EUROPE’S DIRTY 30

HOW THE EU’S COAL-FIRED POWER PLANTS ARE UNDERMINING ITS CLIMATE EFFORTS
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, CO₂ 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 CO₂-polluting thermal power plants in the EU - the “Dirty 30” - and sets out the policies needed to tackle the pollution they produce.
“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 and global coal reserves represent a greater source of potential CO₂ 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.

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. 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. 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.

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 CO₂-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 CO₂-polluting thermal power plants - the Dirty 30 - is based on the absolute CO₂ 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 CO₂ 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 CO₂ 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.
EUROPE’S DIRTY 30
EU’s top CO₂ polluting power plants in 2013

1. Bergheim, Germany
   - CO₂ emissions: 37.18 Mt/a
   - MW: 5298
2. Bolchów, Poland
   - CO₂ emissions: 10.67 Mt/a
   - MW: 1610
3. Kozienice, Poland
   - CO₂ emissions: 10.23 Mt/a
   - MW: 2840
4. Rybnik, Poland
   - CO₂ emissions: 8.39 Mt/a
   - MW: 1720
5. Lippendorf, Germany
   - CO₂ emissions: 11.73 Mt/a
   - MW: 2427
6. Usedom, Germany
   - CO₂ emissions: 18.66 Mt/a
   - MW: 1798
7. Weisweiler, Germany
   - CO₂ emissions: 18.66 Mt/a
   - MW: 1798
8. Fiddler’s Ferry, UK
   - CO₂ emissions: 8.45 Mt/a
   - MW: 2000
9. Neurath, Germany
   - CO₂ emissions: 29.58 Mt/a
   - MW: 3680
10. Donk, Belgium
    - CO₂ emissions: 25.87 Mt/a
    - MW: 3680
11. Eversley, UK
    - CO₂ emissions: 8.31 Mt/a
    - MW: 1000
12. West Burton, UK
    - CO₂ emissions: 10.89 Mt/a
    - MW: 1924
13. Ratcliffe-on-Soar, UK
    - CO₂ emissions: 8.31 Mt/a
    - MW: 1000
14. Aberthaw, UK
    - CO₂ emissions: 8.31 Mt/a
    - MW: 1000
15. Grantham, UK
    - CO₂ emissions: 10.89 Mt/a
    - MW: 1924
16. Drax, UK
    - CO₂ emissions: 20.32 Mt/a
    - MW: 3300
17. Brindisi Sud, Italy
    - CO₂ emissions: 11.81 Mt/a
    - MW: 2640
18. Teruel, Spain
    - CO₂ emissions: 6.86 Mt/a
    - MW: 922
19. Torrevieja, Spain
    - CO₂ emissions: 6.86 Mt/a
    - MW: 922
20. Agios Dimitrios, Greece
    - CO₂ emissions: 13.11 Mt/a
    - MW: 1588.5
21. Tallinn, Estonia
    - CO₂ emissions: 10.67 Mt/a
    - MW: 1610
22. Kardia, Greece
    - CO₂ emissions: 8.91 Mt/a
    - MW: 1200
23. Fiddler’s Ferry, UK
    - CO₂ emissions: 8.45 Mt/a
    - MW: 2000
24. West Burton, UK
    - CO₂ emissions: 10.89 Mt/a
    - MW: 1924
25. Rybnik, Poland
    - CO₂ emissions: 10.67 Mt/a
    - MW: 1610
26. Belchatów, Poland
    - CO₂ emissions: 10.67 Mt/a
    - MW: 1610
27. Sinis, Portugal
    - CO₂ emissions: 7.18 Mt/a
    - MW: 1250
28. Sines, Portugal
    - CO₂ emissions: 6.86 Mt/a
    - MW: 922
29. Grohnde, Germany
    - CO₂ emissions: 10.89 Mt/a
    - MW: 1924
30. Drax, UK
    - CO₂ emissions: 20.32 Mt/a
    - MW: 3300
## THE EU’S DIRTY 30

### Top 30 most CO₂-polluting thermal power plants in the EU

<table>
<thead>
<tr>
<th>Rank</th>
<th>Plant Name</th>
<th>Country</th>
<th>Owner</th>
<th>MWe (2013)</th>
<th>Fuel</th>
<th>Start of operation*</th>
<th>CO₂ emissions (2013, Mt/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bełchatów</td>
<td>Poland</td>
<td>PGE</td>
<td>5298</td>
<td>lignite</td>
<td>1982-88, 2011</td>
<td>37.18</td>
</tr>
<tr>
<td>2</td>
<td>Neurath</td>
<td>Germany</td>
<td>RWE</td>
<td>4168</td>
<td>lignite</td>
<td>1975-76, 2012</td>
<td>36.28</td>
</tr>
<tr>
<td>3</td>
<td>Neurath</td>
<td>Germany</td>
<td>RWE</td>
<td>3660</td>
<td>lignite</td>
<td>1969-71, 2002</td>
<td>29.58</td>
</tr>
<tr>
<td>4</td>
<td>Janschwalde</td>
<td>Germany</td>
<td>Vattenfall</td>
<td>2790</td>
<td>lignite</td>
<td>1981-1987</td>
<td>25.40</td>
</tr>
<tr>
<td>5</td>
<td>Boxberg</td>
<td>Germany</td>
<td>Vattenfall</td>
<td>2427</td>
<td>lignite</td>
<td>1978-79, 2000, 2012</td>
<td>21.89</td>
</tr>
<tr>
<td>6</td>
<td>Didcot</td>
<td>United Kingdom</td>
<td>Didcot Power</td>
<td>3300</td>
<td>hard coal</td>
<td>1974-76, 1984-1986</td>
<td>20.32</td>
</tr>
<tr>
<td>7</td>
<td>Welzow</td>
<td>Germany</td>
<td>RWE</td>
<td>1798</td>
<td>lignite</td>
<td>1965-75</td>
<td>18.66</td>
</tr>
<tr>
<td>8</td>
<td>Agios Dimitrios</td>
<td>Greece</td>
<td>PPA</td>
<td>1397</td>
<td>lignite</td>
<td>1984-86, 1997</td>
<td>13.11</td>
</tr>
<tr>
<td>9</td>
<td>Brindisi</td>
<td>Italy</td>
<td>Enel</td>
<td>2640</td>
<td>hard coal</td>
<td>1991-95</td>
<td>11.81</td>
</tr>
<tr>
<td>10</td>
<td>Lippendorf</td>
<td>Germany</td>
<td>Vattenfall / Erfurt</td>
<td>1750</td>
<td>lignite</td>
<td>1999, 2000</td>
<td>11.73</td>
</tr>
<tr>
<td>11</td>
<td>Eggborough</td>
<td>United Kingdom</td>
<td>Eggborough Power</td>
<td>2000</td>
<td>hard coal</td>
<td>1967</td>
<td>11.50</td>
</tr>
<tr>
<td>12</td>
<td>Schwarze Pumpe</td>
<td>Germany</td>
<td>Vattenfall</td>
<td>1500</td>
<td>lignite</td>
<td>1997, 1998</td>
<td>11.28</td>
</tr>
<tr>
<td>13</td>
<td>Ratcliffe-on-Soar</td>
<td>United Kingdom</td>
<td>E.ON</td>
<td>2000</td>
<td>hard coal</td>
<td>1968-70</td>
<td>11.01</td>
</tr>
<tr>
<td>14</td>
<td>West Burton</td>
<td>United Kingdom</td>
<td>E.ON</td>
<td>2000</td>
<td>hard coal</td>
<td>1967-68</td>
<td>10.89</td>
</tr>
<tr>
<td>15</td>
<td>Eesti Elektrijaam</td>
<td>Estonia</td>
<td>Eesti Energia</td>
<td>1610</td>
<td>oil shale</td>
<td>1969-73, 2004</td>
<td>10.67</td>
</tr>
<tr>
<td>16</td>
<td>Koszowice</td>
<td>Poland</td>
<td>ENEA</td>
<td>2840</td>
<td>hard coal</td>
<td>1972-79</td>
<td>10.23</td>
</tr>
<tr>
<td>17</td>
<td>Scholven</td>
<td>Germany</td>
<td>E.ON</td>
<td>2006</td>
<td>hard coal</td>
<td>1968-71, 1979</td>
<td>10.22</td>
</tr>
<tr>
<td>18</td>
<td>Cottam</td>
<td>United Kingdom</td>
<td>E.ON</td>
<td>2000</td>
<td>hard coal</td>
<td>1969-70</td>
<td>10.17</td>
</tr>
<tr>
<td>20</td>
<td>Torvaldalga</td>
<td>Italy</td>
<td>Enel</td>
<td>1980</td>
<td>hard coal</td>
<td>2006, 2010</td>
<td>9.73</td>
</tr>
<tr>
<td>21</td>
<td>Longannet</td>
<td>United Kingdom</td>
<td>Iberdrola</td>
<td>2400</td>
<td>hard coal</td>
<td>1978-79</td>
<td>9.31</td>
</tr>
<tr>
<td>23</td>
<td>Abington</td>
<td>United Kingdom</td>
<td>PPA</td>
<td>1550</td>
<td>hard coal</td>
<td>1971</td>
<td>8.50</td>
</tr>
<tr>
<td>24</td>
<td>Fiddler’s Ferry</td>
<td>United Kingdom</td>
<td>Scottish and Southern Energy (SSE)</td>
<td>2000</td>
<td>hard coal</td>
<td>1971-73</td>
<td>8.45</td>
</tr>
<tr>
<td>25</td>
<td>Robinik</td>
<td>Poland</td>
<td>EON</td>
<td>1720</td>
<td>hard coal</td>
<td>1972-78</td>
<td>8.39</td>
</tr>
<tr>
<td>26</td>
<td>Ferrybridge “C” United Kingdom</td>
<td>Scottish and Southern Energy (SSE)</td>
<td>1300</td>
<td>hard coal</td>
<td>1966-68</td>
<td>8.31</td>
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<tr>
<td>27</td>
<td>Sines</td>
<td>Portugal</td>
<td>EDP</td>
<td>1250</td>
<td>hard coal</td>
<td>1985-87</td>
<td>7.18</td>
</tr>
<tr>
<td>28</td>
<td>Abona</td>
<td>Spain</td>
<td>EDP</td>
<td>922</td>
<td>hard coal</td>
<td>1974, 1980</td>
<td>6.86</td>
</tr>
<tr>
<td>30</td>
<td>Maasvlakte</td>
<td>Netherlands</td>
<td>E.ON</td>
<td>1060</td>
<td>hard coal</td>
<td>1978</td>
<td>6.68</td>
</tr>
</tbody>
</table>

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 CO₂ 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. A combination of economic factors, including rising gas prices, lower coal prices and a low CO₂ 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. 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. 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 CO₂ 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 CO₂ emissions from coal in 2013 compared to 2012, as does the new Eurostat data for electricity generated from coal, 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, 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.

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. The EU experienced a net closure of 19 gigawatts (GW) of coal capacity between 2000 and 2013. 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. This suggests that the idea of an EU “coal renaissance” 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. 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) and the Industrial Emissions Directive (IED). 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 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 CO₂ 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. This will require a stark decrease compared to the 36% share of electricity generation from coal in 2011.

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 CO₂ 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 generation from coal. The German 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.
GERMANY

GERMANY’S MOST CO₂-POLLUTING THERMAL POWER PLANTS IN THE EU DIRTY 30 RANKING

- **Coal Plant: Lippendorf**
  - Location: Büren, Germany
  - Ranking: Nr. 10
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 11.73
  - MW: 1750

- **Coal Plant: Jänschwalde**
  - Location: Peitz, Germany
  - Ranking: Nr. 4
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 25.40
  - MW: 2790

- **Coal Plant: Weisweiler**
  - Location: Eschweiler, Germany
  - Ranking: Nr. 7
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 16.66
  - MW: 1798

- **Coal Plant: Neurath**
  - Location: Grevenbroich, Germany
  - Ranking: Nr. 2
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 33.28
  - MW: 4168

- **Coal Plant: Neideraussem**
  - Location: Bergheim, Germany
  - Ranking: Nr. 3
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 29.58
  - MW: 3680

- **Coal Plant: Niederaussem**
  - Location: Gelsenkirchen, Germany
  - Ranking: Nr. 17
  - Fuel: Hard Coal
  - CO₂ Emissions (2013, Mt/a): 10.22
  - MW: 2056

- **Coal Plant: Mannheim**
  - Location: Mannheim, Germany
  - Ranking: Nr. 20
  - Fuel: Hard Coal
  - CO₂ Emissions (2013, Mt/a): 8.75
  - MW: 1520

- **Coal Plant: Boxberg**
  - Location: Boxberg, Germany
  - Ranking: Nr. 5
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 21.89
  - MW: 2427

- **Coal Plant: Schwarze Pumpe**
  - Location: Spremberg, Germany
  - Ranking: Nr. 12
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 11.28
  - MW: 1500

- **Coal Plant: Bochum**
  - Location: Bochum, Germany
  - Ranking: Nr. 11
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 11.72
  - MW: 1500

- **Coal Plant: Jänschwalde**
  - Location: Peitz, Germany
  - Ranking: Nr. 4
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 25.40
  - MW: 2790

- **Coal Plant: Weisweiler**
  - Location: Eschweiler, Germany
  - Ranking: Nr. 7
  - Fuel: Lignite
  - CO₂ Emissions (2013, Mt/a): 16.66
  - MW: 1798
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. 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). Renewables are also replacing fossil fuelled generation, having saved a total of 147mt in CO₂ emissions in Germany in 2012 alone.

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. In 2013 Germany’s year-on-year CO₂ emissions rose by 1.5%. Due to Germany burning more coal the country is running the risk of not meeting its 40% GHG reduction target for 2020.

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. 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. 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, NIEDERASSEM POWER STATION IS THE THIRD-WORST POWER STATION IN THE EU IN TERMS OF TOTAL CO₂ 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. 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 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 CO₂-POLLUTING THERMAL POWER PLANTS IN THE EU DIRTY 30 RANKING
The nine dirtiest coal power plants in the UK collectively put nearly 100 million tonnes of CO₂ 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 CO₂ per year, swallowing up half the 20Mt CO₂ annual emissions limit for the energy sector but providing only 3% of the UK’s electricity supply.35

**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 CO₂ 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 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. Given the necessity of keeping the global temperature rise well below 2 degrees, only a fraction of this coal can be exploited.

**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 CO₂ 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) 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 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 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.

**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.**
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.\textsuperscript{38,39} 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.\textsuperscript{40} 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.\textsuperscript{41} 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)
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.44

A 2013 EEA report confirms that emissions from coal power plants could be reduced by 69% for NOx, 94% for SO2 and 79%45 for particulate matter (PM2.5/10) if operators would simply apply existing BAT standards.46 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 relativley dirty plants. This can already been 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”.47

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.

**KEY POLICY ASKS:**

**WHAT THE EU AND ITS MEMBER STATES NEED TO DO TO PHASE OUT DIRTY COAL-FIRED POWER GENERATION**

1. **Ensure the rapid closure of the most polluting EU coal power stations like the Dirty 30.** Such large CO2 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 CO2 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 CO₂-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.

NEARLY 2/3 OF THE EU’S THIRTY MOST CO₂-POLLUTING COAL-FIRED POWER PLANTS

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

Burning coal is not compatible with protecting:

The climate + Human health + The environment

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 emission reduction trajectory governing the EU ETS cap to at least 2.6% to cost-efficiently meet the EU’s 2050 climate objectives.

2. Introduce an Emissions Performance Standard (EPS) for CO2 emissions from the power sector to apply to new and existing coal power plants in order to prevent lock-in of new coal power infrastructures, 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 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.”

   
   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 CO2.

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6. Products of sulfur dioxide and nitrogen oxides after reactions in the atmosphere are acid rain (sulfuric and nitric acid) which damages ecosystems and buildings, particulate matter (ammonium sulfate and ammonium nitrate) which is harmful to human health, and ozone (formed through reactions of nitrogen gases) which causes respiratory problems and eye irritation.
17. http://www.carbontracker.org/site/carbonbubble
25. circularization of products that shift out emission limit values under the EU Large Combustion Plants Directive (Article 4-6) will have to close at the latest by January 1st 2016 unless they use their maximum permissible operation hours before then. The kit of plants and their status on January 1st 2013 is available here. http://www.eia.europa.eu/data-and-maps/data/large-combustion-plants-icp-opted-out-under-article-4-4-of-directive-2001-80-ec-3
26. Directive 1999/31/EC on industrial emissions (BPPC-Recast), which tightens Emission Limit Values for 3 key pollutants, unless operators may effectively use operational derogations.
This analysis is taken from the work of the UK Committee on Climate Change.


$26$-$71$ billion if CO2 is excluded: EEA report No 15/2011 “Revealing the costs of air pollution from industrial facilities in Europe”.

The EEA is due to publish an updated version of this report in June 2014.

NOx, SO2 and dust are among the most dangerous air pollutants given the number of people impacted.


The health external costs, excluding CO2 effects, of the Dirty 30 amounted to €$2$-$4$ billion Euro in 2009. Health damage costs from heavy metal and organic compound emissions were as at 34 million Euro, according to the data sheet accompanying EEA report No 15/2011.


A 2013 assessment of the economic costs associated with NOx point sources from mercury contamination in the European population arrived at the figure of 9 billion Euro lost annually for the EU27. Contamination was estimated Belanger et al. (2013): Economic benefits of methylmercury exposure control in Europe: Monetary value of neurotoxicity prevention. Environmental Health 2013, 12:3

Over 16 tonnes of mercury are emitted into the air each year by about 180 LCPs. The economic costs of mercury point sources from mercury contamination in the European population arrived at the figure of 9 billion Euro lost annually for the EU27. Contamination was estimated. https://www.cms-gruen.de/fileadmin/media/guenuebundesliga_de/themen_ua/energi e/pdf/BZL_ Studie_QuicksilberemissionenAuskraftwerkenInDeutschland_final.pdf

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EUROPE’S DIRTY 30
“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

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