

THE GREENPEACE CASE AGAINST COAL-FIRED POWER GENERATION

And the case for real solutions to climate change and energy insecurity

Summary

* The single greatest threat to the climate comes from burning coal. Coal-fired generation is historically responsible for most of the fossil-fuel CO₂ in the air today, about half of all fossil-fuel carbon dioxide emissions globally.¹

* Coal-fired power generation is the most environmentally damaging means of generating electricity yet devised. In fact, in carbon terms, coal is the dirtiest fuel known to man.²

* As we close old coal-fired and nuclear power stations in the next decade we will lose capacity currently providing around a quarter of our electricity output. But Gordon Brown committed to European legal targets which require us to generate up to 40% of our electricity from renewables alone by 2020, and the UK also has fairly ambitious energy efficiency targets.³ According to Europe's leading independent energy experts, Poyry, if the UK was to hit these existing renewables and efficiency targets, there will be no 'energy gap.' In other words, we can keep the lights on and cut emissions, and in the long run bring down fuel bills too - all without any new coal-fired plants.⁴

* The world's pre-eminent climate scientist, Professor James Hansen, who is director of the NASA Goddard Institute for Space Studies, is so concerned about plans for new coal plants in Britain that he has campaigned to stop Kingsnorth. He argued that with the Kingsnorth decision Ministers have the potential to influence *"the future of the planet."*⁵

He has called coal stations *"death factories"*⁶ and said, *"The only practical way to prevent CO₂ levels from going far into the dangerous range, with disastrous effects for humanity and other inhabitants of the planet, is to phase out use of coal except at power plants where the CO₂ is captured and sequestered."*⁷

¹ Dr. James E. Hansen, open letter to Gordon Brown, December 2007

<http://www.greenpeace.org.uk/blog/climate/letter-to-the-prime-minister-20071219>

² IPCC Working Group III Fourth Assessment Report chapter 4 table 4.9

Supercritical coal plants emit 710gCO₂/Kwh compared to 404gCO₂/Kwh for CCGT (gas), for example.

³ The UK efficiency target is to achieve an 18% reduction in end-use energy demand against current rates of increase.

⁴ http://us.ft.com/ftgateway/superpage.ft?news_id=fto073120082322523374&page=2

⁵ Dr. James E. Hansen, open letter to Gordon Brown, December 2007

<http://www.greenpeace.org.uk/blog/climate/letter-to-the-prime-minister-20071219>

⁶ <http://www.guardian.co.uk/commentisfree/2009/feb/15/james-hansen-power-plants-coal>

⁷ Dr. Jim Hansen, Testimony to the State of Iowa, 2007

http://www.columbia.edu/~jeh1/IowaCoal_071105.pdf

Equally, Sir Martin Rees, President of the prestigious Royal Society, wrote to the Energy Minister saying, *"I (therefore) suggest that the government only gives consent to any new coal- fired power station, such as Kingsnorth, on condition that the operating permits are withdrawn if the plant fails to capture 90% of its carbon dioxide emissions by 2020. This would send a clear policy signal to industry of the need to develop and deploy Carbon Capture and Storage (CCS) as quickly as possible."*⁸

Sir David King - the government's former chief scientist - said, *"There's little doubt that if we burn all of the coal that sits below the earth's surface, we can return the planet to the condition it was in 50 million years ago when the Antarctic was a tropical forest and much of the rest of the planet would be pretty difficult for human beings to live on...We've got to see that coal is not a useful resource to burn unless we can recapture the carbon that is produced by burning it."*

He added of CCS, *"This is still unproven technology and I think until it's proven, it's dangerous to assume that we can continue to use coal."*⁹

* Lord Stern of Brentford, in interview with the BBC Radio 4 Today Programme, supported the view that coal stations like the one proposed for Kingsnorth should not be approved without CCS.¹⁰

Today Programme: *"And when you talk about clean coal, what do you think about the coal fired power stations that are planned, should they only be allowed to go ahead with certain commitments, how should that work?"*

Lord Stern: *"I think they should be planned to involve carbon capture and storage from the beginning"*

Today programme: *"And if not, they don't get the go ahead?"*

Lord Stern: *"I think that's right"*

* The government's own climate advisers, the Committee on Climate Change, advised the Prime Minister in December 2008 that no coal station - old or new - should be allowed to operate without fully functioning CCS by the early 2020s.

* The way forward is through an emissions performance standard (EPS) which would place a legal limit on the amount of carbon emissions a power station is allowed to produce per each unit of energy they generate. This sort of limit, if applied to all NEW power stations immediately, would rule out unabated coal power stations. The limit would be tightened in 2025 to minimise emissions

⁸ <http://www.guardian.co.uk/environment/2008/apr/03/fossilfuels.energy>

⁹ <http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/08/01/eapower101.xml>

¹⁰ BBC Radio 4, Today programme, 6th October 2008

from power stations in line with our climate change targets, thereby allowing generators time to decide how best they intend to comply with the limit, or close their dirty plants down. Such an EPS would provide a cast iron guarantee that high emissions would be illegal in the future. Only this sort of legal limit avoids the risk of locking us into a high-carbon future and ensures that only low-carbon power will be generated.

FAQs

“But hasn’t Ed Miliband dealt with the coal issue already?”

On Thursday 23rd April Ed Miliband told Parliament *“the era of new unabated coal is over.”*

Given that E.ON still planned to pour the concrete for a completely unabated station at Kingsnorth last summer, this was a significant U-turn in government policy.

However, whilst it marks a break from all of the previous Energy Secretaries who have consistently failed to lay down the gauntlet to the utilities over their climate change emissions, even Miliband’s own officials admitted on the day that large parts of his policy remain *“unclear.”*

This is an understatement. It is not clear how Britain could hit its legally binding carbon budget for a 34% reduction in CO₂ by 2020 were new coal stations to go ahead under the current proposals. Furthermore, huge questions remain about what the new coal policy will look like, and with significant loopholes remaining.

Miliband announced that he will launch both a new consultation into what exactly the new coal policy might look like, and a Strategic Environmental Assessment of the plans but since CCS technology is still fraught with uncertainties, if Miliband doesn’t show the necessary leadership to completely rule out unabated coal, then all the evidence of past experience suggests we will end up with high carbon infrastructure belching out climate-damaging emissions indefinitely.

We still haven’t got a cast iron guarantee from Ministers that new power stations won’t be emitting high levels of CO₂ in the future.

“So what exactly did the Secretary of State announce?”

Ed Miliband announced that any new coal station built in Britain would need to capture and store “at least” 400MW of its emissions - from day one - using CCS technology.

On a normal (so-called “supercritical”) coal station such as Kingsnorth, that would amount to using a technique known as “post-combustion” CCS technology to capture about a quarter of its emissions. So Miliband says for every ton of CO₂ generated by new coal fired powers he would force energy companies to capture, he’d let three tonnes go unabated into the atmosphere.

On any new so-called “pre-combustion” coal station (“IGCC plant”), the nature of the technology means that 80-90% of emissions would be captured from day one.

Miliband said he supports four new coal stations being built under these conditions but didn’t specify how many would be “pre-combustion” and how many would be “post-combustion”. He outlined that the CCS programme would be paid for by a new ‘consumer levy’ announced in Darling’s budget. This means public money would be used by the power companies to fit CCS.

Additionally to this, Miliband said that once CCS is proven to be economically and technically feasible (probably to be determined by the Environment Agency) it must be scaled up to full CCS from 2020 and by the latest 2025.

Miliband’s proposal so far fails to give a cast-iron guarantee that there won’t be high emissions for years to come, which is what the science dictates.

“But doesn’t CCS mean that “clean coal” exists and is a viable low carbon fuel?”

CCS still hasn’t been demonstrated at full scale anywhere in the world and the technology is fraught with uncertainties. Here’s what some CCS enthusiasts have said recently about it:

* Energy Minister, Mike O’Brien, said, *“CCS is as yet unproven as a commercial deployment. I hope that will alter in the future but it is surely a huge risk strategy to base your whole energy strategy on CCS.”* (18th November 2008, Speech to Chatham House)

* Energy Minister, Mike O’Brien, admitted in a robust exchange with the SNP, that CCS is *“a bet”* and accused the First Minister of *‘gambling everything on the successful commercial application of carbon capture technology to provide a future for the coal industry.’* (10th February 2009, Article in The Scotsman)

* The government’s own Energy White Paper on nuclear power stated, *“By 2050 it is possible that most new coal-fired power stations will be able to deploy CCS technology...However, CCS is as yet unproven technology and we have to acknowledge there is some risk that safe and reliable CCS for power generation might not be proven or deployable at scale and at reasonable costs. This could happen if the projected costs turn out to be too high or if it proves*

to be difficult to develop safe ways to transport and store CO2. " (Paragraph 2.80 on page 71 of the White Paper, 2007)

* Chancellor Alistair Darling, when he was Business Minister, told Parliament that CCS is *"still in the foothills"* and *"may never work."*

He said: *"Yes, carbon capture and storage, if it can be developed, would help. But at this stage we cannot be certain of that. There is no commercial scale operation of CCS on power generation anywhere in the world."* (23rd May 2007, Launch of Energy White Paper)

* Sir David King, the government's former chief science adviser:

"This is still unproven technology and I think until it's proven, it's dangerous to assume that we can continue to use coal." (August 2008)

* John Robertson, Labour MP who sits on the DECC Committee, said, *"To say we're going to return to the days of Old King Coal may make for good headlines, but with climate change and the policies we will need to tackle this it just isn't credible. My constituents are facing higher food and fuel bills and fluctuations in the price of oil and global events have underscored the need to reduce our dependence on fossil fuels."* (9th February 2009, Energy Conference in Scotland)

* The CEO of the coal utility RWE npower, Andy Duff, admitted:

"At this time there are still many financial, legal, regulatory, and technical hurdles to clear on CO2 transportation and storage technology." (Modern Power System journal, June 2007)

* E.ON themselves are privately sceptical. In an email they sent to officials at the Department of Business, the company says that CCS technology at Kingsnorth *"obviously... has no current reference for viability at any scale."* (January 16th 2008)

* Standard & Poor's credit analyst David Lundberg:

"Given its high costs, it (CCS) will not be economically justified in the near term, when CO2 reduction requirements are likely to be small, and other approaches to CO2 reduction will be less expensive." (Global Power Report, June 7th 2007)

"If we don't go for coal we'll be dependent on gas as a replacement. And therefore on unstable regimes and countries like Russia."

The real threat to the security of our gas supplies derive from the inefficient way in which we use our gas, combined with a failure to sufficiently invest in distribution and storage infrastructure in order to guard against sudden price fluctuations. As the Government's most recent energy white paper showed, global gas supplies are becoming more varied and more stable. The UK simply isn't dependent on a handful of rogue states to keep our stoves running. For instance, we currently import very little of our gas from Russia. In contrast, over 70% of coal burned in the UK is imported - largely from Russia.¹¹

“Don't we ultimately need coal though to keep the lights on?”

No. Research from Europe's leading independent energy experts, Poyry, showed that if the UK hit its existing 2020 renewables and efficiency targets, there is no need for new coal capacity.¹²

There are now lots of studies, including many by government, engineering consultants, eminent academics and energy industry bodies all showing how this scale of electricity generation could be met through energy efficiency, cleaner use of fossil fuels, renewables and state-of-the-art decentralised power stations like they have in Scandinavia.

A sizable portion of the 'gap' could be closed through energy efficiency alone - delivering a substantial economic savings at the same time. Government figures show that there is the potential to save over 30% of all energy (not just electricity) used in the UK solely through efficiency measures that would also save more money than they cost to implement. Government puts the total saving for consumers for this level of efficiency improvement at £12 billion.¹³

There are several government and industry figures published for the potential contribution from marine power - electricity harnessed from waves and tides. A conservative view based on these, including one of the government's own studies into what could be achieved economically by 2020, suggests that 12% of UK electricity - or 1/3 of the so called 'energy gap' - could be met by marine power in the next decade or so.

According to the government, there is the potential in the UK by 2015 to generate 25% of our electricity using Combined Heat and Power with greater capacity thereafter.¹⁴ According to another report from the energy consultancy, Poyry, there is so much industrial CHP potential in the UK that we could halve our gas imports.¹⁵ CHP is a super-efficient way of generating

¹¹ <http://www.guardian.co.uk/environment/blog/2008/aug/22/carbonemissions.fossilfuels>

¹² <http://www.greenpeace.org.uk/files/pdfs/climate/energy-gap-summary.pdf>

¹³ <http://www.cabinetoffice.gov.uk/upload/assets/www.cabinetoffice.gov.uk/strategy/piuh.pdf>

¹⁴ Cogeneration Directive Assessment, DEFRA, November 2007

¹⁵ <http://www.ft.com/cms/s/81acd316-3d62-11dd-bbb5->

[0000779fd2ac.Authorised=false.html? i_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2F](http://www.ft.com/cms/s/81acd316-3d62-11dd-bbb5-0000779fd2ac.Authorised=false.html?i_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2F)

electricity and using the subsequent heat that is otherwise wasted. Combined Heat and Power stations can mix efficient use of gas and coal with other types of cleaner fuels such as woodchip, straw or biogas, further reducing any reliance on gas.

Ministers have said they're looking towards achieving 33 gigawatts of offshore wind.¹⁶ The wind industry is confident that this is absolutely do-able. Their magazine, Wind Power Monthly wrote in February 2008:

" Today about 56GW of wind supplies 3-4% of Europe's electricity. That will need to move to 165 GW over the next 12 years, or 13.75GW a year. The challenge is not that great; the industry is already putting up more than 10GW in Europe every 12 months. "

In 2007, the US installed 12 times more wind capacity than the UK. Spain 8 times, China 8 times, India 4 times, Germany 4 times and France - double.¹⁷

"Aren't renewables notoriously unreliable? What happens when the wind doesn't blow?"

The operator of the current electricity national grid said, *"...based on recent analysis of the incidence and variation of wind speed, the expected intermittency of wind does not appear to pose major problems for stability..."*¹⁸

Back-up for the electrical grid already exists, because even major power stations have to come off line very rapidly in response to incidents - like safety scares at nuclear power stations such as those experienced in 2007. There is a considerable variability in the demands on the power system which grid operators are well used to managing. Intermittency is not likely to become an issue at all until you have more than 20% wind penetration on the grid, and even then there are numerous opportunities to provide baseload without needing to rely upon coal. For example, research by Poyry shows there is enough CHP potential to generate more electricity at just nine existing industrial sites than ten nuclear power stations. This is untapped potential that could be utilized.

The wind is blowing somewhere in Britain almost constantly. Research using meteorological records by the Oxford University Environmental Change unit showed that over a 5 year period there was no wind in Britain for only 1 hour in every 5 years. Even then other renewables like solar, wave, tidal, biomass and

81acd316-3d62-11dd-bbb5-0000779fd2ac.html&i_referer=http%3A%2F%2Fwww.greenpeace.org.uk%2Ftags%2Fnuclear

¹⁶ Statement from Hutton, December 11th, 2007

¹⁷ Global Wind Energy Council, February 2008

¹⁸ National Grid Transco, Seven Year Statement, May 2005

biogas would still be generating power, with back up from the efficient use of fossil fuels.

In the future, when there are very high levels of intermittent renewables, the opportunity remains to set up so-called 'super-grids' using interconnectors between countries to allow the grid to be balanced across large sections of Europe which would further avoid any need for coal and nuclear power.

"But if China and India are inevitably going to burn coal for decades to come then we need to become a world leader in 'clean coal' technology and export it to them?"

Placing all our hope in making one unproven technology work just isn't a rational position - especially when there are real, tried-and-tested solutions like renewables, decentralised energy and energy efficiency. That's the modern, clean technology we should be exporting to the developing world.

Industrialising nations should be supported in shifting to a low carbon energy system from now - and that means efficiency, decentralisation and large scale renewables. In the case of China, there is a huge opportunity in that much of the increase in energy demand is coming from the emergence of new mega-cities. These provide ample opportunity to go low-carbon from the get-go using zero-carbon homes and decentralised networks.

It's worth noting that in the last year, China has been taking renewables much more seriously than the UK. The country's wind capacity grew by 156% to over 6000MW by the end of 2007. That's about 1.5 times the amount the UK has installed ever. They did it in a year!

China is now the fifth biggest user of wind energy in the world. Based on current growth rates, the Chinese Renewable Energy Industry Association (CREIA) forecasts a capacity of around 50,000 MW by 2015!¹⁹

"Won't the Emissions Trading Scheme sort things out?"

The European Emissions Trading Scheme (ETS) is already up and running and yet we have at least seven new coal plants proposed for the UK with at least three of them intended to be burning coal - unabated - by 2012 - the year that the tougher caps for emissions trading come into play. So clearly the ETS is simply not working well enough to stop new coal plants. Following advice from Lord Turner and the Committee on Climate Change, Ed Miliband has acknowledged that additional measures will be required.

¹⁹ Global Wind Energy Council - [http://www.gwec.net/index.php?id=30&no_cache=1&tx_ttnews\[tt_news\]=139&tx_ttnews\[backPid\]=4&chash=6691aa654e](http://www.gwec.net/index.php?id=30&no_cache=1&tx_ttnews[tt_news]=139&tx_ttnews[backPid]=4&chash=6691aa654e)

One danger with the ETS is that once new coal plants are built, it will be hard to get rid of them. The Stern Review stated, *"It is critical that governments consider how to avoid the risks of locking into a high-carbon infrastructure, including considering whether any additional measures may be justified to reduce the risks."*²⁰

Gradually as carbon becomes more expensive the UK will get left behind, lumbered with increasingly redundant technology and have less scope to change its system for the really deep CO₂ cuts in the longer term. These costs will likely get passed onto consumers too.

In addition, the ETS allows participants to simply buy in credits from overseas rather than address our energy mix at home, meaning that we will be faced in the future with buying in renewable technology from abroad and being charged a premium price for it. This incurs an additional cost of the loss of the industrial development and job creation opportunities that other countries who are pursuing renewables have already begun to realise.

Different CCS enthusiasts have argued over the price at which the European ETS makes CCS-coal plants more cost-effective than unabated coal plants without coming to agreement, but what is clear is that nobody thinks that the next ETS phase will deliver a high enough carbon price to stop unabated coal.

So for example, Vattenfall believes that you need an ETS carbon price signal of between 100 and 200 euros before CCS becomes cost effective. The investment bank, Climate Change Capital, believe the price would need to be between 100 and 155 euros,²¹ and Shell says between 50 and 100 euros.²² Deutsche Bank says 62 euros.²³ To put these estimates in to context, the Financial Times reported on 29th July 2008, that the price of carbon in 2012 is selling in the forward market at 30 euros.²⁴ This is nowhere near high enough to affect investment decisions sufficiently to drive the transition to a low-carbon economy.

"Surely if we don't replace our coal plants, thousands are going to be left jobless?"

The truth is that the renewables and efficiency sector offers a huge opportunity for job creation whereas jobs in the fossil fuel industry simply aren't going to be sustainable in a climate-changing world.

²⁰ Stern Review on the Economics of Climate Change – Professor Jonathan Stern, October 2006

²¹ <http://ccs-association.com/docs/2008/23%20April%202008/2%20Tony%20White%20-%20Climate%20Change%20Capital%20%20%2023%20April%202008.ppt>

²² http://business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article3371862.ece

²³ 'It takes CO₂ to contango' report, June 2008

²⁴ <http://www.ft.com/cms/s/0/be496fb6-5cfa-11dd-8d38-000077b07658.html>

Germany has already created a quarter of a million green-collar jobs in renewables and that's just in the past six years alone. Denmark's wind industry alone employs 20,000 and Spain's 35,000. Equally, the US employs literally millions in energy efficiency and renewables.²⁵ In the race to a low carbon economy, the UK lags behind.

The potential for employment in renewables far exceeds the relatively small numbers employed in UK coal burning and experience in the US shows that renewable energy creates more jobs per megawatt of power installed, unit of energy produced, and dollar invested than fossil energy.²⁶

A report published in March 2009 from Impetus Consulting, which was backed by the TUC, Greenpeace and the Federation of Master Builders and launched by Lib Dem leader Nick Clegg, showed that an annual £5 billion investment in domestic energy efficiency would create around 55,000 jobs directly. Hundreds of thousands of jobs would be created indirectly. And every year it would reduce emissions of carbon dioxide by about 1.6 million tonnes while also addressing fuel poverty.

"We can have both coal and renewables."

This is merely a political statement. At the moment, because of the conditions the government has established, the market is stacked in favour of coal. Increasingly the government is trying to fix the conditions to make nuclear more attractive too - although at this stage its future remains risky and uncertain. We need Miliband to adopt a framework which will deliver on his promise of a successful renewables industry.

A policy framework for renewables and decentralised energy would look totally different from one that supports new coal. It would, amongst other things:

- * Value the efficiency of fuel burn and low carbon heat
- * Value short supply distances so as to avoid the need for expensive transmission and distribution lines
- * Value low carbon emissions
- * Be friendly to power being sold in small amounts, and be easy for small producers to engage with.

But in practice the current framework does none of these things. The government's system is designed to accommodate large, inefficient and remote power stations owned by large companies like the coal and nuclear utilities

²⁵ Environmental and Energy Studies, Institute, Washington DC.
http://www.eesi.org/briefings/2007/Energy%20&%20Climate/11-8-07_green_jobs/EEREJobsFactSheet_11-8-07.pdf

²⁶ Environmental and Energy Studies, Institute, Washington DC.
http://www.eesi.org/briefings/2007/Energy%20&%20Climate/11-8-07_green_jobs/EEREJobsFactSheet_11-8-07.pdf

such as E.ON. In other words, nuclear and coal power stand like two bouncers at the door blocking the way for renewables and efficiency - and perpetuating our outdated, inefficient and centralised energy system.

Given that no credible person supports continued unabated coal generation in the face of climate science, then the need for low-carbon energy generation seems inarguable - and the barriers almost entirely political.

Proposed new supercritical coal-fired power stations include:

1) Kingsnorth (1600MW, E.ON, Kent)

- E.ON submitted their application in December 2006. The local authority 'did not object' and asked the Minister to hold a public enquiry. The Minister 'called in' the application. It has been delayed by the campaign against it since then. No decision is now anticipated until after Ed Miliband's coal review which means autumn 2009 at the earliest, but more likely Spring 2010.

2) Tilbury (1600MW, RWE npower, Essex)

- Scoping studies are underway. A Section 36 application to government is expected. The utility is aiming to construct for 2014.

3) Blyth (2400MW, RWE npower, Northumberland)

- Scoping studies underway. A Section 36 application to government is expected. Construction for 2014.

4) Ferrybridge (Scottish and Southern Energy, 800MW, West Yorkshire)

- Scoping studies underway. They plan to get a decision in 2010 to build and have online by 2014. *These plans replaced previous plans to 'refit' 500MW.*

5) Fiddler's Ferry (Scottish and Southern Energy, 800MW, Cheshire)

- At pre-application scoping stage.

6) Longannet (Scottish Power, Fife)

- The utility want to start construction in 2009, with operation scheduled to begin in 2012. No official application yet.

7) Cockerzie (Scottish Power, East Lothian)

- Construction could start in 2009 if approved to start using in 2012. No official application yet.

Longannet and Cockerzie would have a combined output of 3390MW

8) High Marnham (1600MW, E.ON, Nottinghamshire)

- At pre-proposal stage. The energy industry journal, Platts, reported that E.ON approached local MP Patrick Mercer and local residents about replacing the existing plant which was closed in 2003.

9) Hunterston. (1600MW, Dong, North Ayrshire)
- Pre-application stage.