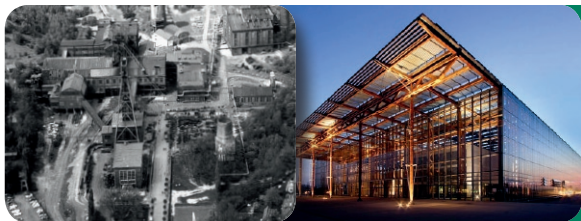


Coal 2015



Acting responsibly.
Creating new perspectives.



German Coal Association

Title

The Mont-Cenis colliery in Herne was closed in 1978. On the former mine site the so-called city district park was developed in an oval shape and includes the advanced training academy of the North Rhine-Westfalian Land government and an energy park producing electricity and heat from mine gas and solar energy.

German Coal Association

Coal Annual Report **2015**

(Excerpt)

Foreword



The closure of Auguste Victoria colliery at the end of the year will leave North Rhine-Westphalia with just two coal mines in operation. This will be the last closure before subsidised mining in Germany is finally brought to a close at the end of 2018. It will also see Germany's mining workforce fall to below 10,000 in number for

the very first time. It is interesting to recall that when RAG was set up in 1969 it was responsible for more than fifty collieries and nearly 200,000 employees. And yet the coal industry has continued to meet its delivery commitments with absolute reliability. The figures confirm that the company has lived up to its part of the political agreement. Managing the industry downsizing process in a socially acceptable way while at the same time meeting the agreed delivery commitments has been a highly complicated business and its success was never a foregone conclusion.

The end of coal mining in Germany will herald-in the post-mining era and the coal industry leaves behind a number of 'eternity tasks' that will have to be managed in a reliable manner. One of the key undertakings will involve mine water management, which will mean handling the water that collects in the underground workings. This is of particular importance for the coalfield areas. We are therefore paying special attention to ensuring that these operations are carried out safely and reliably, as damage and disruption are to be avoided at all costs. Moreover, RAG's mine water plans for the Ruhr coalfield are essential for the successful completion of an important centennial project, namely the renaturation of the river Emscher.

In the Ruhr coalfield the mine dewatering plans are currently being worked out in detail, while in the Saar they are already at the approval stage. They will then be implemented on a step-by-step basis. This will enable us properly to meet our responsibilities towards man and the environment. During this process RAG will make the best possible use of in-house and

external expertise and the company also intends to have its mine water management plan monitored by an authoritative, national body of experts. This ongoing strategy will ensure that full attention is paid to the sensitivity of the population in general to the issue of water and to RAG's commitment in assuming responsibility for a sustainable approach to the long-term impact of the mining industry.

That is why the title of this year's Annual Report is 'Coal 2015 –Acting responsibly. Creating new perspectives.' And the responsibilities facing RAG are not confined to water management issues alone. Our Report outlines all kinds of ways in which the coal industry is already readying itself to deal responsibly with the post-mining era. This also includes payment provisions designed to take account of the fact that from 2019 on household coal allowances can no longer be serviced from indigenous production. A balanced solution to this issue has now been agreed with our social partners. The Report also presents the current situation of the German coal industry and discusses the national and international background conditions. This includes a review of the international commodity markets and an analysis of energy and climate policy, along with current developments in mine gas utilisation.

Now that we are three quarters of the way through the period from the coal policy agreement of 2007 to the final closure of the industry in 2018 it can be concluded that the German coal industry has successfully faced up to the challenges that this huge task entails. We now have to continue steadily along this path so that we can fulfil right to the end the responsibilities and commitments that we have towards our employees and partners and to the regions as a whole.

Herne, October 2015

A handwritten signature in blue ink that reads "Bernd Tönjes". The signature is written in a cursive, flowing style.

Bernd Tönjes
Chairman of the Executive Board
German Coal Association

Editorial

The German coal industry has been continuing systematically with the socially-responsible phase-out process that was politically mapped out for it. The next decisive step will be the closure of the tradition-steeped Auguste Victoria colliery at the turn of the year 2015/2016 and this year's Annual Report will therefore include a detailed history of Auguste Victoria as written by the mine's manager, Jürgen Kroker. This means that from the beginning of 2016 to the end of coal production at the end of 2018 Germany will only have two collieries in operation - Prosper-Haniel in Bottrop and Ibbenbüren. These two mines will be responsible for meeting the remaining production targets. The process of phasing out the coal industry is tied in with RAG's post-mining strategy that is geared towards sustainability. The company is already making preparations for the period after 2019 that will include all relevant social, economic and environmental factors. At present this is very much focused on the use of personnel-management tools for adjusting workforce numbers without the need for compulsory redundancies. Using the existing mining infrastructure for renewable-energy production as a contribution to regional structural change and the energy transition is also part of the future-oriented development of the coal-based business portfolio. It will also be important to maintain ongoing access to the industry's accumulated expertise and to ensure that a coal-mining memorial culture is properly preserved. The key issue will involve putting in place effective provisions to manage the long-term and eternal liabilities that the German coal industry will leave behind in the wake of its ultimate closure in 2018.

The core task for the post-mining era will be to deal with the 'eternity tasks', which primarily means permanent water management, that is to say pumping and draining water of disused collieries. The RAG Foundation that was set up in 2007 for this specific purpose will be responsible for funding this and other eternity tasks (groundwater purification and polder protection measures) from 2019 on.

Mine water management concepts

RAG laid down its long-term mine water management concepts for the German coalfields in 2014 and 2015. In Saarland, where coal mining ceased in mid-2012, the planning notification required for the licensing approval process was submitted in spring 2015. The object of all RAG mine water management plans is to ensure effective water management at all relevant sites, this to comprise a cautious

transition period of some 20 years – during which absolute priority will be afforded to protecting drinking water supplies and other environmental concerns – that will see the number of pumping stations reduced, pumping levels adapted to suit non-critical levels and various cost-saving technical changes introduced. In order to avert the potential threat of water pollution from underground residues a programme of regular sampling will be introduced as a precautionary measure aimed at identifying risk, checking estimates and, where necessary, revising the water management measures accordingly. Here top priority will be given to preventing damage to man and the environment.

This approach is also reflected in the way RAG deals with the question of whether the use of polychlorinated biphenyls (PCB), whose inclusion in lubricants for the underground coal industry was mandatory in the second half of the last century following the Marinelle incident in Belgium, has had an adverse effect on coal industry employees. After this issue was raised in the media in early 2015 RAG got together with various stakeholders to examine the question from today's perspective, based on current evidence of the potential health risk. Involving external and independent scientific experts it will be clarified whether and, if necessary, how the degree of exposure affecting underground workers is still detectable and should be assessed. This question should be answered as quickly as possible and the dedicated working group is now fully engaged in examining the different possibilities and reviewing the legal and factual practicability of the operation.

Social welfare developments

In the area of labour law and social legislation there has been a further continuation of the trend towards an expansion of social security benefits and greater regulation of employment legislation that marked the first year of the 'grand coalition'. The introduction of the 'pension at 63' regulation and the extended recognition of child-care periods, commonly referred to as 'mothers' pensions', will increase the cost of the statutory pensions insurance system. It is foreseeable that the financial reserves will continue to dwindle to the extent that it will in a few years time be necessary to raise the contribution rate. While a certain slowdown has been taking place as far as pensions policy is concerned, other social insurance areas are now increasingly coming into focus. This year has seen the adoption of the second and final stage of the extended nursing care insurance scheme, major parts of which will come into force

in early 2017. This second stage will see a redefinition of the concept of care dependency. In future, five levels of care will apply to the classification of care dependency and these will replace the existing three-tier system. This changeover will not only mean an increase in the contribution rate – the two stages of the reform package will together account for an additional burden of one half of a percentage point – but because of the transitional provisions and their extensive 'grandfathering clauses' will also result in a one-off charge of some 4.5 bn € to the long-term care insurance funds. The transition is to be financed from the funds' reserves, which will not be easy to achieve given that the system is already showing signs of being overstrained in the long term. These provisions at least have the merit that they are being used exclusively for nursing care insurance, thereby enabling the scheme to fulfil its remit. This is not the case with two proposed pieces of legislation that essentially affect health insurance. Both the Prevention Act and the Hospital Structure Act transfer to the health insurance providers financial responsibility for tasks that are intrinsically to be performed by society as a whole and therefore are to be funded by the taxpayer. The rerouting of 500 million € of contributions into the hospital services is not the right response to the fact that the federal states are not adequately performing their duty in respect of the investment financing of hospitals. The same applies to the use of contributions for the future co-funding of the Federal Office for Health Education, as the latter also carries out its duties for the whole of society.

In parallel with these social welfare measures we are also seeing employment legislation encroaching into entrepreneurial and wage policy decision making. A uniform minimum wage of 8.5 € per hour has basically been in effect since the beginning of 2015. Even in sectors such as the coal industry, where a minimum wage of this amount has already been collectively agreed or where an even higher level of pay is already generally in force, the companies concerned still have a duty to meet recording and documentation requirements. And despite some simplification of the system these procedures continue to affect employees who are in receipt of much higher rates of pay.

The law on gender-related quotas, which came into force in the summer, is a particular challenge for traditionally male-dominated sectors like the coal industry. This legislation requires coal industry companies covered by the coal and steel co-determination act to set themselves targets by 30 September 2015 for increasing the percentage of women

in managerial positions. The targets have to be drawn up for the Supervisory Board, the Management Board and the two tiers of management directly below. Political reasons dictate that the initial deadline for meeting these objectives must be no later than 30 June 2017 (i.e. within the present parliamentary term), after which a five-year cycle will apply. For the coal industry in particular it will be a real challenge to increase the percentage of female employees in management at a time when the workforce is undergoing a process of socially-responsible downsizing, as the number of women who can move up into a managerial role is relatively low in the overall workforce. It is therefore no surprise that the targets set for this particular branch of industry have initially met with a certain degree of reticence. In an era dominated by staff reductions it could in fact be rated as a success if the current quotas were to be maintained.

It is gratifying to see that in implementing the Mobility Directive the legislators have opted for a fairly restrictive approach in Germany so as not to burden the occupational pension provisions more than is necessary. As a result, the proposals contained in the Directive will basically be implemented on a one-to-one basis. The transposition of the EU Directive, which German companies and politicians too have fought against for so long, will obviously impose burdens on German businesses, though no further provisions have been added when transposing these arrangements into national law. It is equally satisfying to see politicians taking steps towards a real strengthening of collective bargaining autonomy (in contrast to the bargaining autonomy enforcement law) by way of the law on tariff uniformity. The latter essentially enshrines in law the principle of 'one business – one collective agreement'. By this means the legislators are taking into account the responsible behaviour of the social partners and are paving the way for stable and sustainable tariff solutions from the viewpoint of the company and workforce. It is to be hoped that this law can withstand a constitutional examination in Karlsruhe.

Energy policy

One issue of direct significance for the domestic coal mining industry was Germany's 2015 candidacy for the international 'Extractive Industries Transparency Initiative' (EITI). This initiative aims to create globally valid transparency standards for the financial interrelationships that exist between the state and the mining sector. In view of the large degree of transparency that already exists when it comes to coal industry subsidies, and the commitment to cease coal

production in Germany at the end of 2018, the indigenous coal industry will not however be particularly affected by any future EITI reporting. Nevertheless, the coal companies are required to present all the tax payments that are triggered as a result of mining activities. These are certainly substantial. In the course of the discussions about a subsidised coal industry it was repeatedly pointed out that the subsidies are much lower when considered as 'net'.

The phasing-out of indigenous coal mining means that the industry is set to lose its significance for the energy sector. By 2019 Germany will be totally reliant on imports to meet its coal needs. Coal as a fuel (both domestically produced and imported) has managed to hold on to third spot in the national energy mix in terms of both primary energy consumption (behind oil and gas) and electricity production (behind renewables and lignite). The structure of the German energy industry is gradually changing with the advent of the energy transition. One clear indication of this is that in 2014 total renewables-based electricity production, which has been heavily subsidised by the EEG (Renewable Energy Sources Act), was able to overtake lignite-based generation for the very first time. However, there is still a huge discrepancy between the enormous contingent stake that renewables have in electricity production capacity and the amount of power that is actually generated in Germany from sources of this type. This is a reflection of the fluctuating availability of renewable energy. Without the support of fossil fuels the energy transition will not succeed. Yet the environmental and energy policy framework for Germany and Europe as a whole is being increasingly shifted towards renewables without first ensuring a proper expansion of the transmission grid or the development of adequate storage capacity.

All this presents huge challenges for German energy policy in terms of the economic viability and reliability of energy supplies. Following the 2014 EEG Amendment and other measures aimed at stabilisation and cost containment the Federal Government is now meeting these challenges by applying greater systematisation to the targets laid down in the energy plan. In its 2014 progress report on the energy transition the Government proposed a new 'target architecture' whose key objectives, in addition to the security and competitiveness of energy supplies, include adherence to national greenhouse-gas emission reduction targets (which are quantified for several decades ahead) and to the scheduled withdrawal from nuclear energy by 2022. The expansion of renewables and improvements in energy efficiency are seen

as the key instruments for achieving these targets. However, the German Government has not yet fully implemented the EU Directive on energy efficiency. This apparent contradiction can be attributed to the overly bureaucratic provisions of the Directive, and indeed Germany is not alone in experiencing implementation problems in this area.

Another focal point has been the reorganisation of the German electricity market. To this effect broad-based technical discussions and public consultations have taken place on the basis of a green paper and subsequent white paper, with the German coal industry also taking part in these activities. The Federal Government ultimately decided against the option of introducing a capacity market system and in favour of the development and refinement of an 'energy only' market for the power generation sector, this to be linked to a series of 'no regret' measures (grid expansion, European integration, strengthening of CO₂ emission rights trading, etc.) and flanked by a limited capacity reserve designed to safeguard electricity supplies. There were also some tough negotiations around the 'climate contribution' to be made by the coal fired power stations. With this contribution the CO₂ emissions from the electricity generating sector – over and above the respective limitations already imposed by the European Emissions Trading Scheme – are to be further reduced at national level in addition to the commitments that Germany has previously made for the electricity industry. The industry and trade unions proposed alternative plans involving lower economic and energy costs.

The Land government of North Rhine-Westphalia and the IG BCE industrial union submitted an alternative concept whereby a number of older coal fired power stations would be assigned to a capacity reserve, for which they would receive appropriate compensation. On 2 July 2015, following top-level coalition talks, the German Economy Minister Sigmar Gabriel (SPD) declared that the climate levy had finally been settled. One element of the agreement was that some 2.7 GW of lignite fired generating capacity would gradually be transferred to a capacity reserve and then shut down after four years. The capacity reserve therefore acts as a safeguard for electricity market 2.0. In the words of Economy Minister Gabriel: '... this means that we are now closing our lignite fired stations, that is to say instead of just a few operating hours less we shall actually be shutting down entire generating units.' As a new electricity market design has been agreed, this essentially constitutes a belt-and-braces approach.

The debate on a rearrangement of the German electricity market has therefore been concluded for the time being. Given the approach signalled by the Federal Government there now only remains for the electricity market to be 'upgraded' and supplemented by a reserve on a transitional basis. Depending on the way in which the compromise is ultimately delivered this reserve could easily be much higher than the current 'winter reserve' conceived by the Federal Network Agency. According to Economy Minister Gabriel the Federal Government would now have to discuss and take a positive decision on increasing the financial support for cogeneration (CHP) so that an additional element in the referred-to alternative proposal can be put into practice. This would result in older coal fired CHP stations being replaced by similar gas fired plant. The coal industry is generally critical of the lack of fuel neutrality in Minister Gabriel's proposal. Even if Germany is no longer producing coal of its own the availability of imported fuel makes for a very reasonably priced product that in terms of cost could help contribute towards a successful energy transition.

It is evident that the cost of the energy transition process is being increasingly overlooked. The dominance of opinions and sentiments in the decision-making process is continuously on the rise, and not just in Germany but in Brussels and in the G7 countries too. Non-governmental organisations (NGOs) are fuelling the debate and are claiming to represent organised civil society. A number of opinion-shaping journalists ('alpha journalists') are disseminating their own ideology and are attempting to turn this into the opinion of civil society. However, a closer look at the funding of NGOs shows that there is a dependency factor at work here and that the European Commission in particular finances non-governmental organisations through its budget and can then call on these groups when circumstances dictate.

As these organisations evidently harbour a certain level of scepticism towards the success of the world climate policy they are now increasingly turning their attention to the theme of air pollution control and are now one-sidedly blaming coal for the poor quality of the air in those countries that do not yet apply the same standards as in Germany. It is correct to say that using coal to provide heat energy from small-sized boiler plant is often a significant contributor of pollutant emissions. Modern thermal power stations could provide a remedy to this problem. This applies not only to far-off countries like China but also to our neighbour Poland. However, it is completely inaccurate to say that in Germany

coal fired power stations are contributing significantly to the generation of noxious air pollutants. In actual fact road traffic is by far and away the main source, while the latest research also indicates that agriculture is also largely responsible for emissions of this kind.

The European Commission itself could make the debate more objective, for example by referring to the body of data currently held by the European Environment Agency. Similarly, the German Government could also avail itself of the knowledge and expertise of the Federal Environment Agency. The latter does of itself not produce findings likely to exonerate coal in the context of the general environmental debate. An objective approach based on data and facts should be part of a sustainable agreement on the climate contribution to be made by coal fired power plant.

Against such a background the use of coal, especially for electricity production, finds itself faced with huge challenges. Yet this also opens up new vistas, including the intensified use of coal as a processing material. In the energy sector, moreover, modern, flexible and efficient coal fired power stations can make an important contribution to the energy transition, as coal enjoys significant advantages over gas when it comes to security and pricing, while the coal fired generators are also benefitting from the technological advances being made in the field of climate protection. The maxim must therefore be: greater efficiency, an expansion of the CHP sector and CO₂ capture and use. CO₂ and regeneratively produced hydrogen can be used to manufacture methanol and synthetic diesel fuel and this would at the same time help involve the transport sector in the energy transition process.

Seeing carbon dioxide not as waste but as a reusable material is therefore one of the programmes being funded by the Federal Ministry of Education and Research. As part of the funding initiative 'Technologies for sustainability and climate protection – chemical processes and material use of CO₂' a number of supported projects have already demonstrated some initial success, including – as mentioned above – transforming water and CO₂ into high-purity, sulphur-free, synthetic diesel fuel in a power-to-liquids demonstration rig in Dresden. The Essen-based company STEAG GmbH is also involved in the ongoing development of power-to-liquids technology at one of its coal fired power stations. It is now working with international partners to produce methanol using CO₂ emissions obtained from the plant.

The German energy transition could still prove to be a success, but it has already demonstrated a number of shortcomings and has unduly neglected a number of important economic and social factors. The IG BCE and many energy-sector players (including the coal industry) as well as energy-intensive industries have indicated as much this year in their information campaign 'Working together for the good of all'.

In June 2015 the Land government of North Rhine-Westphalia passed the first climate protection plan for NRW and presented it to the state parliament. The climate protection measures and strategies for adapting to climate change that are contained in this plan are aimed at achieving the targets laid down in the Climate Protection Law that was adopted in 2013 (reduction of greenhouse-gas emissions by at least 25% by 2020 and by at least 80% by 2050 – in both cases using the reference year 1990). Industrial associations and environmental bodies, churches and trade unions and many other social groups had already given their comments on the draft text and many of their suggestions were subsequently adopted. Finally, in all its climate protection efforts the Land government will continue to bear in mind the special role that North Rhine-Westphalia plays as an industrial region.

World markets and global climate

Over the course of the year coal has come under increasing pressure on the international markets. With more than adequate capacity available, and with demand at a relatively low level worldwide, prices on the international steam coal and coking coal markets have fallen sharply. Maritime freight rates for bulk goods have suffered similarly, with prices having practically halved within a period of six months.

World coal production in 2014 remained fairly steady at some 7.2 bn t. However production levels varied considerably from country to country, with China recording a 2% fall in output as a result of economic and regulatory factors.

In addition to actual coal production, the use of coal for electricity generation has also been coming under increased criticism internationally and, more particularly, in the run up to the next UN Climate Change Conference that is to take place in Paris from 30 November to 11 December 2015.

The heads of leading European gas and oil companies have launched their own climate policy initiative by declaring themselves in favour of a worldwide CO₂ pricing system, though their actions were clearly also aimed at raising the

competition stakes against their rival fuel, coal. It should therefore come as no surprise that the American oil giants ExxonMobil and Chevron refused to put their signature to it. In the USA gas is able to compete with coal. It could also be said that Europe does not need higher CO₂ prices but rather lower gas prices. Experts firmly expect that the shale-gas boom in the USA will be long-lasting and that cheap liquid gas will be available in Europe some time soon. By then, if not before, we will not be hearing any more statements to the effect that the European gas industry is not proving to be price competitive in the power generation sector.

At governmental level the G7 Summit in June this year agreed on short- to medium-term measures for mitigating anthropogenic climate change and on the target of '100% renewables' in global electricity production by the end of this century at the latest, though the meeting failed to produce any concrete resolutions to this effect. The International Energy Agency (IEA) in Paris believes that we are off course when it comes to achieving the 'two degree target' – that is to say limiting the increase in the average global temperature to a maximum of 2 °C compared with preindustrial levels – and immediately after the G7 Summit proceeded to draw up its own package of climate-policy measures, which were particularly directed against coal. However, the oil and gas industries were also sharply criticised and were called on to reduce their methane emissions, which have a much greater equivalent impact on the climate than CO₂.

In order to achieve the two-degree goal, according to the UK think-tank Carbon Tracker, four fifths of the fossil fuel resources currently rated as economically recoverable should be left in the ground. This proposition triggered an international debate on the possible bursting of a 'carbon bubble' and raised more fears about the impact this would have on the global economy. However, as the reserves in question are not accounted for completely in the balance sheets, this warning is somewhat overblown. While the German Federal Government wants to see a careful assessment of this question, the German banking supervisory authority does not as yet anticipate any increased risk to financial stability as a result of a sudden depreciation of financial assets in the fossil fuel sector. International investors such as the Norwegian sovereign wealth fund are at any rate seeking to get out of the coal business, although holdings in the oil and gas sectors would also be affected. While a number of major international development banks now want to reduce the funding of coal-related projects quite significantly, the

German Reconstruction Credit Institute, for example, is giving a high priority to the funding of the latest coal utilisation technologies, as these can deliver higher efficiency rates and thus have a huge potential for saving on CO₂ emissions.

Coal must remain part of the solution to the global climate problem. As the only fuel readily and cheaply available on a worldwide basis coal is ideally placed to support the transition to the renewable-energy era.

Statistics

World primary energy consumption

year	nuclear energy	non-renewable energies			renewable energies		total
		coal and lignite	mineral oil	natural gas	hydro	other fuels	
1970	28	2,277	3,262	1,326	146	827	7,866
1980	247	2,724	4,320	1,853	206	1,066	10,416
1990	738	3,205	4,477	2,525	271	1,420	12,636
2000	955	3,123	5,005	3,091	329	1,534	14,037
2005	1,031	4,191	5,488	3,522	379	1,960	16,571
2010	1,028	4,968	5,882	3,918	422	1,986	18,204
2011	964	5,395	5,876	3,985	429	2,041	18,690
2012	918	5,547	5,997	4,067	452	2,125	19,106
2013 ¹	945	5,640	6,178	4,231	484	2,219	19,697
2014 ¹	974	5,691	6,227	4,286	496	2,285	19,959
2020 ²	1,208	6,022	6,416	4,550	561	2,661	21,418
2040 ²	1,730	6,361	6,808	6,318	765	4,177	26,159

¹ estimated ² outlook

nuclear energy and renewables evaluated by efficiency method; incl. traditional energies

Sources: BP Statistical Review, 2015; WEC Germany, 2015

IEA New Policies Scenario, 2014

Global electricity generation

year	coal and lignite	nuclear energy	mineral oil	natural gas	hydro and others	total
	TWh					
1970	2,075	80	1,625	—	1,175	4,955
1980	3,163	714	1,661	976	1,802	8,316
1990	4,286	1,989	1,216	1,632	2,212	11,335
2000	5,759	2,407	1,402	2,664	2,968	15,200
2005	7,040	2,640	1,240	3,750	3,550	18,220
2010	8,685	2,756	1,000	4,760	4,207	21,408
2011	9,139	2,584	1,062	4,847	4,481	22,113
2012	9,204	2,461	1,144	5,104	4,808	22,721
2013 ¹	9,368	2,505	1,164	5,195	4,894	23,126
2014 ¹	9,490	2,583	1,124	5,294	5,153	23,644
2020 ²	10,619	3,400	801	5,983	7,196	27,999
2040 ²	12,312	4,294	556	8,313	11,612	37,087

¹ estimated ² outlook

Sources: BP Statistical Review, 2015; WEC Germany, 2015; IEA New Policies Scenario, 2014

Global CO₂ emissions

regions/countries	1990 (base year)	2000	2005	2010	2012	2013	2014	changing rates	
								2014 vs 2013	2014 vs 1990
	mt							%	
Annex-I-States ¹	14,988.8	14,432.0	14,900.2	14,170.5	13,816.2	13,808.5	13,561.3	-1.8	-9.5
EU-28	4,442.0	4,143.0	4,270.5	3,917.6	3,727.4	3,645.6	3,451.9	-5.3	-22.3
thereof EU-15 ¹	3,375.1	3,382.6	3,486.0	3,166.0	2,997.7	2,940.3	2,765.8	-5.9	-18.1
thereof Germany ^{1/2}	1,042.1	891.5	861.7	829.4	821.7	841.4	794.2	-5.6	-23.8
Australia ¹	276.1	346.6	380.4	399.4	397.8	389.8	380.9	-2.3	38.0
Canada ¹	459.0	567.7	576.7	554.4	550.5	556.6	557.1	0.1	21.4
USA ¹	5,100.6	5,963.1	6,103.3	5,712.8	5,375.0	5,519.1	5,568.2	0.9	9.2
Russia ¹	2,505.4	1,477.0	1,531.7	1,602.4	1,656.8	1,624.4	1,599.7	-1.5	-36.1
Ukraine ¹	718.9	293.5	320.6	289.7	302.7	288.1	236.1	-18.0	-67.2
Japan ¹	1,141.1	1,251.5	1,282.1	1,191.1	1,275.6	1,264.0	1,224.6	-3.1	7.3
Korea	229.3	437.7	469.1	564.5	592.9	598.5	598.9	0.1	161.2
India	580.5	978.1	1,191.1	1,749.3	1,954.0	2,034.0	2,198.8	8.1	278.8
China	2,277.7	3,350.3	5,444.3	7,294.9	8,250.8	8,478.2	8,552.6	0.9	275.5
rest of Far East	697.8	1,162.1	1,448.4	1,662.7	1,744.5	1,783.5	1,841.5	3.3	163.9
Middle East	549.9	899.7	1,165.9	1,521.7	1,647.1	1,672.5	1,741.1	4.1	216.6
Africa	545.0	684.0	829.0	982.3	1,032.4	1,045.0	1,071.7	2.6	96.7
Brazil	192.4	303.6	322.7	388.5	440.2	474.4	493.7	4.1	156.6
Mexico	265.3	349.6	385.8	417.9	435.8	437.9	431.4	-1.5	62.6
r.o. Latin America	384.9	512.4	577.1	681.5	707.3	730.8	730.6	0.0	89.7
Other States	1,408.2	1,515.4	1,727.5	1,920.1	1,945.4	1,926.7	1,958.4	1.6	39.1
World	21,774.1	24,235.3	28,026.2	30,850.8	32,036.2	32,469.1	32,637.2	0.5	49.9

¹ Annex-I-countries according to United Nations Framework Convention on Climate Change (see also <http://unfccc.int>)

² temperature- and inventory-adjusted

Sources: H.-J. Ziesing, „...CO₂-emissions...“, in ET 9/2015

World reserves of coal, lignite, mineral oil and natural gas 2014

	coal and lignite	mineral oil	natural gas	total
regions	bnt ce			
EU-28	20.8	1.2	1.8	23.8
rest of Europe and Central Asia ¹	140.2	31.0	67.0	238.2
Africa	32.4	26.8	16.7	75.9
Middle East	1.1	169.1	94.5	264.7
Northamerica ²	156.2	48.5	14.4	219.1
Central and South America ³	9.7	68.9	9.2	87.8
China	79.7	3.9	4.1	87.7
India	58.7	1.2	1.7	61.6
Indonesia	8.6	0.8	3.4	12.8
Far East	4.4	2.2	4.4	11.0
Australia ⁴	50.0	0.8	4.4	55.2
World	561.8	354.4	221.6	1137.8
	49 %	31 %	19 %	100 %

¹ Rest of Europe, Russia, Kazakhstan, Ukraine, Mongolia

² including Canadian oil sands ³ including Mexico ⁴ including New-Zealand

Source: BP Statistical Review, 2015

World reserves and production of coal 2013

	reserves	production
regions	bnt ce	
EU-28	19.229	0.114
rest of Europe	0.940	0.004
CIS	130.362	0.478
Africa	13.150	0.267
Middle East	1.203	0.002
USA	223.435	0.823
Canada	4.346	0.060
Rest of North America ¹	1.343	0.016
Columbia	4.881	0.086
Rest of Central and South America	4.062	0.005
China	120.697	3.533
India	81.897	0.566
Indonesia	13.511	0.430
Mongolia	1.170	0.025
Australia	62.095	0.410
Rest of Central Asia / Oceania	6.136	0.095
World	688.457	6.913

¹ Mexico, Greenland

Source: DERA/BGR, 2014

Primary energy consumption in EU-27*

	coal and lignite	mineral oil	natural gas	nuclear energy	hydro and others	total
year	mt ce					
2005	431	1 003	606	367	123	2,530
2010	402	814	631	342	261	2,450
2011	409	785	578	337	263	2,372
2012	420	752	561	329	285	2,347
2013 ¹	412	860	563	284	275	2,395
2014 ¹	386	847	498	283	289	2,303
2020 ²	356	681	576	319	376	2,308
2040 ²	187	480	656	296	559	2,178

* from 2013 EU-28 ¹ estimated ² outlook

Sources: BP Statistical Review, 2015;

IEA New Policies Scenario, 2014

Power generation in EU-27*

	coal and lignite	mineral oil	natural gas	nuclear energy	hydro and others	total
year	TWh					
2005	990	160	660	930	440	3,180
2010	862	86	758	917	687	3,310
2011	884	74	696	907	696	3,257
2012	935	73	582	882	788	3,260
2013 ¹	860	73	600	890	877	3,300
2020 ²	788	37	583	856	1,136	3,400
2040 ²	346	11	881	793	1,711	3,742

* from 2013 EU-28 ¹ estimated ² outlook

Sources: EU-Commission: Energy in Figures - Statistical Pocketbook, 2014; BP Statistical Review, 2015;

IEA New Policies Scenario, 2013, RWE AG 2015

Coal and lignite production and imports in EU-28* in 2014

	production			imports
	coal	lignite	total	coal
country	mt ce			
Poland	62	19	81	9
United Kingdom	10	0	10	35
Germany	7	53	60	46
Czech Republic	7	11	18	2
Spain	3	—	3	13
Bulgaria	0	10	10	1
Romania	1	7	8	1
Greece	—	15	15	—
Hungary	—	3	3	1
Slovenia	—	1	1	0
Slovakia	—	1	1	3
Kroatia	—	—	—	1
Italy	—	—	—	17
France	—	—	—	12
Netherlands	—	—	—	11
Finland	—	—	—	5
Denmark	—	—	—	4
Belgium	—	—	—	4
Sweden	—	—	—	2
Portugal	—	—	—	4
Austria	—	—	—	3
Ireland	—	—	—	2
EU-28	90	120	210	176

* Croatia's accession to the EU on 1.7.2013

Source: EUROCOAL 2015

Primary energy consumption in Germany

	mineral oil	coal	lignite	natural gas	nuclear energy	wind energy	hydro, biomass and others ²	total
year	mt ce							
1980	206.7	85.2	115.7	73.9	20.7	0.0	5.9	508.1
1990	178.4	78.7	109.2	78.2	56.9	0.0	7.2	508.6
2000	187.6	69.0	52.9	101.9	63.2	1.2	15.6	491.4
2005	176.3	61.7	54.4	110.9	60.7	3.3	29.4	496.7
2010	159.8	58.5	51.6	108.2	52.3	4.6	50.1	485.1
2011	154.4	58.5	53.4	99.3	40.2	6.0	52.2	464.0
2012	154.4	58.9	56.1	99.6	37.0	6.2	46.6	458.8
2013 ¹	157.9	62.8	55.6	104.4	36.2	6.3	48.4	471.6
2014 ¹	154.1	58.8	53.7	91.2	36.2	7.0	47.1	448.1

¹ preliminary ² incl. elec. exchange balance

nuclear energy and renewables evaluated by efficiency method

Source: AGE, 8/2015

Power generation in Germany

	coal	lignite	nuclear energy	mineral oil	natural gas	wind energy	hydro, biomass and others	total
year	TWh							
1980	111.5	172.7	55.6	27.0	61.0	0.0	39.8	467.6
1990	140.8	170.9	152.5	10.8	35.9	0.1	38.9	549.9
2000	143.1	148.3	169.6	5.9	49.2	9.5	50.9	576.5
2005	134.1	154.1	163.0	12.0	72.7	27.2	59.5	622.6
2010	117.0	145.9	140.6	8.7	89.3	37.8	93.7	633.0
2011	112.4	150.1	108.0	7.2	86.1	48.9	100.4	613.1
2012	116.4	160.7	99.5	7.6	76.4	50.7	118.8	630.1
2013	127.3	160.9	97.3	7.2	67.5	51.7	126.8	638.7
2014 ¹	118.4	155.7	97.1	6.1	59.8	57.3	130.9	625.3

¹ preliminary

German coal sales

	domestic			EU countries		third countries	total sales
	heat market	power stations	steel industry	steel industry	others		
year	mt ce						
1960	61.3	22.1	31.3	27.0		5.3	147.0
1970	28.5	31.8	27.9	19.8	5.7	3.2	116.9
1980	9.4	34.1	24.9	13.0	4.8	2.1	88.3
1990	4.1	39.3	19.8	5.2	2.2	0.4	71.0
2000	0.7	27.6	10.0	0.0	0.3	0.0	38.6
2005	0.3	20.3	6.1	0.0	0.1	0.0	26.8
2010	0.3	10.6	3.7	0.0	0.2	0.0	14.8
2011	0.3	10.1	2.3	0.0	0.1	0.0	12.8
2012	0.3	9.9	1.1	0.0	0.1	0.0	11.4
2013	0.3	6.6	0.9	0.0	0.2	0.0	8.0
2014	0.3	6.8	0.5	0.0	0.1	0.0	7.7

Rationalisation efforts in German coal industry

year	output per manshift underground	output ¹ per working face	mines ²	working faces
	kg saleable ³	t saleable ³	number	
1960	2,057	310	146	1,631
1970	3,755	868	69	476
1980	3,948	1,408	39	229
1990	5,008	1,803	27	147
2000	6,685	3,431	12	37
2005	6,735	3,888	9	24
2010	6,092	3,018	5	16
2011	6,623	3,156	5	14
2012	6,876	3,739	3 ⁴	11
2013	6,624	3,454	3	8
2014	7,491	3,886	3	8

¹ daily face output ² data status: end of year excl. small mines

³ until 1996 Saar figures in t = t ⁴ as at: 01.01.2013

German coal industry workforce¹

by end of year	workers		white-collar employees		staff (workers and white-collar employees)	
	under-ground	surface	under-ground	surface	total	thereof apprentices
1957	384.3	169.3	16.3	37.4	607.3	48.2
1960	297.0	140.2	16.8	36.2	490.2	22.7
1965	216.8	110.5	15.6	34.1	377.0	15.2
1970	138.3	75.6	13.0	25.8	252.7	11.5
1975	107.9	60.9	11.5	22.0	202.3	14.1
1980	99.7	55.8	10.6	20.7	186.8	16.4
1985	90.1	47.4	10.2	18.5	166.2	15.7
1990	69.6	35.9	8.9	15.9	130.3	8.3
1995	47.2	25.7	6.1	13.6	92.6	2.9
2000	25.6	18.2	3.8	10.5	58.1	2.3
2005	17.7	10.9	2.6	7.3	38.5	3.2
2010	10.7	6.7	1.5	5.3	24.2	1.1
2011	9.0	5.8	1.4	4.7	20.9	1.1
2012	7.1	5.1	1.3	4.1	17.6	1.0
2013	5.6	4.3	1.1	3.5	14.5	0.8
2014	4.4	3.7	0.9	3.1	12.1	0.7

¹ workforce including short-time workers and trainees

Coal production in Germany

	area				total
	Ruhr	Saar	Aachen	lbben- büren	
year	mt saleable				
1957	123.2	16.3	7.6	2.3	149.4
1960	115.5	16.2	8.2	2.4	142.3
1965	110.9	14.2	7.8	2.2	135.1
1970	91.1	10.5	6.9	2.8	111.3
1975	75.9	9.0	5.7	1.8	92.4
1980	69.2	10.1	5.1	2.2	86.6
1985	64.0	10.7	4.7	2.4	81.8
1990	54.6	9.7	3.4	2.1	69.8
1995	41.6	8.2	1.6	1.7	53.1
2000	25.9	5.7	—	1.7	33.3
2005	18.1	4.7	—	1.9	24.7
2010	9.6	1.3	—	2.0	12.9
2011	8.7	1.4	—	2.0	12.1
2012	8.4	0.4	—	2.0	10.8
2013	5.7	—	—	1.9	7.6
2014	5.7	—	—	1.9	7.6

Coal industry data for 2014

Mines (as at 01.01.2015) **3**

Workforce¹ total **12,104 employees**

- Ruhr coalfield	9,500 employees
- Saar coalfield	311 employees
- Ibbenbüren	2,293 employees

Coal production total **7.6 mt saleable²**

≅ 7.8 mt ce³

- Ruhr coalfield	5.7 mt saleable
- Saar coalfield	— mt saleable
- Ibbenbüren	1.9 mt saleable

Technical statistics

output per production unit	3,886 t saleable/day
average seam thickness	203 cm
average face length	312 m
average winning depth	1,249 m
deepest shaft	1,545 m

Sales total **7,7 mt ce**

- electricity industry	6.8 mt ce
- steel industry	0.5 mt ce
- heat market	0.4 mt ce

German coal's contribution

- to primary energy consumption in Germany	2 %
- to electricity generation in Germany	4 %
- to coal consumption	13 %
- to coal-fired electricity production	17 %

¹ at year end; including staff on short time working and trainees

² saleable includes water and ash content

³ t ce = tonnes of coal equivalent. 1 kg t ce = 7,000 kcal or 29,308 kJ

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