1970s, for example, the Finnish nuclear operator TVO had built up a supply mechanism in which it first purchased crude uranium from Canada. This "yellow-cake", as it is also called, was then shipped across the Atlantic to La Hague on the French coast for conversion – in the same facilities that processed France's African uranium – into uranium hexafluoride. After that, the fuel embarked on another lengthy voyage, heading for the port of Riga in Soviet Latvia, where it was reloaded onto railway cars for transport to the Mayak nuclear complex in the eastern Urals. Enriched in the Soviet Union, the fuel

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<sup>18</sup> Högselius, Per. *Red Gas: Russia and the Origins of European Energy Dependence*. Basingstoke and New York: Palgrave Macmillan, 2013.

reappeared a few weeks later in Leningrad. Next, it floated across the Baltic to the fuel element factory at Västerås, Sweden, after which it could eventually be transported, in its final form, to TVO's nuclear power plant at Olkiluoto on the Finnish coast. For each step in the supply chain, TVO concluded a detailed contract with the respective supplier.<sup>19</sup>

An interesting side-effect of such complexity in European nuclear fuel supply was that it stimulated cooperation between different European countries in the nuclear field, sometimes, as in the Finnish case, also involving close links across the Iron Curtain. Many smaller European countries relied on France, Britain, the Soviet Union and later on Germany for conversion and enrichment of colonial uranium resources, while French, British and Russian reprocessing plants emerged as hubs for European spent fuel management. Some nuclear fuel cycle facilities, designed for processing colonial uranium, were even jointly built and operated by two or more European countries. The cooperation between Britain, Germany and the Netherlands in uranium enrichment is a case in point.<sup>20</sup> European nuclear transnationalism thus went hand in hand with a uranium supply pattern rooted in close relations between Europe and its (former) colonies.

#### **4. Coal**

Now, what about coal? How has Europe's coal import dependence played out in the global arena, and how has the globalization of European coal interacted with European coal transnationalism?

Coal is unique in European energy history because it is the only fuel for which a dynamic European market emerged long before the supplies were globalized. European coal transnationalism here preceded European coal colonialism. Britain early on emerged as a coal exporter of great significance for almost all other European countries; British coal was used in industrial steam engines, in locomotives, in town gas works and so on in such diverse places as St. Petersburg and Stockholm, Milan and Athens. It was a win-win relationship: Britain was able to boost its export revenues and the importing nations were able to industrialize through the combustion of British coal. Later on Germany also became a significant coal exporter. Poland, upon becoming an independent nation, joined in after World War I, and the intra-European coal trade grew increasingly complex. Many places, such as the Netherlands and northern Germany's port cities, saw a healthy competition between British coal and Ruhr

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<sup>19</sup> Högselius et al. *Europe's Infrastructure Transition*.

<sup>20</sup> Schrafstetter, Susanna, and Stephen Twigge, "Spinning into Europe: Britain, West Germany and the Netherlands – Uranium Enrichment and the Development of the Gas Centrifuge, 1964-1970". *Contemporary European History* 11, 2 (2002): 253-272.

coal, and European coal was so abundant and prices so low that coal from elsewhere in the world was not able to compete in European markets before 1914.<sup>21</sup> European coal transnationalism triumphed, and colonial coal relations were insignificant.

In 1913, however, British coal production peaked and then started to decline, and in the Interwar years several other coal-producing countries understood that their coal deposits were likewise being depleted at an alarming rate. After World War II France, facing depletion, desperately sought access to German coal; this became a major motivation for creating the European Coal and Steel Community (ECSC) in 1950, which further strengthened European coal transnationalism while also paving the way for (West) European political and economic integration more generally. But then in 1956 German coal production also peaked, and unsurprisingly intra-European coal became more and more expensive in the decades that followed.

At the same time transportation costs, thanks to new oil-propelled ships, declined rapidly, while new institutional conditions in the world economy favoured trade. The effect was that coal from very far away started to become competitive in Europe. The intensifying European coal transnationalism that had been institutionalized through the ECSC was thus counterbalanced – and challenged – by a surge in European coal colonialism. As a matter of fact, coal from overseas (post)colonial regions became so cheap that all the state subsidies that European governments poured into their coal industries did not have much of an effect. Steelworks, cement producers and power plants soon found themselves negotiating coal imports with producers from distant countries such as Colombia, South Africa, Australia and the United States. Today a vast majority of Europe’s hard coal is imported. Poland is the only remaining EU member state with any significant production.<sup>22</sup>

### **In the age of renewables**

What will happen if and when Europe manages to phase out its dependence on fossil fuels and uranium and replaces these energy sources by renewables? Will the trend towards ever growing European import dependence be reversed? Will Europe once again be able to produce most of its own energy, as in the age of firewood and charcoal? Or will we see the emergence of new, unexpected patterns of globalization?

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<sup>21</sup> Barbier, Edward. *Scarcity and Frontiers: How Economies Have Developed through Natural Resource Exploitation*. Cambridge: Cambridge University Press, 2011.

<sup>22</sup> See e.g. Euracoal, “Coal in Europe 2017”, European Association for Coal and Lignite, 2018, <https://euracoal.eu/info/euracoal-eu-statistics/>.

One thing is clear: growing volumes of wind and solar energy creates a new reality in which *electricity* will play an ever more central role. Electricity is a refined form of energy and it is the least internationalized of all major energy sources. As of today, the European electricity system takes the form of a set of national and subnational grids that have been linked to each other on the margin only. This makes it very different from oil, gas, uranium and coal. Only 13% of all electricity in Europe was exported in 2016; most countries are more or less self-sufficient.<sup>23</sup>

It could have been different. Historically we find visions both of European colonialism and of European transnationalism in electricity system-building – visions that resemble the ones discussed above in the cases of oil, natural gas, uranium and coal. European electricity visionaries, especially in continental Europe, early on started dreaming about accessing electricity from faraway regions, notably from the colonial lands of northern Scandinavia, Russia, Asia and Africa – and about combining access to such colonial electricity sources with a dynamic intra-European electricity transnationalism. In particular, there were intense attempts to construct what we would now call a European “supergrid”. Such visions were at the forefront of electrification debates especially in the years around 1930.<sup>24</sup>

Nothing came of those visions at the time. Since the 1990s, however, the old transnational electricity ideas have been revived, partly in the context of changing political landscapes in Europe and the world, and partly because of technological change in wind and solar energy. On the one hand, we have seen visionary attempts in Europe to access massive volumes of solar energy from North Africa, the Middle East and Central Asia, most famously through what used to be called the Desertec project. Such a project would preferably be combined with massive wind energy supplies from the North Sea and elsewhere.

However, the transition to wind, solar and other intermittent sources of electricity poses a huge challenge to electricity transmission grids. In this context a number of grand visions are now taking form, centring on the construction of a European supergrid – that is, a grid that spans all of Europe and which does not necessarily respect national borders. The EU Commission, in particular, is very eager to see such visions materialize, because just like the electricity visionaries of the 1930s they think that greater European integration in electricity will also strengthen Europe’s political cohesion.<sup>25</sup> And so electricity and the transition to renewable energy may, arguably, become a

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<sup>23</sup> Eurostat, “Import and export of electricity”, *Statistics explained*, 2018, <https://ec.europa.eu/eurostat/statistics-explained>.

<sup>24</sup> Lagendijk, Vincent. *Electrifying Europe: The Power of Europe in the Construction of Electricity Networks*. Amsterdam: Aksant, 2008.

<sup>25</sup> Högselius, Per. *Energy and Geopolitics*. London and New York: Routledge, 2019.

pathway for Europe in overcoming current separatist and protectionist trends in European and international politics. European electricity transnationalism may become a way for Europe to find its way in the current age of globalization.