

Manuel Frondel, Rainer Kambeck,
and Christoph M. Schmidt

Hard Coal Subsidies: A Never-Ending Story?

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Abstract

In Germany, hard coal has been subsidized for almost half a century. Despite the declining significance of hard coal production for the domestic labor market, the magnitude of subsidies increased until the middle of the last decade. In 1996, they peaked at € 6.7 bill. While German hard coal subsidies have been shrinking to € 2.7 bill. in 2005, it is very likely that they will be extended well into the next decade and even beyond. This article discusses the feeble arguments raised by the proponents of hard coal subsidization in Germany and other EU countries. Most importantly, in addition to the drain imposed on public budgets, these subsidies imply a substantial opportunity cost, leading funds away from alternative, more beneficial public investments. From a social welfare perspective, we therefore recommend the rapid abolition of these subsidies not only in Germany, where in nominal terms the accumulated amount of subsidies has now by far exceeded € 130 bill., but all across Europe.

JEL-Classification: Q28, Q42, Q58.

Keywords: Energy policy, energy security, coal mining

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1. Introduction

Since the coal crisis of 1958, Germany has been subsidizing the hard coal mining sector, spending some € 128 bill. between 1958 and 2002 (Storchmann 2005). Arguably, there is no other German producer subsidy that has been granted for so many years at such a high level. Even today, hard coal support is still the largest single subsidy paid by the German federal government (BMF 2006). The European Commission authorized Germany to grant € 2.7 bill. hard coal subsidies in 2005 (EC 2006a), cementing Germany's role as by far the largest supporter of hard coal production among all OECD countries (Storchmann 2005: 1469).

Although hard coal subsidization has been criticized for decades by virtually all respectable German economists (e.g. SVR 1983), the subsidies paid in 2005 were at about the same level as in the first half of the 1980s (Figure 1), when hard coal production was substantially higher. This pattern reflects the widening gap between domestic production cost and world market price (Figure 2). The amount of subsidies rose particularly dramatically between 1986 and 1996. Only since 1996, when a peak at about € 6.7 bill. had been reached, German hard coal subsidies have been shrinking.

The persistency of hard coal subsidization in European countries such as Spain, Poland, and particularly Germany, nicely matches standard political economy considerations (Anderson 1995: 492)¹. This approach to explaining political decisions argues that it is in the interest of governments to deliver large benefits to well-organized groups, while costs are typically imposed on less organized groups such as taxpayers in a dispersed way.

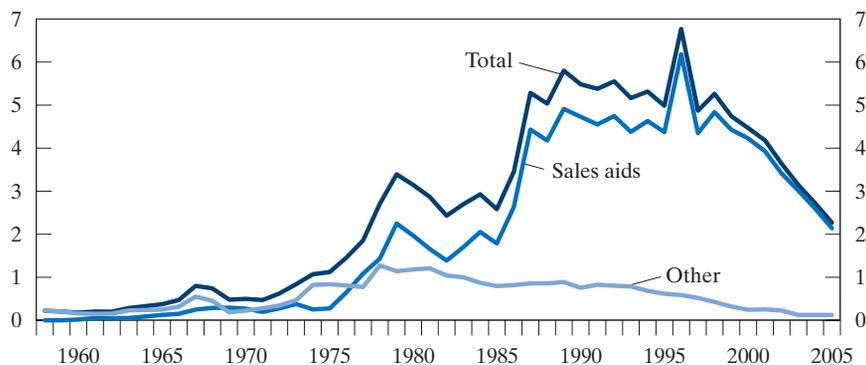
Since the publication of a special issue of *Energy Policy* on the implications of dismantled hard coal subsidies (Radetzki 1995a), only a few international studies have addressed the topic, such as Storchmann (2005) and Welsch (1998), despite the fact that Anderson's (1995: 495) mild hope that Belgium's dismantling of subsidies in the early 1990s would spread to the remaining protectionist countries has not come true. Meanwhile, the situation on the demand side has changed significantly, in particular in the European power generation sectors, and the time has come to re-examine the case for a prolongation of hard coal subsidization. Its proponents relentlessly advocate extended subsidies, referring to energy supply security and employment effects as their major arguments.

¹ Anderson (1995: 492) summarizes the empirical evidence that an industry is likely to be assisted more intensively the more it is a low-wage, low-value-added, declining industry involving few firms and facing strong and growing import competition. Political support can typically be recruited even more successfully, if the industry is geographically concentrated, e.g. being a major employer in a region and involving only a small number of towns. Anderson concludes that it is thus not surprising that Western Europe's coal mining industry has enjoyed increasing assistance.

Figure 1

Subsidies for the German Hard Coal Mining Industry

1958 to 2005; bn €



Sources: Storchmann 2005; BMF, several years.

Against this backdrop, the current article discusses the pros and cons of hard coal subsidization, mainly concentrating on the example of Germany. From a social welfare perspective, none of the arguments raised in favor of further subsidization is convincing. In line with the International Energy Agency (IEA 2002: 72), we therefore recommend the rapid abolition of this most significant single subsidy in Germany, where it currently seems likely that subsidies will be extended well into the next decade and even beyond – despite the fact that domestic production costs are dramatically higher than the price of imported hard coal (Figure 2) and that it is very unlikely that the German coal industry would become competitive even if world market prices were to rise due to an increase of global demand for coal (Heilemann, Hillebrand 1992: 154).

Our analysis commences with a description of the hard coal market in OECD Europe and its competitiveness with the international hard coal market (Section 2). Section 3 is devoted to the frequently employed argument of energy supply security. In Sections 4 and 5, we balance the economic and environmental costs and benefits of subsidies for domestic hard coal production. Section 6 examines the social consequences of discontinuing coal production. In the last section, we draw our conclusions.

2. Hard Coal Production in Europe

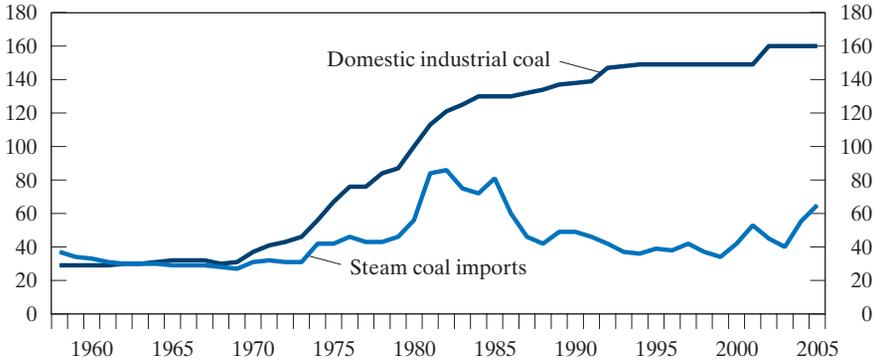
In 2005, hard coal was produced in ten European OECD countries, with five countries being only of minor importance². With a production of almost

² Belgium and France produced merely small amounts from recovered slurries, while the production of Norway, Turkey, and Italy is usually between 0.1 and 3 mill. t (IEA 2006: I.5).

Figure 2

Widening Gap between Prices for German and Imported Steam Coal

1958 to 2005; €/t of coal equivalents



Source: VdKI 2005:78.

26 mill. t in 2005 (Coal Statistics 2006), Germany was the second largest producing country, being only topped by Poland, whose production amounted to about 100 mill. t (IEA 2006: I.5). While some of these OECD countries, most notably Germany, spend huge amounts of money on hard coal subsidization, other countries, above all the United Kingdom and Czech Republic, operate without significant government support (IEA 2006: I.5). The reason is that, unlike the situation in Germany, production costs are close to the world market price, particularly in the UK (IEA 2003: I.208). In fact, the UK records by far the lowest and declining cost levels over time (Radetzki 1995b: 517).

The importance of hard coal has steadily declined in Europe over the past decades. In Germany, for instance, demand for hard coal fell from about 106 mill. t in 1973 (IEA 2003: I.107) to just below 68 mill. t in 2004 (IEA 2006: II.166). Almost exclusively, this decrease in demand was driven by the decline in coking coal (IEA 2006: II.166) – a high-quality coal grade needed for producing the coke that is essential for steel production. In the UK, the decline in hard coal consumption was even more pronounced than in Germany. In 2004, the UK's consumption of hard coal was only about half of the 120 mill. t used in 1978, primarily caused by the decline in steam coal consumption of electricity producers (IEA 2006: II.232). In OECD Europe as a whole, hard coal consumption shrank some 25% to roughly 382 mill. t in 2004 (IEA 2006: III.59).

Even stronger than the decrease in consumption was the decline in production: Between 1978 and 2004, total hard coal production in OECD Europe fell by some 60%, from 483 to about 187 mill. t (IEA 2006: II.56). As a result, the import share of these OECD countries has increased from 5% to 51%. The

most important reason for this much stronger dependency on imports is the lacking competitiveness of European hard coal production. In Germany, for example, the cost of domestic coal production has been more than three times the import price of steam coal for decades (Figure 2; Radetzki 1995b: 517). This cost discrepancy is due to the fact that virtually all the coal produced in countries such as Colombia, Indonesia, and Venezuela comes from large-scale low-cost open-cast mining operations, rather than pit mines as in Europe. Open-cast mines also account for some 80% of Australian coal and about 60% of the coal produced in the USA. This is why these countries are able to reach a productivity of up to 16,000 tonnes per employee per year (Schiffer, Kopal 2005: 173). In Europe, where mining conditions are generally much more difficult, productivity only reaches about 5% of this figure. The considerably lower cost makes overseas coal much more attractive to customers than coal from Europe, and especially from Germany.

3. Energy Policy: Security of Supply

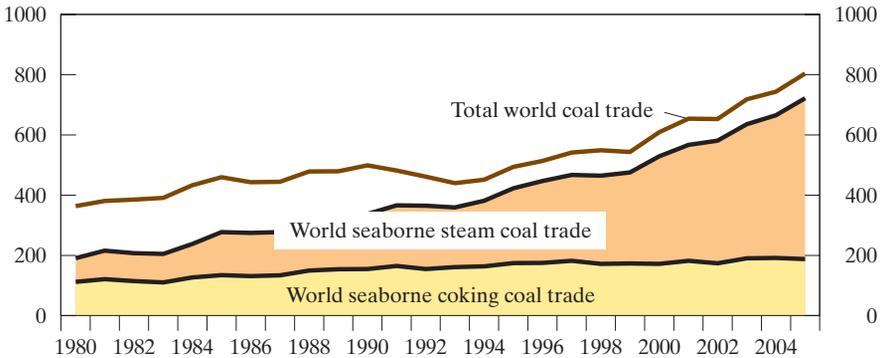
Security of supply is among the most cited arguments raised against the abolition of hard coal subsidies in EU countries such as Spain and Germany (IEA 2002: 70). Yet, when the issue of supply security is emphasized by those defending continued subsidization, they typically ignore that the situation in the European power generation sectors – responsible for as much as 81% of hard coal use in OECD Europe in 2004 (IEA 2006: II.59) – has significantly changed since their liberalization, which was initiated by the EU in 1998. As a consequence of liberalization, ascertaining secure energy and raw material supplies has now become the responsibility of the *private industry*, rather than that of the national *governments*. This shift in responsibility is in perfect accord with the governments' diminished influence on the power generation sectors. To an even greater extent than in the past, it is thus the private interest of power generators to use long-term contracts and other measures to avoid any supply scarcities; otherwise, their profit would shrink.

The situation in power generation is now similar to that in other sectors of industry, such as the copper and aluminum production, where it is the sole responsibility of the firms to secure their production inputs. In the chemical industry, for example, companies have always been responsible for obtaining adequate quantities of naphtha, one of their main raw materials. Meanwhile, it has also become normal practice for power generators to bear the price and quantity risks pertaining to the procurement of their major inputs, such as natural gas and coal. German power generators, for instance, increasingly purchase imported hard coal from a variety of countries, mainly from the Non-OECD countries Colombia, South Africa, and Russia, as well as from OECD countries such as Australia, Poland, and the U.S. (IEA 2006: II.168).

Figure 3

World Hard Coal Trade

1980 to 2005; Mill. t

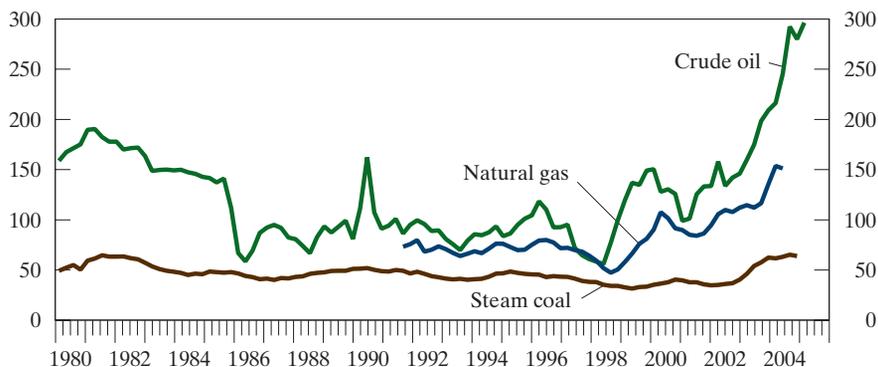


Sources: IEA Statistics 2004, 2006; VdKI 2006.

Short-term bottlenecks can be – and usually are – accommodated by privately organized stockpiling of imported coal. Thus, security of supply can clearly be ensured much more efficiently than by cost-intensive subsidies for domestically produced coal. Most importantly, over the long term, there has been a significant improvement in the supply situation, as global trade in hard coal has been growing substantially in recent decades. Since 1990, the seaborne trade in hard coal has doubled; the increase since 1975 has been almost sixfold. The total amount of globally traded coal, including coal carried by land, has quadrupled between 1975 and 2005 (Schiffer, Kopal 2005: 172; VdKI 2006: 2). Over the past 15 years, traditional coal exporters such as Australia, Canada, Poland, and the U.S. have been joined by many other countries, most notably China, Russia, Colombia, Indonesia, and Venezuela (Schiffer, Kopal 2005: 173).

The increase in hard coal trading has even accelerated between 2003 and 2005: world trading surged by about 20%, i.e. by 134, to 804 mill. t (VdKI 2006: 2). That is, within only two years, world market growth might have easily replaced Poland's current hard coal production of roughly 100 mill. t. Compared with these volumes, the quantities of coal produced in Germany and Spain were virtually insignificant. At about 26 mill. t in 2005, German hard coal production only corresponded to about 3% of the total quantity traded globally, while Spain's production of about 8 mill. t is even less significant (IEA 2006: I.34). Given the strong capacity expansion in several countries, particularly in Indonesia and Russia, world production capacity and, hence, global trade can well be expected to grow considerably in the future (Kopal 2006: 72).

Figure 4
Comparison of Oil, Gas and Steam Coal Prices
 1980 to 2005; \$/t of coal equivalents



Sources: IEA 2005, 2006.

Some observers currently raise particular concerns about the shrinking exports of China, the world's largest hard coal producer, whose production share was higher than 40% in 2004 (IEA 2006: I.4). Since 2003, China's steam coal exports sank by 18%, from about 80 to approximately 66 mill. t in 2005 (IEA 2006: III.19). Chinese coking coal exports were even more reduced, from slightly more than 15 to 6 mill. t (IEA 2006: III.18), a decrease of 61%. Yet, as Figure 3 demonstrates, higher levels of exports by Australia, Colombia, Russia, Indonesia, and the U.S. have been more than sufficient to offset the shortfall in Chinese exports in recent years (VdKI 2006: 55). After all, reduced exports of China had hardly any impact on Europe's import volumes³, but on world market and import prices. Yet, the volatility of import prices for steam coal is significantly less pronounced than for other fuels such as oil or natural gas (IEA 2006: I.18; Figure 4).

In sum, while raw material markets are well-known for cyclical fluctuations (Kopal 2006: 72), electricity generators, as well as steel producers, can avoid short-term bottlenecks by stockpiling imported coal, which is a much more efficient way of achieving supply security than by subsidizing the domestic production of hard coal, while a growing world market offers a reasonable long-term supply security (IEA 2002: 70). The International Energy Agency therefore concludes that ensuring energy supply security is not a strong basis

³ OECD countries in Europe have not been affected by this dramatic drop, as they usually do not import Chinese coking coal (IEA 2006: III.18). Similarly, steam coal imports from China have always been heavily fluctuating around low levels of several hundred thousand tonnes in Germany, France, Spain, and the UK, once again reaching only very low levels in 2005 (IEA 2006: III.19).

for continuing German hard coal production, since the risk of a persistent interruption of supplies can be regarded as minimal (IEA 2002: 71).

4. Economic Effects of Subsidized Hard Coal Mining

Any analysis of the economic effects of hard coal subsidies must depart from recognizing that there is no *genuine* demand for German hard coal. The reason is that domestic power generators as well as steel producers can purchase hard coal on the fast-growing world market, while today hardly any coal is used for heating by private consumers. Therefore, any decision to reduce or even discontinue hard coal production would have virtually no effect on the activities of German power and steel companies and their demand for labor. Subsidies for the coal industry therefore simply degenerate to a program of job provision in the public sector, bearing all the negative consequences of this type of active labor market policy (Schmidt et al. 2001; Jacobi, Kluve 2006; Kluve 2006).

For a comprehensive assessment of subsidies, one has to take financing aspects into account. After all, the use of public funds requires that they are collected from the taxpayer first. Yet, the question of financing is frequently neglected. This is all the more important, since subsidies are often a significant contributor to an increase in public debts. Germany seems to be an outstanding example, where an accelerated reduction of hard coal subsidies would help to mitigate current severe public deficits. Public debts of the federal state reached a level of about € 888 bill. by 2005 (BWpV 2006). The contribution of hard coal subsidies to the increase in public debts since 1990 amounts to almost € 74 bill. Reducing public deficits thus appears to be a particularly promising alternative to hard coal subsidization in Germany.

In this context, a superficially plausible argument frequently put forward in support of subsidies is that the increased income and consumption tax revenues, which are the consequences of the impetus evoked by the subsidies, in turn lower the government's net support⁴. However, a comprehensive account of public resource flows would also include a variety of services provided by the government to the mining industry, such as the maintenance of infrastructure, to the extent that they benefit the subsidized sector. Not counting these services, but including the tax revenues would thus be distorting the record. If these services were contrasted with the additional tax revenues, though, the result would likely tilt even more against the German coal mining industry, as these subsidies were granted to compensate for its poor economic performance, not as a premium for its achievements.

⁴ This kind of argument is also employed in favor of the support of other commodities such as biofuels, for instance, which are not competitive to conventional fuels and thus are supported in many EU countries by reductions and exemptions from mineral oil taxes (Frondel, Peters 2006).

Another typical justification of public subsidies is that they tend to induce so-called Leontief multiplier effects. In addition to the immediate impact on the subsidized sector, so the argument goes, there is also an indirect impetus in sectors with close economic ties to the subsidized industry (Raa 2005). Based on the interconnections between different sectors of industry, which are typically captured by input-output analyses, such Leontief multiplier effects reflect the fact that upstream sectors usually provide significant input to the added value generated by the subsidized sector, whose output, on the other side, triggers added value in downstream sectors. After all, however, (gross) multiplier effects are even created in the classical example of wasting public funds, the tearing up of a perfectly intact road in order to rebuild and pave it again. This type of project would also call for inputs of up-stream sectors and employs workers who use their wages to buy food and other goods and services, but it is easy to agree that there could not be any genuine added value.

Furthermore, it would be more than naïve to report any such multiplier effects without raising the question of opportunity costs. Specifically, one needs to ask what alternative multiplier effects are not realized, because the public funds are allocated to the subsidized sector and not to some other use. If the counterfactual alternatives – contrasting what level of economic activity we do observe and what we would have seen, had the government spent the taxpayers' money more wisely – command higher multiplier effects, the net effect of the subsidy is negative. Clearly, it is always easier to defend a *status quo* than to make the case for a counterfactual alternative situation, with lower or even without any subsidized hard coal production.

Yet, not explicitly constructing an assessment of the counterfactual situation, where it is always necessary to invoke assumptions about the market results in alternative circumstances⁵, for instance about the miners' alternative employment prospects, does not mean avoiding the question altogether: When the proponents of hard coal subsidies present multiplier effects as their assessment of the economic effects of hard coal subsidization, they implicitly assume that all economic agents involved automatically ceased any activity when subsidies were removed from the system. This is certainly the least convincing counterfactual one can think of. To the extent that economic activity was to emerge without hard coal subsidies, the public subsidies would crowd out private action, and public funds would simply be wasted.

Given that the large-scale reduction of government interventions into the market economy is not a viable political alternative, the most important aspect in the discussion of the hard coal subsidies' net effects is the crowding-out of possible alternatives: The subsidies currently granted to the hard coal industry

⁵ For an extensive discussion of the fundamental evaluation problem and potential evaluation approaches in environmental contexts, see Frondel, Schmidt 2005.

might be used in other sectors, potentially creating substantial value added there and therefore improving social welfare. This crowding-out of alternative investments is often ignored when the economic impact of subsidies is evaluated. Investments in traffic infrastructure, education, as well as research and development regarding future energy technologies, particularly improving the efficiency of coal-fired power stations and the removal of carbon dioxide from power station flue gases, can be certainly expected to yield much higher (gross) benefits than hard coal subsidies. Given the large reserves of lignite, such technologies are of crucial importance for the power generation industry in the future and for the reduction of Germany's greenhouse gas emissions.

More generally, only those alternative investments that unleash the creative and economic potential of a country may substantially enhance future economic performance and increase future employment prospects and, hence, create genuine value added. Investments and subsidies that are not found to meet this objective, however, should be abolished as soon as possible. For this reason, as a general principle, subsidies are to be granted only for a limited time. In case of the German hard coal industry, however, there are no prospects whatsoever that it could become profitable within a foreseeable period of time. On the one hand, these subsidies merely ensure the continued existence of this industry, thereby reinforcing obsolete structures. In addition, they impede structural change of companies in upstream sectors by reducing their incentives to develop to the point where survival is possible under market conditions. On the other hand, the continued support for coal subsidies significantly weakens the chances for supporting promising, future-oriented projects, as governments commonly do not have unlimited funds at their disposal.

An often repeated argument in this context is that subsidies and the continuation of German mining operations are essential in order to ensure export prospects for leading-edge mining technology from Germany. The questions we ought to be asking, though, are, first, why such a successful, but highly specialized, activity is not subsidized directly and only for a limited period of time and, second, why companies cannot find opportunities to test their technology in the mines of potential customers located in other countries. In addition, it seems to be very unlikely that all these companies and employees would fall idle if subsidies for the German coal industry were discontinued.

In sum, when the public sector hands out funds, they can be spent more or less wisely. If they are spent in a way that enhances future economic potential substantially, chances are high that net social welfare is improved by the whole operation. In the case of a large-scale job provision program, though, that supports the continued production of a good, such as domestic hard coal, for which no genuine demand exists, any hope for positive net effects seems highly

questionable. In the next section, we argue that the continuation of the hard coal subsidy policy results in significant environmental damages. Thus, even the subsidies' gross effects, not only the net effects, are likely to be negative.

5. Environmental Consequences of Hard Coal Production

If hard coal production was to be entirely halted today, it would be possible to avoid large quantities of greenhouse gas emissions, particularly methane, which is about 21 times more harmful than carbon dioxide (CO₂) in warming the planet. Methane is released from coal seams that are exposed to air, as frequently happens during mining. It is a hazard in underground mines and must be vented in order to prevent explosions. Methane emission rates from hard coal mines in Europe are generally 50% to 100% greater than those in the major exporting countries (Steenblik, Coronayannakis 1995: 547). Hence, substituting imported coal for European hard coal upon closing down mines could not only make a considerable contribution to meeting the European climate targets of the Kyoto Protocol, but would indeed reduce overall greenhouse gas output in the world.

The CO₂ emissions of the German hard coal mining sector, for instance, amounted to 2.7 mill. t in 2002. Within the bunch of voluntary commitments to climate protection offered by the German industries, it is the declared aim of this industry to reduce its annual CO₂ emissions to 2.3 mill. t by 2012 (RWI Essen 2006: 211). Hence, if production were to be discontinued in 2012, it would be possible to avoid more than 2 mill. t of CO₂ emissions per year, not to mention the methane emissions that may also be saved: Abstaining from the foreseen production of 16 mill. t in 2012 would allow for avoiding roughly 250,000 t of methane per year, given the methane emissions rate of 15,230 tonnes per mill. t coal provided by Steenblik and Coronayannakis (1995: 548). Based on the global warming factor of 21, this would mean an additional annual greenhouse gas reduction of more than 5 mill. t CO₂ equivalents. In other words, abandoning German hard coal production would yield much larger greenhouse gas emission reductions than is required by the first German national allocation plan and almost half of the requirements set by the second plan. These plans demand an annual CO₂ emission reduction target of 2 mill. t in the period 2005 to 2007 for those industries involved in the emissions trading system and of 15 mill. t in the period 2008 to 2012 (EID 2006: 19).

Moreover, as a result of the artificial extension of hard coal mining in Germany, attention is increasingly focusing on other environmental damages, such as the potential contamination of aquifers, and substantial damages of private buildings due to earthquakes originating from mining. There is anecdotal evidence that some of those areas affected by current or former

mining suffer from more than one hundred earthquakes a year. The consequence of these damages, inducing instability and potential destruction of private houses, is confirmed by the large number of people who are organized in initiatives because they are directly and strongly affected by coal mining. If coal mining continues, these damages will become even more pronounced.

In sum, the continuation of subsidies for hard coal mining is therefore not only dispensable with respect to ascertaining energy security, and not only highly questionable as an instrument to provide economic stimulus, it is even harmful. Hard coal mining causes significant environmental and individual damages, be it partial or complete destruction of houses or be it losses in the value of buildings and properties, and, hence, even the subsidies' gross effects are likely to be negative when these damages were to be included in the quantitative assessments.

6. Social Consequences of Dismantling Hard Coal Production

Based on the status quo, a final major argument often used against dismantling subsidies for the German hard coal industry is that the people employed in that industry would most likely become unemployed without exception. As those employed in the mining industry are said to be very well trained, their prospects on the labor market ought to be comparatively bright, however. In fact, unemployment in Germany is largely a problem associated with a lack of training and marketable skills (e.g. Schmidt et al. 2001). Thus, it appears to be unlikely that all employees occupied by the hard coal mining industry would remain unemployed for a long time after the closure of the last of the currently 8 operating mines.

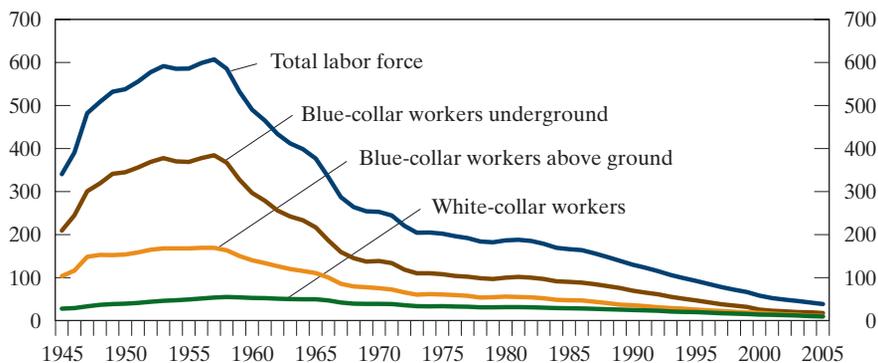
In addition, it is difficult to imagine that the integration of the present mining workforce into the unsubsidized labor market would pose such a severe challenge, when their number is compared with the redundancies that have occurred in the past (Figure 5). By the end of 2005, the number of employees directly involved in the German hard coal mining industry was about 38 500 (Coal Statistics 2006). Compared to the mining workforce in the 1960s and 1970s, when several hundred thousands of employees belonged to this industry, this figure is relatively small. In fact, reducing the industry's workforce by a similar number of employees was achieved in those decades within a couple of years. Relative to the total number of unemployed people in Germany, averaging more than 4.8 mill. in 2005 (Destatis 2006), this figure is also rather negligible. Furthermore, in the worst case scenario that all of the 38 500 employees were to become unemployed, the unemployment rate of 11.6% in 2005 would have risen by 0.09 percentage points.

To specifically mitigate social disruptions, it would be more efficient if the employees of the hard coal mining sector were supported directly (IEA 2002: 72),

Figure 5

Number of Employees in the German Hard Coal Mining Industry

1945 to 2005; 1000



Source: Coal Statistics 2006.

for example in the form of transitional benefits for a limited time, combined with incentives to quickly switch to a new job. Payments could also ensure additional training for people with problems on the labor market. The funds required for this purpose would only be a fraction of the cost of continued coal subsidies, since subsidies, when expressed on a per mine employee basis, are several times the average wage per miner (Anderson 1995: 485, 495). Finally, domestic hard coal production would not cease suddenly, from one day to the next, but would last at least until 2008, currently the last year for which subsidies are already legally guaranteed. Thus, both the employees affected as well as the related up-stream sectors would have sufficient time to search for alternative employment.

7. Summary and Conclusions

Year after year, billions of euros are spent for hard coal subsidies in Europe, most notably in Germany, where these subsidies currently amount to about € 2.6 bill. (EC 2006b). While hard coal is still produced in several OECD countries in Europe, for instance in Spain, Great Britain, and France, it was Germany that granted by far the highest subsidy per tonne of coal among these countries in the last decade of the twentieth century (IEA 2002: 68). Without these subsidies, hard coal production in Europe would not be competitive due to geological disadvantages. Although production damages buildings and contributes to a range of environmental problems, most notably via the emission of greenhouse gases, and directs scarce resources from more competitive, forward-looking sectors of the economy to obsolete structures, thereby exacerbating public deficits, the German government is miraculously

considering to continue subsidizing domestic hard coal production for more than another decade, implying that new coal fields have to be opened and additional permanent cost are induced due to the necessity to pump down ground water.

This article has identified a number of key arguments that are repeatedly put forward in favor of hard coal subsidies. These arguments, which are frequently employed for the subsidization of other commodities such as biofuels as well, are anything but well-founded. As a general rule, almost all of these arguments nurture economic fears and anxieties held by the general public.

The first line of arguments rests on the security of energy supply, raising concerns about a growing dependence on imports of increasingly scarce raw materials. Of course, at times when energy and raw material prices are high, energy security arguments find particularly high acceptance. While raw material markets are well-known for cyclical developments with alternating high- and low-price phases, one has to recognize that the situation in the European power generation sectors – responsible for as much as 81 % of hard coal use in OECD Europe in 2004 (IEA 2006: II.59) – has significantly changed since the liberalization of European power markets initiated by the EU in 1998. As a consequence, the security of energy supplies has now become the responsibility of the private power industry, rather than national governments. To avoid short-term bottlenecks, electricity generators, as well as steel producers, can store imported coal, ensuring a much more efficient supply security than by subsidizing hard coal, while a growing world market offers a reasonable long-term supply security (IEA 2002: 70).

A second line of arguments refers to the cost and benefits of subsidies. It is generally argued that subsidies initiate multiplier effects, conserving not only jobs in the subsidized sector but also creating substantial employment effects and value added in up- and downstream sectors. Furthermore, it is a popular general argument of proponents and recipients of subsidies that the direct and indirect impetus evoked by subsidies lower the government's net support due to additional income and consumption tax revenues originating from the subsidized as well as related sectors.

Yet, we have highlighted the importance of considering counterfactual situations, rather than only the status quo, and argue that, if hard coal funds, which represent the largest individual subsidy in Germany, were to be discontinued, there would be significant additional scope for future-oriented policies. The tremendous amount of more than € 130 bill. that has been employed for hard coal funds over the past fifty years could have been used to a much greater benefit elsewhere, for example for education as well as research and development of future energy technologies. Indeed, such expenditures of public funds would have likely generated much larger multiplier effects than those

from hard coal subsidization. In addition, it would be less harmful for the environment if hard coal production was to be abolished as soon as possible (Heilemann, Hillebrand 1992: 155). Above all, greenhouse gas emissions might be reduced by more than 7 mill. t of CO₂ equivalents per year – almost half of the German burden set for the second period of the EU emissions trading system (2008–2012).

The third line of arguments stokes anxieties about a further growth in unemployment, as mass redundancies are threatened if coal subsidies are abolished. To specifically mitigate social disruptions, it would be more efficient if the workers currently employed in the subsidized hard coal mining sector were supported directly, for example in the form of transitional benefits for a limited time, combined with incentives to quickly switch to a new job. Payments could also ensure additional training for people with problems on the labor market. The funds required for this purpose would be only a fraction of the cost of continued coal subsidies.

These considerations have clearly shown that there are no convincing arguments whatsoever for the continuation of hard coal subsidies in Europe and particularly in Germany. Politicians would be well advised to rapidly abolish these subsidies and set a clear deadline for this abolition, as was recommended by the International Energy Agency (IEA 2002: 72). As a consequence, it would become easier to, first, argue for the necessary discontinuation of other subsidies and tax concessions and, second, reduce public deficits, whose level has been criticized by the European Commission for several consecutive years. Ultimately, it would be fundamentally inconsistent if the European Commission was to punish Germany for exceeding public deficit thresholds, while simultaneously accepting substantial subsidization of hard coal production, which has bleak prospects in whole Europe, but particularly in Germany.

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