

# EUROPE'S DIRTY 30

## HOW THE EU'S COAL-FIRED POWER PLANTS ARE UNDERMINING ITS CLIMATE EFFORTS





## HIGHLIGHTS

- The EU has long claimed leadership on tackling climate change. Although the rapid expansion of renewables and an overall decrease in total EU greenhouse gas emissions are promising developments, CO<sub>2</sub> emissions from EU coal power plants have recently risen;
- Due to the relatively low price of coal compared to gas, many of the EU's coal-fired plants are running at or near full capacity, while conventional gas power plants are running below capacity, less frequently or have been closed;
- The EU's coal problem is one of increased use of existing coal assets rather than a net increase in the number of coal plants;
- For the EU and its Member States to meet their climate targets, the share of coal in the EU's electricity generation mix must decline rapidly. The EU will need to fully decarbonise its power sector in the coming decades;
- The heavy use of coal in key Member States, such as the UK and Germany, shows that the EU is in grave danger of not phasing out emissions from coal quickly enough, particularly if plants in these countries extend their operational lives;
- Germany and the UK are the self-declared climate champions of the EU. However, Germany uses more coal to generate electricity than any other EU country, while the UK comes third in absolute coal consumption for power after Poland;
- EU policy makers should pay more attention to the share of coal in the (EU) energy mix in order to secure power sector decarbonisation. To this end, policies specifically designed to speed up the phase out of coal based emissions need to be put in place;
- The existing EU policy framework on climate, energy and air pollution governing the power sector is not strong enough to achieve the transformation away from coal and toward renewable energy and energy savings. This weakness looks set to continue because of the lack of ambition in current climate and energy proposals for 2030;
- This report exposes the top 30 CO<sub>2</sub>-polluting thermal power plants in the EU - the "Dirty 30" - and sets out the policies needed to tackle the pollution they produce.

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# “COAL IS THE SINGLE GREATEST THREAT TO CIVILIZATION AND ALL LIFE ON OUR PLANET”

James Hansen, climatologist, former head of the NASA Goddard Institute for Space Studies in a letter to Gordon Brown, Angela Merkel and Barack Obama asking them to place a moratorium on new coal-fired power plants.

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# INTRODUCTION

**Coal-fired power plants are the single biggest global source of greenhouse gas emissions. Coal is the dirtiest fuel<sup>2</sup> and global coal reserves represent a greater source of potential CO<sub>2</sub> than any other fossil fuel.**

Although coal-fired plants account for just 40 per cent of world energy production, they are responsible for more than 70 per cent of energy-sector emissions.<sup>3</sup>

Burning coal releases nitrogen oxides, sulphur dioxide, dust and heavy metals such as mercury and arsenic. These pollutants are major causes of acid rain and ground level ozone (smog), and are associated with a range of human health problems including asthma and cancer.<sup>4</sup> These gases can be carried hundreds of kilometers in the atmosphere before they are converted, for example, into acids and deposited having also harmful effects on plants, aquatic animals and infrastructure.<sup>5</sup> The extraction of coal is also problematic. Coal mining can cause local environmental destruction, contamination and depletion of water supplies. Depending on where the mining takes place, concerns arise in relation to human rights and worker's health and safety.<sup>6</sup>

These negative impacts are not sufficiently reflected in the price paid for electricity generated by burning coal.

**Europe's coal power plant operators regularly face the choice of shutting older plants down, or investing in costly life extensions. Such decisions have far-reaching consequences for meeting EU climate goals. This report exposes the top 30 CO<sub>2</sub>-polluting thermal power plants in the EU - the "Dirty 30" - and sets out the policies needed to tackle the pollution they produce.**

## METHODOLOGY

The list of the 30 most CO<sub>2</sub>-polluting thermal power plants - the Dirty 30 - is based on the absolute CO<sub>2</sub> emissions emitted by these plants in 2013 as reported by Member States to the EU under the EU Emissions Trading Scheme.

The Dirty 30 most polluting power plants all burn lignite or hard coal, with the exception of one plant in Estonia, which uses oil shale. Some steel factories are also top CO<sub>2</sub> emitters in the EU, but were omitted as this report focuses on the power sector.

The Dirty 30 were chosen to show the scale of CO<sub>2</sub> emissions generated by EU's coal-fired power plants and as a symbol for what needs to happen with coal in the EU power sector. Ultimately, the emissions from all coal plants in the EU - of which there are about 350 - will need to be phased out, not just from these Dirty 30.

**"... IT IS IMPORTANT TO EMPHASISE THAT COAL IN ITS CURRENT FORM IS SIMPLY UNSUSTAINABLE... COAL-FIRED HEAT AND POWER GENERATION IS THE BIGGEST SINGLE SOURCE OF CARBON DIOXIDE EMISSIONS RESULTING FROM FUEL COMBUSTION TODAY. MORE THAN THREE-FIFTHS OF THE RISE IN GLOBAL CO2 EMISSIONS SINCE 2000 IS DUE TO THE BURNING OF COAL TO PRODUCE ELECTRICITY AND HEAT. AND WE SHOULD NOT OVERLOOK THE HEALTH PROBLEMS TIED TO LOCAL POLLUTION PRODUCED BY COAL COMBUSTION."**

Maria van der Hoeven, Executive Director of the International Energy Agency, launching the Medium-Term Coal Market Report 2013.

# EUROPE'S DIRTY 30

EU'S TOP CO<sub>2</sub> POLLUTING POWER PLANTS IN 2013



# THE EU'S DIRTY 30

## TOP 30 most CO<sub>2</sub> -polluting thermal power plants in the EU

Top CO <sub>2</sub> polluters in 2013 in the EU	Thermal Power Plant	Country	Owner	MWe (2013)	Fuel	Start of operation*	CO <sub>2</sub> emissions (2013, Mt/a)
1	Bełchatów	Poland	PGE	5298	lignite	1982-88, 2011	37.18
2	Neurath	Germany	RWE	4168	lignite	1972-76, 2012	33.28
3	Niederaussem	Germany	RWE	3680	lignite	1963-1974, 2002	29.58
4	Jänschwalde	Germany	Vattenfall	2790	lignite	1981-1989	25.40
5	Boxberg	Germany	Vattenfall	2427	lignite	1978-79, 2000, 2012	21.89
6	Drax	United Kingdom	Drax Power	3300	hard coal	1974-1976, 1984-1986	20.32
7	Weisweiler	Germany	RWE	1798	lignite	1965-75	18.66
8	Agios Dimitrios	Greece	PPC	1587	lignite	1984-86, 1997	13.11
9	Brindisi Sud	Italy	Enel	2640	hard coal	1991-93	11.81
10	Lippendorf	Germany	Vattenfall / EnBW	1750	lignite	1999, 2000	11.73
11	Eggborough	United Kingdom	Eggborough Power	2000	hard coal	1967	11.50
12	Schwarze Pumpe	Germany	Vattenfall	1500	lignite	1997, 1998	11.28
13	Ratcliffe-on-Soar	United Kingdom	EON	2000	hard coal	1968-70	11.01
14	West Burton	United Kingdom	EDF	2000	hard coal	1967-68	10.89
15	Eesti Elektriijaam	Estonia	Eesti Energia	1610	oil shale	1969-73, 2004	10.67
16	Kozienice	Poland	ENEA	2840	hard coal	1972-79	10.23
17	Scholven	Germany	EON	2056	hard coal	1968-71, 1979	10.22
18	Cottam	United Kingdom	EDF	2000	hard coal	1969-70	10.17
19	Turów	Poland	PGE	1505	lignite	1963-71, 1998, 2000	9.99
20	Torrevaldaliga	Italy	Enel	1980	hard coal	2008, 2010	9.73
21	Longannet	United Kingdom	Iberdrola	2400	hard coal	1970-73	9.51
22	Kardia	Greece	PPC	1200	lignite	1975, 1980-81	8.91
23	Aberthaw	United Kingdom	RWE	1555	hard coal	1971	8.50
24	Fiddler's Ferry	United Kingdom	Scottish and Southern Energy (SSE)	2000	hard coal	1971-73	8.45
25	Rybnik	Poland	EDF	1720	hard coal	1972-78	8.39
26	Ferrybridge "C"	United Kingdom	Scottish and Southern Energy (SSE)	980	hard coal	1966-68	8.31
27	Sines	Portugal	EDP	1250	hard coal	1985-87	7.18
28	Aboño	Spain	EDP	922	hard coal	1974, 1985	6.86
29	Mannheim	Germany	Grosskraftwerk Mannheim	1520	hard coal	1966, 1970, 1982, 1993, 2005	6.75
30	Maasvlakte	Netherlands	EON	1080	hard coal	1975	6.68

Source: EU ETS database, Platts, Bundesnetzagentur, utilities reports.  
MWe = Megawatt electric

\* the dates indicate start of operation of original and added power blocks / units'

THE RISE IN EMISSIONS FROM COAL HAS NOT BEEN DRIVEN BY AN INCREASE IN THE AMOUNT OF TOTAL COAL-FIRED POWER PLANT CAPACITY IN EUROPE. THE EU'S REAL COAL PROBLEM IS ONE OF INCREASED USE OF EXISTING ASSETS RATHER THAN A NET INCREASE IN THE TOTAL AMOUNT OF COAL PLANTS.

# EUROPE'S RISING CO<sub>2</sub> EMISSIONS FROM COAL

The EU has long claimed leadership on tackling climate change. Despite this long-standing ambition, emissions from the EU's coal power stations have recently risen.<sup>7</sup> A combination of economic factors, including rising gas prices,<sup>8</sup> lower coal prices and a low CO<sub>2</sub> price caused by weak EU climate policy all contributed to an increase in electricity generated from coal since 2009/2010.

Because coal is cheaper than gas in the EU, a price differential which has grown in recent years, many of the EU's coal-fired plants are running at or near full capacity while gas power plants are running below capacity and less frequently.<sup>9</sup> This, among other reasons, has for example led to a rise in emissions in the power sector in Germany, as coal is twice as carbon intensive as gas.<sup>10</sup> At the same time, gas-fired power plants are becoming increasingly unprofitable and several have been decommissioned or mothballed in recent years.

However, power sector CO<sub>2</sub> emissions in the EU as a whole are still declining. This is in large part thanks to the deployment of renewables, including solar PV and onshore wind, which have achieved significant cost reductions in recent years. Nonetheless, the increase in electricity generated from coal between 2009 and 2012 has partially offset this fall in emissions. While the latest EU ETS emissions data shows a modest fall in CO<sub>2</sub> emissions from coal in 2013 compared to 2012<sup>11</sup>, as does the new Eurostat data for electricity generated from coal<sup>12</sup>, if recent conditions continue coal emissions could bounce back.

Some utilities are even considering further expansion of existing coal mines and opening new ones, particularly in Germany and Poland, where there are significant lignite reserves. However, opening new mines means additional large-scale investments, which will lock-in the future use of even more coal to make the investment pay off. According to the most recent IPCC report, between 60 to 80 per cent of known fossil fuel reserves must stay

in the ground to have any chance of keeping below the 2-degree threshold for global warming,<sup>13</sup> above which governments have agreed unacceptable impacts would occur. Therefore, it's vital that more 'unburnable carbon' is not made available by opening new coal mines.<sup>14</sup>

## THE MYTHICAL COAL RENAISSANCE AND THE EU'S REAL COAL PROBLEM

It is important to understand what is behind this recent increase in coal-fired electricity generation. Is it a temporary blip or does it represent a trend that will continue? In 2013, approximately 19% of electricity generation capacity in the EU was coal-based compared to 25% in 2000.<sup>15</sup> The EU experienced a net closure of 19 gigawatts (GW) of coal capacity between 2000 and 2013.<sup>16</sup> During that time, more coal plants closed than were built. Furthermore, many of the plans announced before 2008 to build new coal power plants in the EU have been either abandoned or shelved.<sup>17</sup> This suggests that the idea of an EU "coal renaissance" defined as building a lot of new coal capacity is not supported by the evidence. **The rise in emissions from coal has not been driven by an increase in the amount of total coal-fired power plant capacity in Europe. The EU's real coal problem is one of increased use of existing assets rather than a net increase in the number of coal plants.**

The question, therefore, is what will happen to the existing fleet of coal plants. The International Energy Agency (IEA) argues that increased coal use in Europe in

recent years was only a temporary spike caused by the cheap price of coal relative to gas and that European coal consumption will soon decline once again.<sup>18</sup> So should we just sit back and wait for the EU to simply resume its slow move away from coal?

Some existing coal plants are indeed expected to close in the coming years as their pollution levels exceed those allowed by the EU's Large Combustion Plant Directive (LCPD)<sup>19</sup> and the Industrial Emissions Directive (IED).<sup>20</sup> However, a majority of plants are expected to remain operational, unless the EU's energy, climate and air pollution policy frameworks are strengthened to reduce the use of coal plants. Current developments in EU energy and climate policy may allow or even incentivise the prolonged operation of coal plants, and thus conflict with the EU's own climate targets.

The European Commission's proposed reform of the EU Emissions Trading System (EU ETS) will not remove enough surplus pollution credits or do enough to speed up annual emissions reductions and so is not sufficient to increase the carbon price signal to a level that ensures a sufficiently rapid shift away from coal. Neither will the options for new renewables targets and support schemes currently being debated at EU level provide the investment certainty needed for the rapid expansion of renewables required to displace fossil fuels.

The price paid for electricity generated from coal also fails to sufficiently reflect the damage it causes to the climate, air quality and human health. While the EU ETS partially corrects this market failure, the current CO<sub>2</sub> price is far below the level required to sufficiently reflect the negative costs of coal or to drive a switch away from burning coal for electricity.

In addition, Member States often take a lenient stance on the EU IED if they believe that compliance could affect the profitability of existing plants or force plant

closures. With these factors in play, there is no immediate prospect of the EU's coal fleet shutting down rapidly enough unless new policies that force coal to pay for the damage it causes are put in place.

For the European Union and its Member States to meet their climate targets, the EU will need to fully decarbonise its power sector in the coming decades. This means that the share of coal in the EU's electricity generation mix must decline rapidly. According to climate scenarios by the IEA, the share of coal in electricity generation in the EU must be below 4% by 2035.<sup>21</sup> This will require a stark decrease compared to the 26% share of electricity generation from coal in 2011.<sup>22</sup>

**The heavy use of coal in key Member States, such as the UK and Germany, shows that the EU is in grave danger of not phasing out CO<sub>2</sub> emissions from coal quickly enough, particularly if these plants extend their operational lives.**

## GERMANY AND THE UK: CLIMATE OR COAL?

Germany and the UK are the self-declared climate champions of the EU. However, each of them has nine coal-fired power plants in the Dirty 30. Germany uses more coal to generate electricity than any other EU country, while the UK comes third in absolute coal consumption for power after Poland.<sup>23</sup> While this report focuses on Germany and UK due to their apparent climate ambitions it is important to note that Poland has four power plants in the Dirty 30. The Polish government, however, does not make it a secret that it wants to continue to rely on coal, as evidenced by the Polish Government's recent call for a fossil fuel dependent 'Energy Union' for the EU.<sup>24</sup>



# GERMANY

## GERMANY'S MOST CO<sub>2</sub>-POLLUTING THERMAL POWER PLANTS IN THE EU DIRTY 30 RANKING

**COAL PLANT: WEISWEILER**  
LOCATION: ESCHWEILER, GERMANY  
RANKING: NR. 7  
FUEL: LIGNITE  
CO<sub>2</sub> EMISSIONS (2013, Mt/a): 18.66  
MW: 1798

**COAL PLANT: NEURATH**  
LOCATION: GREVENBROICH, GERMANY  
RANKING: NR. 2  
FUEL: LIGNITE  
CO<sub>2</sub> EMISSIONS (2013, Mt/a): 33.28  
MW: 4168

**COAL PLANT: SCHOLVEN**  
LOCATION: GELSENKIRCHEN, GERMANY  
RANKING: NR. 17  
FUEL: HARD COAL  
CO<sub>2</sub> EMISSIONS (2013, Mt/a): 10.22  
MW: 2056

**COAL PLANT: NIEDERAUSSEM**  
LOCATION: BERGHEIM, GERMANY  
RANKING: NR. 3  
FUEL: LIGNITE  
CO<sub>2</sub> EMISSIONS (2013, Mt/a): 29.58  
MW: 3680

**COAL PLANT: JÄNSCHWALDE**  
LOCATION: PEITZ, GERMANY  
RANKING: NR. 4  
FUEL: LIGNITE  
CO<sub>2</sub> EMISSIONS (2013, Mt/a): 25.40  
MW: 2790

**COAL PLANT: BOXBERG**  
LOCATION: BOXBERG, GERMANY  
RANKING: NR. 5  
FUEL: LIGNITE  
CO<sub>2</sub> EMISSIONS (2013, Mt/a): 21.89  
MW: 2427

**COAL PLANT: SCHWARZE PUMPE**  
LOCATION: SPREMBERG, GERMANY  
RANKING: NR. 12  
FUEL: LIGNITE  
CO<sub>2</sub> EMISSIONS (2013, Mt/a): 11.28  
MW: 1500

**COAL PLANT: LIPPENDORF**  
LOCATION: BÖHLEN, GERMANY  
RANKING: NR. 10  
FUEL: LIGNITE  
CO<sub>2</sub> EMISSIONS (2013, Mt/a): 11.73  
MW: 1750

**COAL PLANT: MANNHEIM**  
LOCATION: MANNHEIM, GERMANY  
RANKING: NR. 29  
FUEL: HARD COAL  
CO<sub>2</sub> EMISSIONS (2013, Mt/a): 6.75  
MW: 1520





# CASE STUDY: FOUR OF THE FIVE DIRTIEST POWER PLANTS IN THE EU ARE IN GERMANY

In 2010 Germany committed itself to reducing its greenhouse gas emissions by 40% by 2020, to increasing the share of renewable energy in its power sector to 35% by 2020 and to consuming 20% less energy compared to 2008 levels.<sup>25</sup> Together with the 2011 post-Fukushima decision to phase out nuclear energy by 2022, these commitments essentially constitute the country's "Energiewende". This energy transition will shift the world's fourth largest economy away from its current heavy reliance on fossil fuels and nuclear power towards an emission-free economy by 2050, with an electricity system dominated by renewables.

**Germany's Energiewende is working.** The country increased its share of electricity produced from renewables from 7% in 1990 to over 25% in 2013. As renewables steadily expand, Germany is becoming less dependent on fossil fuels and is spending €10 billion less a year on energy imports. By meeting its national renewable and climate protection targets, Germany could halve its import bill for fossil fuels by 2020, increasing savings to €50 billion per year. The reduction of nuclear powered electricity (-43 TWh 2010 to 2013) has been more than compensated for by the boost in renewables (+47 TWh over the same period).<sup>26</sup> Renewables are also replacing fossil fuelled generation, having saved a total of 147mt in CO<sub>2</sub> emissions in Germany in 2012 alone.<sup>27</sup>

While German emissions would be even higher today without the energy transition, the country still has nine of the EU's 30 dirtiest power plants (four out of the EU's top five). In 2013 the domestic production of electricity from lignite coal peaked at 162 TWh - the highest since reunification.<sup>28</sup> In 2013 Germany's year-on-year CO<sub>2</sub> emissions rose by 1.5%.<sup>29</sup> Due to Germany burning more coal the country is running the risk of not meeting its 40% GHG reduction target for 2020.<sup>30</sup>

## GERMANY'S FUTURE DIRECTION?

Despite having invested significant time and money to secure a successful and sustainable economy, Germany's efforts could still be derailed. Currently, EU law, including an inadequate carbon price and unambitious renewable energy and energy efficiency targets, is not offsetting the market forces that continue to push in favour of dirty fuels because they ignore the full costs.

In 2012 both RWE and Vattenfall started the operation of new coal plants that added almost 3 gigawatts of generation capacity.<sup>31</sup> Such actions, which will have implications all along the life-cycle of these plants, represent a huge gamble. Either the long-term emissions cuts needed to help prevent catastrophic climate change will not be delivered, or these companies will have to write off their investments without making the significant returns they had hoped for.

These investments therefore betray the hope of these companies that EU legislation will remain too weak to end coal power in Europe for good, despite the IEA's assertion that it should already be as little as 4% by 2035 in order to help avoid dangerous climate change.

## LIGNITE COMBUSTION CONTRADICTS A GREEN FUTURE AND IS INCOMPATIBLE WITH THE ENERGY TRANSITION

It is particularly important to tackle power from lignite – the dirtiest form of coal. Even when power is cheapest, as windmills and solar panels churn it out on sunny and windy days, operators still run lignite plants, even at a loss, because of the challenges of shutting them down altogether and the inability to run them at less than 40% of their maximum output.<sup>32</sup> This absurd situation reaffirms the fact that lignite's high-carbon power and inflexibility make it unfit for a low carbon future and electricity systems dominated by renewables.

## ACCORDING TO THE STUDY EUROPE'S DIRTY 30, NIEDERAUSSEM POWER STATION IS THE THIRD-WORST POWER STATION IN THE EU IN TERMS OF TOTAL CO<sub>2</sub> EMISSIONS.

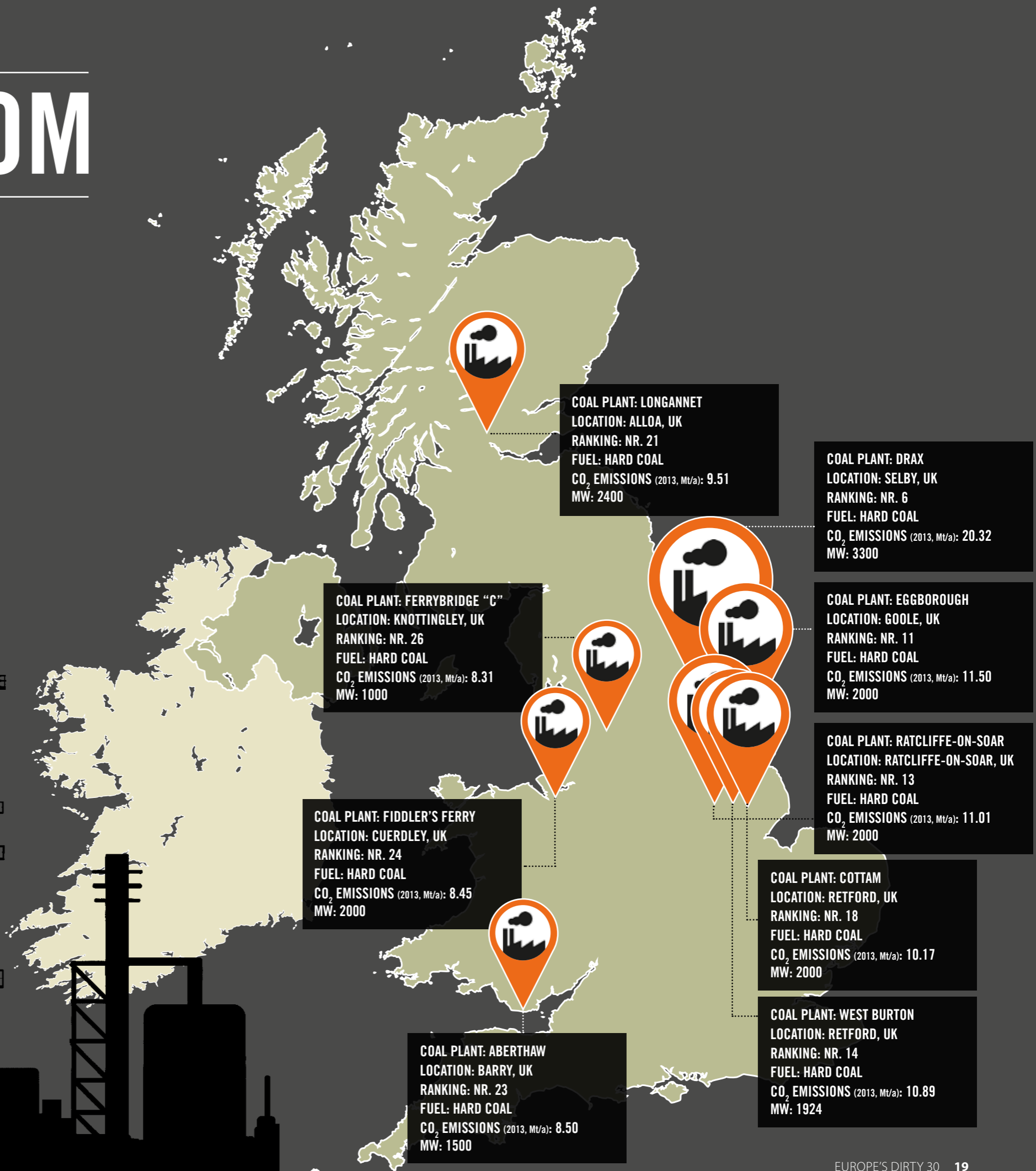
## CREDIBLE CLIMATE AND ENERGY POLICY URGENTLY NEEDED

There remains a realistic chance that we will be able to avoid the worst impacts of climate change provided we act within the narrow time frame available.<sup>33</sup> Against this background a successful energy transition in Germany can set the blueprint for the whole of Europe. As Europe develops its climate and energy laws up to 2030, and the world looks to set new emissions reductions targets, Germany must make the case for efforts that are at least in line with its own domestic goals. This means, first and foremost, supporting a structural reform of the EU ETS<sup>34</sup> to address the historic chronic oversupply of carbon credits and rejecting any future proposals to provide further offset allowances, which would only exacerbate the problem. Germany should also support ambitious binding national targets for EU Member States on emissions reductions, renewable energy, and energy efficiency.



# UNITED KINGDOM

## UK'S MOST CO<sub>2</sub>-POLLUTING THERMAL POWER PLANTS IN THE EU DIRTY 30 RANKING



# CASE STUDY: COAL AND THE UK'S CLIMATE AMBITION

The UK has a world leading legally binding Climate Change Act, which commits to reductions in carbon emissions of 80% by 2050. A crucial part of meeting this target is reducing emissions from electricity generation, which must fall from approximately 155 million tonnes of carbon dioxide (Mt CO<sub>2</sub>) per year in 2013 to only 20 Mt CO<sub>2</sub> by 2030.

The nine dirtiest coal power plants in the UK collectively put nearly 100 million tonnes of CO<sub>2</sub> into the atmosphere in 2012. Despite their colossal emissions, these plants provided only a third of the UK's electricity - because they converted coal to electricity at an average efficiency of 36%. Given the terrible inefficiency of the UK coal fleet, running just one 2GW coal-fired power station at capacity in 2030 would emit around 10Mt CO<sub>2</sub> per year, swallowing up half the 20Mt CO<sub>2</sub> annual emissions limit for the energy sector but providing only 3% of the UK's electricity supply.<sup>35</sup>

## SPOTLIGHT ON EDF

EDF owns two of the coal power plants in the UK that are on the Dirty 30 list, West Burton and Cottam. Both were built in the late 1960s and are now over 45 years old. Together these two power plants released approximately 20 Mt CO<sub>2</sub> into the atmosphere in 2013. Until recently, EDF had not been expected to invest in the equipment required at these plants to ensure they meet new pollution limits required under the IED - meaning they would have to finally close by 2023, with only limited hours of operation post 2016.

However, in January 2014, EDF issued a statement signaling its intention to upgrade these power plants so that they comply with the IED and are able to operate beyond 2023. If EDF is looking to extend the life of its aging dirty coal plants then it is likely other coal plant owners are considering similar investments.

## COAL INVESTMENT AND THE CARBON BUBBLE

Despite low levels of domestic coal production, Carbon Tracker has estimated that coal reserves equivalent to 44.56 Gt CO<sub>2</sub> are held by companies listed on the London Stock Exchange. This is equivalent to 400 years of emissions from the UK's own power stations and 4.5 times the total carbon the UK can emit in the period 2011 - 2050. Given the necessity of keeping the global temperature rise well below 2 degrees, only a fraction of this coal can be exploited.

Despite that fact, in 2012 coal companies spent four times as much (US\$81 billion (bn)) on finding and extracting new reserves as they did on returning money to shareholders (US\$21bn). In the event of a global agreement to tackle climate change, investors could soon find that company balance sheets hold large numbers of 'stranded assets' with no commercial potential, posing financial risks to investment portfolios and the economic system as a whole.

This heavy coal exposure therefore represents a huge risk to large UK investors who have investments and stock holdings across the economy. Endowments, pension funds and similar institutional investors are particularly vulnerable to this risk.<sup>36</sup> The threat of stranded assets and severe related financial impacts would add to the risk of powerful vested interests trying to reverse political commitments to reducing carbon emissions by weakening key pieces of legislation, such as the EU ETS.

**RATCLIFFE ON SOAR IS A MASSIVE COAL POWERED POWER STATION IN NOTTINGHAMSHIRE, UK, OPERATED BY E.ON. ACCORDING TO THE STUDY EUROPE'S DIRTY 30, RATCLIFFE ON SOAR IS THE THIRTEENTH-WORST POLLUTING POWER STATION IN THE EU.**

## CONSISTENT CLIMATE AND ENERGY POLICY URGENTLY NEEDED

The UK economy is especially exposed to the economic impacts of a poorly managed and rushed response to climate change that would send shockwaves through the financial institutions from which it derives significant wealth. This is in part why the UK has led calls in the European Council for more ambitious EU 2030 emissions reductions targets. While this is necessary, greenhouse gas reduction targets are not enough on their own. Research from the international Energy Agency<sup>37</sup> shows that renewable energy and energy efficiency targets also play an important role.

While the UK has reluctantly agreed not to block EU wide renewable energy targets, it still does not support an equivalent target for energy savings.

To match its own domestic ambition, and to lead the way in Europe, the UK should become a leading advocate of renewable energy and energy efficiency targets that are binding on individual Member States.



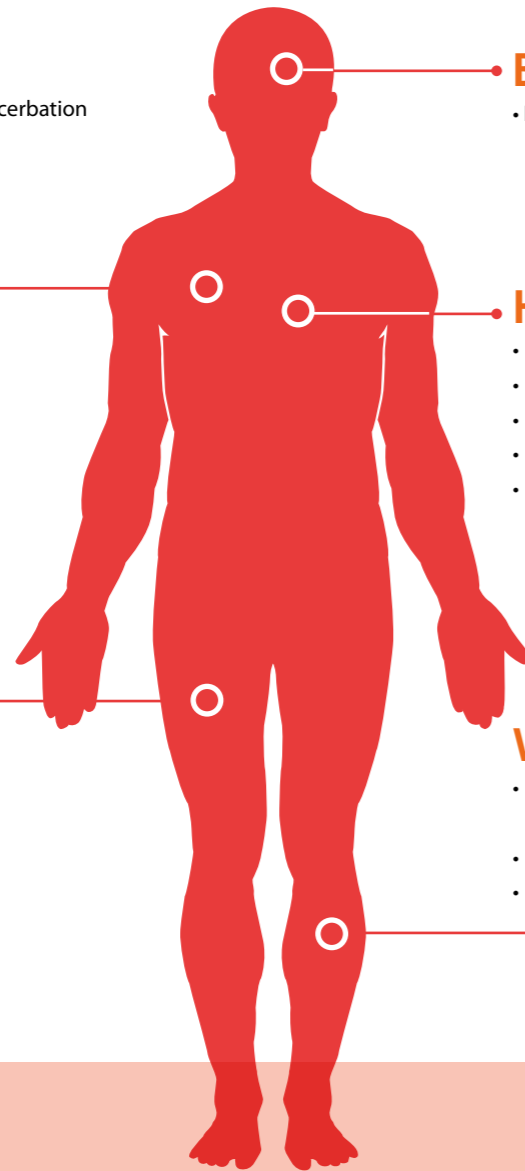
# HEALTH RISKS OF COAL POLLUTION

## Lungs

- Inflammation
- Oxidative stress
- Accelerated progression and exacerbation of COPD
- Increased respiratory symptoms
- Effected pulmonary reflexes
- Reduced lung function

## Blood

- Altered rheology
- Increased coagulability
- Translocated particles
- Peripheral thrombosis
- Reduced oxygen saturation



## Brain

- Increased cerebrovascular ischemia

## Heart

- Altered cardiac autonomic function
- Oxidative stress
- Increased dysrhythmic susceptibility
- Altered cardiac repolarisation
- Increased myocardial ischemia

## Vasculature

- Atherosclerosis, accelerated progression and destabilisation of plaques
- Endothelial dysfunction
- Vasoconstriction and hypertension

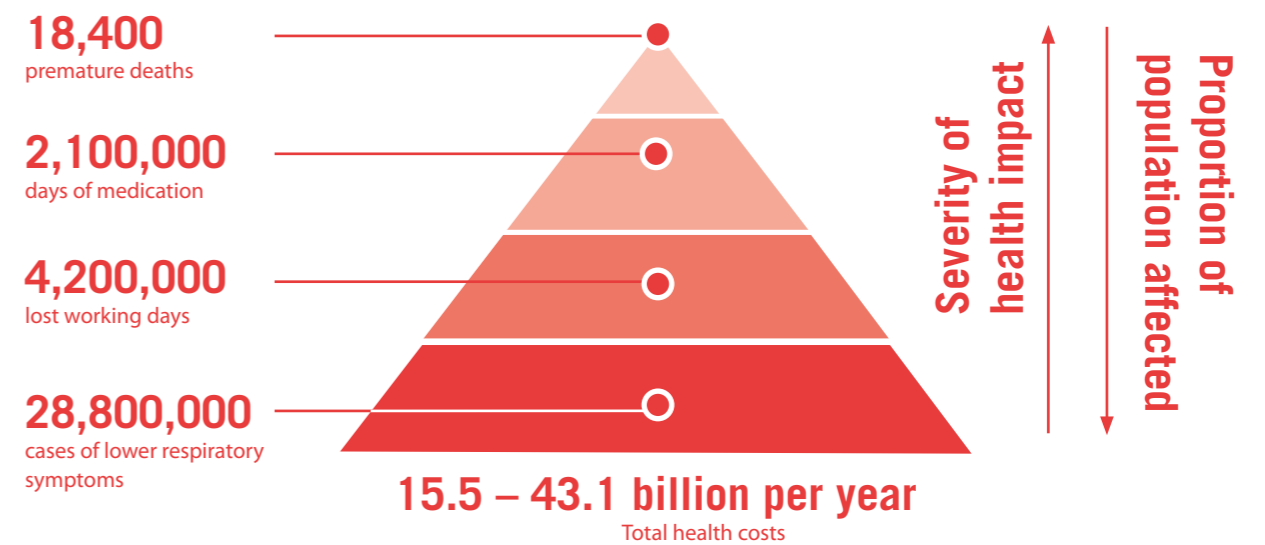
Source: Health and Environment Alliance (2013): The Unpaid Health Bill - How Coal Power Plants Make Us Sick.

# DIRTY AND NOXIOUS COAL: HOW EUROPE'S GOVERNMENTS AND UTILITIES MUST RECOGNISE ITS TRUE COSTS

Pollution from burning coal has significant negative impacts on human health and the environment. Cardiovascular and respiratory diseases as well as lung cancer are among the leading chronic diseases in Europe, leading to substantial health care costs and productivity losses. For each of these groups of diseases clear links have been established to air pollution, especially particulate matter. The health damage caused by pollutants such as nitrogen oxides and sulphur dioxide cost an estimated €26 - 71 billion per year.<sup>38,39</sup> From all the major industrial activities of the EU, half of the health damage is caused by only 2% (191) of all installations. The coal power plants listed in the Dirty

30 ranking are all among these top 2%. They alone are responsible for 20% of all power sector health costs, or 14% of total industrial sector health costs in the EU.<sup>40</sup>

According to 2009 emissions figures and methodology used by the European Environment Agency (EEA), the operation of coal power plants results in 196,200 life years lost (equivalent to 18,200 premature deaths), about 8,500 new cases of chronic bronchitis and over 4 million lost working days each year in EU 27<sup>41</sup>. Since those figures were compiled, consumption of coal in the EU has risen further.



**Figure 1: Annual health impacts analysis caused by coal power plants in the EU (28 countries)**

Source: Health and Environment Alliance (2013).

The EEA figures exclude negative effects from the extraction and sourcing of coal (e.g. occupational diseases and associated environmental damages such as water and soil pollution). The additional life cycle effects of coal are in fact the cause of additional health problems, especially in the case of lignite. Furthermore, these figures do not fully account for the negative impacts caused by early life exposure to certain heavy metals such as mercury, with its neuro-toxic effects, leading to IQ loss and subsequent loss of earning potential.<sup>42</sup>

(LCP BREF), been applied from 2006 they would have helped in the avoidance of 14,000 chronic bronchitis cases, 24 million restricted activity days and 22 million incidents of chronic lung respiratory symptoms each year in the EU. The annual net benefits were estimated to be between €28-59 billion.<sup>45</sup>

A 2013 EEA report confirms that emissions from coal power plants could be reduced by 69% for NO<sub>x</sub>, 94% for SO<sub>2</sub> and 79%<sup>46</sup> for particulate matter (PM<sub>2.5/10</sub>) if operators would simply apply existing BAT standards.<sup>47</sup> The economic and environmental decisions about the order of coal plant closure and the standards imposed on those that remain operational longest, including how many hours they run for each year, must be carefully balanced.

It would be counterproductive to spend money on improvements to reduce emissions which then mean a plant that should close altogether stays open in order to recoup the investment. Worst of all would be investing in minimal improvements that operators would then use to appeal for stays of execution for still relatively dirty plants. This can already be seen in practice as instead of applying BAT - the most stringent end of EU limits - the operators of the Dirty 30 thermal power plants located in Greece, Poland and UK all want exemptions from the stricter limits under the IED applicable from 2016 in the form of a Transitional National Plan (TNP).

It is vital that the energy sector transition to environmentally friendly technologies is developed with the holistic outlook of ending emissions from all coal power generation as quickly as possible, and minimising wasted investments and emissions while this is achieved.

The LCP BREF is currently under review, providing an opportunity to tighten the environmental performance benchmarks in order to achieve improved environmental and human health protection. But Member States and the European Commission must resist giving in to pressure from coal plant operators to water it down because of short-sighted profitability reasons. Any profit made by the operators occurs only because the costs to human health are passed on to EU taxpayers.

**It is in any case clear that there is no such thing as “healthy coal”.**

Coal power plants are the largest individual emitter of mercury into the air<sup>43</sup> in the EU, yet no EU level specific pollution prevention standard exists for this major toxic pollutant, unlike in the US. The seven German lignite plants in the Dirty 30 (excluding hard coal-fired Scholven and Mannheim) were listed as the biggest mercury emitters in Germany in a recent study. Together with two other lignite plants, Frimmersdorf and Schkopau, they were responsible for 43% of the total German mercury emissions in 2012, or 61% of the energy sector emissions. The application of the stricter emission standards for mercury (in line with the USA) would reduce mercury emissions from German coal power plants by more than half.<sup>44</sup>

The definitive closure of coal plants, achieved as quickly as possible, will achieve the best long-term improvements in emissions reductions and local air quality. However, while this phase out occurs, some plants will remain operational and their emissions must be reduced as far as possible. A 2007 study indicated that had Best Available Techniques (BAT), as set out in the Large Combustion Plant Best Reference Document

## KEY POLICY ASKS: WHAT THE EU AND ITS MEMBER STATES NEED TO DO TO PHASE OUT DIRTY COAL-FIRED POWER GENERATION

In order to protect its citizens' health and to help the world tackle climate change, the EU and its 28 Member States need to rapidly close coal plants as part of their pathway to a fully decarbonised energy sector.

The EU is currently discussing its climate and energy targets for 2030 on the way towards meeting its agreed greenhouse gas reduction objective of 80 to 95 per cent by 2050. This means that the share of CO<sub>2</sub> emissions generated from coal in the EU will need to drop rapidly and eventually be phased out altogether. **According to the climate scenarios of the International Energy Agency (IEA), the share of coal in the EU electricity mix in 2035 needs to be below 4 per cent,<sup>48</sup> compared to the 26 per cent share in 2011.<sup>49</sup>**

It is dangerous to assume that coal will – somehow – automatically disappear from the EU's energy system. Much more attention must be given to the challenge of phasing out emissions from existing coal power plants. The recent “spike” in burning more coal in the EU is a case in point. **Clearly the EU needs to put a plan in place to rapidly close dirty coal plants.** The coal-specific asks below can guide the EU policy-making process on climate, energy, clean air and industrial activities, which should be seen as complementary, mutually beneficial policies that are not legislated for in isolation from each other.

### I. OVERARCHING OBJECTIVES

**1. Ensure the rapid closure of the most polluting EU coal power stations like the Dirty 30.** Such large CO<sub>2</sub> emitters should be scheduled for closure as needed for EU member states to meet national 2020 and 2030 GHG emission reduction targets. Coal must be substituted with alternative forms of electricity production (renewables and limited conventional gas) alongside investments in energy savings as well as demand-side flexibility.

**2. Put in place a plan or policies, which prevent the lifetime extension of old coal power stations should they receive technical upgrades.** As part of the energy sector transformation coal plants will need to be substituted with renewable energy and energy saving measures. During the transition phase, some power plants will remain operational for longer. Both air pollution and CO<sub>2</sub> emissions from these plants should be minimised through compliance with environmental performance benchmarks achievable with best available techniques (BAT), but this needs to be done without leading to a prolongation of the operational lifetime of these plants.

**3. EU governments must stop investing in coal in the EU and worldwide.** Governments must immediately put an end to all public financing of coal projects, including from international financial institutions of which they are members, their export credit agencies, development finance institutions and bilateral aid agencies. Furthermore, **all direct and indirect domestic public subsidies, state aid and investment incentives** that drive the expansion of coal mining and coal-based electricity generation should be replaced with financial support to assist with the development of renewable technologies and energy savings in Europe and in developing countries.

**4. Put in place a joint EU initiative to support ‘coal mining regional transformation.’** The economies of some mining regions in the EU are dependent on coal. The EU and its Member States must put in place a joint initiative in order to provide financial aid, re-training and other assistance to citizens currently securing their livelihoods from coal in mining

*continued on page 28*

# EUROPE'S DIRTY 30

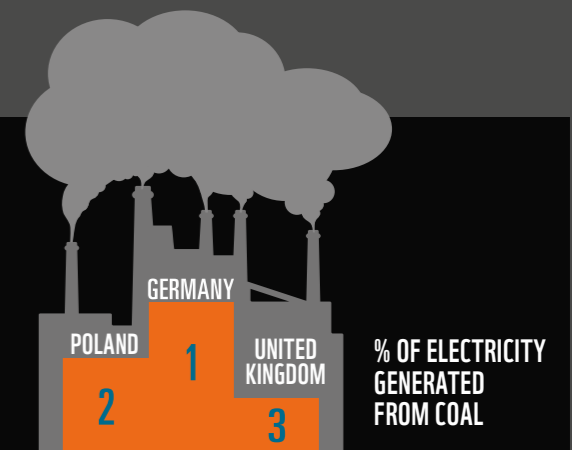
## HOW THE EU'S COAL-FIRED POWER PLANTS ARE UNDERMINING ITS CLIMATE EFFORTS

TOP 30 most CO<sub>2</sub>-polluting thermal power plants in the EU\*



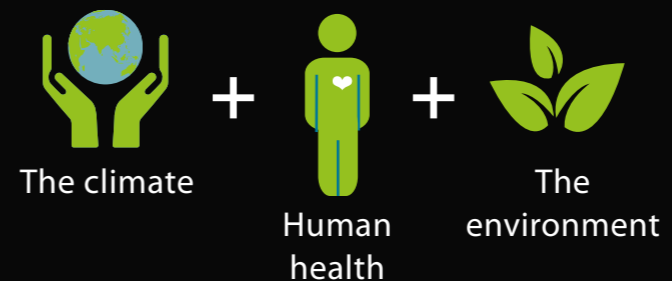
## GERMANY AND THE UK CLIMATE OR COAL?

Germany and the UK are the self-declared climate champions of the EU. However, both rely heavily on coal for their electricity. Germany and the UK rank first and third, respectively, amongst EU countries, in terms of generation of electricity from coal.



## THE EU AND ITS MEMBER STATES MUST BE CONSISTENT WITH THEIR CLIMATE AMBITION

Burning coal is not compatible with protecting:



The EU is currently discussing its climate targets for 2030 on the way toward meeting its agreed greenhouse gas reduction objective of 80% to 95% by 2050.

According to the International Energy Agency (IEA): The share of coal in the EU electricity mix in 2035 needs to be below 4% compared to the 26% share in 2011.



## GLOBALLY, COAL IS THE MAIN CLIMATE WRECKER

The world is already overheating. As the world's third-largest emitter of greenhouse gases, the EU must phase out coal rapidly.

dependent regions. This initiative should have the explicit goal of **supporting a rapid regional transformation away from economic coal dependence, while securing a just transition for those impacted.**

## II. EU CLIMATE & ENERGY AND INDUSTRIAL AND AIR QUALITY POLICIES

### EU 2030 climate and energy framework:

The EU must set **three binding, ambitious climate targets for 2030** - to reduce greenhouse gases, increase deployment of renewables and increase energy savings measures. To secure these targets they must be accompanied by coherent policies and measures, such as **strengthening the EU renewables and EU energy saving related policies.**

- 1. The ailing EU Emissions Trading Scheme (EU ETS) is in urgent need of structural reform.** The structural reform must go beyond the current proposals from the EU Commission if they are to have the desired effect on the power sector. The proposed Market Stability Reserve mechanism is not enough on its own. It should become operational well before 2021 and should be complemented by the permanent cancellation of at least 2.2 billion allowances as well as an increase of the annual linear emission reduction trajectory governing the EU ETS cap to at least 2.6% to cost-efficiently meet the EU's 2050 climate objectives.<sup>50</sup>
- 2. Introduce an Emissions Performance Standard (EPS) for CO<sub>2</sub> emissions from the power sector** to apply to new and existing coal power plants in order to prevent lock-in of the most-polluting power infrastructure, complementing EU ETS reform efforts.

### EU 2030 clean air package and policies targeting industrial activities:

Three EU policy instruments are central to achieving cleaner air and better health through changing our use of coal. These are: The National Emissions Ceiling Directive, the Industrial Emissions Directive and the Ambient Air Quality Directive. Two of these directives are currently undergoing revision.

- 1. Strengthen the National Emissions Ceiling (NEC) Directive.** Introduce **binding national emission reduction commitments for all air pollutants** including mercury for 2020, 2025 and 2030. Emissions reductions commitments must go beyond the levels in the Gothenburg Protocol and aim to achieve the 7th Environment Action Programme's objective of "levels of air quality that do not give rise to significant negative impacts on, and risks to, human health and the environment".
- 2. Strengthen the Industrial Emissions Directive (IED).**
  - a. Provide ambitious environmental performance benchmarks through the swift adoption** of the review of the Best Available Techniques Reference Document (BREF) for Large Combustion Plants (LCPs). Ensure standards are set on the basis of the "best" performer known. Introduce strict mercury standards as well as requirements that improve water quality.
  - b. Review the minimum binding requirements for Large Combustion Plants by the 2016 deadline to align existing emission limit values to the stricter requirements** of the updated BREF. Withdraw the possibility for operators to derogate from pollution levels attainable with the use of best available techniques (BAT) or minimum energy efficiency benchmarks. **Introduce emissions limit values for key heavy metals, in particular mercury, and include an Emissions Performance Standard for CO<sub>2</sub>.**

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**“COAL IS THE SINGLE  
GREATEST THREAT TO  
CIVILIZATION AND ALL  
LIFE ON OUR PLANET”**

James Hansen, climatologist, former head of the  
NASA Goddard Institute for Space Studies

**#EUDirty30**

