Stop Kingsnorth

no to new coal power

policy briefing, June 2008

***"Can we possibly allow twenty years of business as usual before coal power generation becomes clean?** Are we truly investing enough in renewable energy technologies?" Prince Charles, February 2008[1].*

With sharply rising coal, oil and gas prices, the prospect of locking-in more fossil fuel power infrastructure for another 50 years is raising concerns as never before. This analysis examines the context and issues around new coal power in the UK. In October John Hutton will decide if Kingsnorth in Kent will see the first new coal-fired power station in the UK since 1974. Coal is the biggest threat to the climate[2] and in the UK has wiped out any progress in cutting greenhouse gas emissions since 1998[3]. Solutions to capture carbon from power plants are at a trial stage and not deployable before the 2020s. For climate reasons, Canada has announced it will not allow new coal plants to be built without CCS[4].

EON proposes to spend £1.7bn on two 800MW 'supercritical' coal units at Kingsnorth. It says the plant will be marginally (20%) more efficient than what is there now with a small reduction in CO_2 emissions to 8.6m tonnes a year. It also says the plant will be 'capture ready' in preparation for carbon capture being "*considered as an option*" at some later date[5]. To this end the proposal sets aside some land. Simultaneously EON has entered Kingsnorth to the government's CCS competition which means, if it wins, c15% of its carbon may be captured[6].

The UK's electricity companies are planning ten new coal plants. Six are unabated supercritical plants amounting to 9.99GW: Kingsnorth, Longannet, Cockenzie, Tilbury, Fiddler's Ferry, Ferrybridge and

Kingsnorth timetable

January – Medway Council raise no objection on local planning grounds but call for a Public Inquiry. BERR begins assessing the application under s36 of the 1989 Electricity Act and preparing a report for John Hutton's determination

March EON submit Kingsnorth as a candidate site for demonstrating CCS under the government's CCS competition

June –consultation starts on limited aspects of CCS policy, mainly a definition of 'capture ready'

October – possible decision. With CCS-readiness consultation over BERR officials present report to John Hutton. He has the power to turn it down, to consent it, or call a public inquiry

Summer 09 – decision on which scheme wins the government's CCS demonstration competition.

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1 http://www.princeofwales.gov.uk/speechesandarticles/a_speech_by_hrh_the_prince_of_wales_on_climate_change_to_the_113509464.html

2 Hansen, J. (2007). Letter to Gordon Brown from Jim Hansen, NASA Goddard Institute for Space Studies. http://www.columbia.edu/~jeh1/mailings/20071219_DearPrimeMinister.pdf

3 DEFRA official climate data show where emissions reductions have been achieved (principally from non energy industry), they have been overwhelmed by increased CO_2 emissions from burning coal. The resurgence in coal burning followed a 1998 moratorium on building new gas-fired power plants.

4 http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=B2B42466-B768-424C-9A5B-6D59C2AE1C36

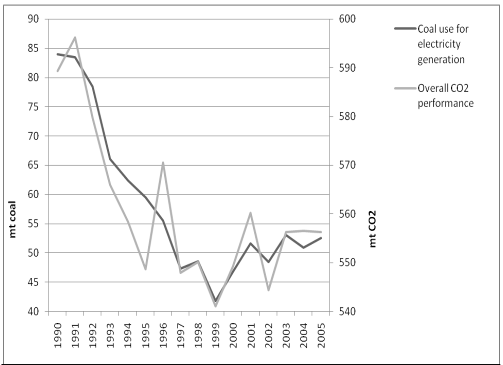
5 EON's application states: "*Deployment of carbon capture and storage (CCS), which involves the removal of CO_2 from the flue stream and injecting it into suitable geological storage, e.g. depleted oil and gas fields, will be considered as an option for GHG emission reduction at the Kingsnorth site by E.ON UK at a later date. This will be subject to the process of CCS being allowed by law and incentivised by a suitable framework and technological hurdles for the process being overcome so that proven technology becomes available for the process of capture and storage. With this in mind the proposed units will be designed "capture ready" to allow retrofit at a later date.*" http://www.eon-uk.com/images/K_-_3_Doc_to_Support_Appropriate_Assessment.pdf

6 http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2008/03/31/E.ON-enters-UK-Government_2700_s-Carbon-Capture-and-Storage-competition.aspx

Blyth[7]. Four are IGCC plants at Hatfield, Immingham, Killingholme and Teesside that would have CCS from the outset, but these now look unlikely to be built[8].

Coal and climate

Coal is a bigger threat to the climate than oil and gas due to its higher carbon intensity[9] and because reserves are much greater. Professor James Hansen of NASA states: "*enough oil and gas remain to take global warming close to, if not into, the realm of dangerous climate effects. But coal and unconventional fossil fuels such as tar shale contain enough carbon to produce a vastly different planet, a more dangerous and desolate planet, from the one on which civilization developed, a planet without Arctic sea ice, with crumbling ice sheets that ensure sea level catastrophes for our children and grandchildren, with shifting climate zones that cause great hardship for the world's poor and drive countless species to extinction, and with intensified hydrologic extremes that cause increased drought and wildfires but also stronger rain, floods, and storms… agreement to phase out coal use except where the CO_2 is captured is 80% of the solution to the global warming crisis.*"[10]



The chart shows overall UK CO_2 emissions in grey overlayed by the pattern of coal burning over the same period. The close fit indicates that coal is more significant than anything else on overall CO_2 performance. Data from DEFRA

The IPCC has set out the threat of 'tipping points' that may accelerate global warming and indicated the next ten years are critical for turning the corner towards less carbon intense economies. Professor Hansen says: "*If we burn most of the available coal without CO_2 capture, even with the lowest estimates of available coal reserves, it will be impractical if not impossible to avoid passing climate tipping points with disastrous consequences.*" Tipping points become much more likely if atmospheric intensity of CO_2 goes above 350ppm. Presently levels are assessed as 280-385ppm and the IPCC has made the case for stabilising the climate system at 450ppm. To have any hope of averting tipping points new unabated coal plants must be avoided.

Coal use globally is increasing every year[11]. The IEA World Energy Outlook Reference Scenario shows the coal trade growing to 1,174mt by 2030, a 50% increase on 2005. Half of the excess CO_2 from fossil fuels in the air today is from coal[12]. Burning coal in the UK has halted the decline in emissions seen in the 1990s following the 'dash for gas' and has thereby wiped out progress from other sectors in cutting emissions. The 59mt CO_2 that will be emitted from six new coal plants[13] will wipe out, for instance, DBERR's projected energy efficiency gains of 25-42mt CO_2 a year.[14]

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[7] Report on this year's work: presentation by UK Coal Forum to Coal Uk Conference, February 2008: http://www.berr.gov.uk/files/file44726.pdf

[8] This is because the government is no longer supporting pre-combustion CCS demonstration http://www.gnn.gov.uk/environment/fullDetail.asp?ReleaseID=331669&NewsAreaID=2&NavigatedFromDepartment=True

[9] IPCC WGIII FAR chapter 4 table 4.9 shows supercritical coal plants emit 710gCO_2/Kwh compared to CCGT 404gCO_2/Kwh http://www.mnp.nl/ipcc/pages_media/FAR4docs/final_pdfs_ar4/Chapter04.pdf

[10] Hansen, J. (2007). Letter to Gordon Brown from Jim Hansen, NASA Goddard Institute for Space Studies; IPCC Fourth Assessment Report http://www.ipcc.ch/ipccreports/ar4-syr.htm

[11] Russell, J. (2007) Coal Use Rises Dramatically Despite Impacts on Climate and Health. Worldwatch Institute, New York. http://www.worldwatch.org/node/5508

[12] Hansen, J. (2007). Letter to Gordon Brown from Jim Hansen, NASA Goddard Institute for Space Studies http://www.columbia.edu/~jeh1/mailings/20071219_DearPrimeMinister.pdf

[13] Assuming all the plants operate as baseload at commonly accepted load factors. This may not be the case for a range of reasons relating to market conditions. The figure therefore represents the risk assuming 'business as usual'. The scenarios are explored in great detail in IPPR's analysis 'After the Coal Rush' to be published in June 2008.

[14] Ministerial statement: http://www.publications.parliament.uk/pa/cm200708/cmhansrd/cm080110/debtext/80110-0003.htm#08011057000005

Carbon Capture and Storage (CCS)

CCS facts

- No coal plant anywhere in the world has CCS.
- Pre-combustion CCS is cheaper overall and technically closer to demonstration. But DBERR does not support demonstration of this technology.
- Post-combustion CCS has technological barriers to overcome before it can demonstrate viability and the UK, according to DBERR, will not see commercial deployment until the 2020s.
- EON says it will not consider CCS without incentives.
- EON says being 'capture ready' presently means little more than setting aside land and being less than 200km from an injection site.
- CCS was projected in 2005 by the IPCC to cost US29-$51 per tonne of CO_2. It is not clear who will pay for CCS.

The IPCC's assessment is that CCS will be globally deployable in the second half of the century[15]. The UK government is supporting a post-combustion CCS demonstration plant with the hope of being able to deploy the technology in the 2020s[16] and market it to China. In November 2007 for financial reasons BERR rejected[17] supporting pre-combustion CCS from IGCC coal plants that companies such as Centrica believe are a more viable way forward. Centrica says pre-combustion CCS would be cheaper overall, more efficient, capture a higher proportion of CO_2 and be as relevant to China as post-combustion technology. It will not build a coal plant without CCS from the outset: *"Supercritical technology, while cleaner than technology at existing coal plants, does not represent the cleanest form of clean coal generation without a carbon capture and storage solution, and would still be nearly four times more emitting than IGCC technology with carbon capture. It should also be noted that several clean coal projects proposed in the UK have to date only committed to their plants being "capture ready", rather than developing an integrated carbon capture and storage solution at the same time as the new generation plant. Almost any generation plant can be altered to capture carbon. We believe that government support for clean coal technology should be limited to those plants actually implementing carbon capture and storage, rather than capture-ready."*[18] There is no accepted legal definition yet of 'carbon capture ready' and many problems with the concept similar to those experienced with rolling out the more simple technology of sulphur capture to 'sulphur capture ready' plants[19]. Nor is there any implicit conditionality that carbon would be captured at any future stage if plants are built 'capture ready' now, which has led EON to admit publicly that there is no guarantee Kingsnorth will ever capture a single tonne of carbon[20].

The EU is about to consult on its proposed CCS Directive and so the policy framework is changing[21]. Capturing carbon from coal plants after the coal has been burnt is challenging. Flue gas from coal contains many impurities, CO_2 is not very reactive (compared for instance to SO_2) and is a relatively small proportion of the waste. Capturing CO_2 on the necessary scale has not been brought to demonstration stage yet. Once captured CO_2 must be compressed then transported either by tanker or through the construction of a new pipeline network. Injection of gas into geological storage has been demonstrated (for instance in oil fields to enhance oil recovery). The UK has the potential to exploit the North Sea for this purpose. Monitoring will be required for many generations.

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15 IPCC special report on carbon capture and storage: http://www.ipcc.ch/pdf/special-reports/srccs/srccs_wholereport.pdf

16 http://www.berr.gov.uk/energy/sources/sustainable/carbon-abatement-tech/ccs-demo/page40961.html

17 See: http://nds.coi.gov.uk/environment/fullDetail.asp?ReleaseID=331669&NewsAreaID=2&NavigatedFromDepartment=True. The reason for the choice of post-combustion only has not been publicly cited. However it is understood that in November 2007 the Treasury had not identified a funding mechanism for CCS and had not included funding for CCS in the pre-budget report. Pre-combustion CCS would require higher costs from the outset as carbon is captured from day one.

18 Centrica comments in: WWF (2007). The UK Power Giants Talking Climate Change. http://www.wwf.org.uk/filelibrary/pdf/uk_power_giants_wwf01.pdf

19 The Scottish Centre for Carbon Storage has examined the issues around the concept, concluding overall there are many problems http://www.wwf.org.uk/filelibrary/pdf/capture_ready_ccs.pdf. These and associated policy implications are discussed in WWF's report Evading Capture: http://www.wwf.org.uk/filelibrary/pdf/evading_capture_brief.pdf. This latter analysis includes the history of flue gas desulphurisation in the UK, which despite being demonstrated at industrial scale in the UK in the 1908s has not until now led to coal plants being cleaned up or closed.

20 EON admitted this in public for the first time in May 2008 in *The Observer*: "However, when asked when carbon capture could be taken beyond the pilot project stage, Eon's clean coal business development manager, Andy Read, admitted: 'It's a bit of a guessing game ... It depends on government support.' He also admitted that there is no guarantee that carbon capture, even if it is proved to work, would be fitted to Kingsnorth without the necessary subsidies." http://www.guardian.co.uk/environment/2008/may/18/carbonemissions.energy

21 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0013:FIN:EN:PDF

CCS costs:

All cost projections for CCS are uncertain at present because the technology has not even been through a 'price discovery' phase yet, but MIT estimates in 2007 were that CCS will add costs around \$29-\$51/tonne CO_2[22]. The supercritical coal plants planned by the UK utilities are intended to be retrofitted with CCS rather than integrated from the outset (they argue the viability of the technology is too uncertain at the moment). This would mean building them then taking them offline to retrofit CCS before returning them to the grid. There is an open question as to whether retrofitting CCS will be mandatory and how it will be paid for. Just looking at capital expenditure, BERR modelled costs for the energy review in 2006[23]. Applying these figures to Kingsnorth and all six of the unabated plants being planned yields the following:

BERR cost modelling 2006 (capex only)	Kingsnorth	All 6 supercritical plants
Capacity	1600MW	9990MW
New plant @ £0.918m/MW[24]	£1.47bn[25]	£9.17bn
CCS retrofit @ £0.721m/MW	£1.15bn	£7.2bn
Total plant + retrofit	£2.6bn	£16.4bn
New plant with integrated CCS @ £1.162m/MW[26]	£1.85bn	£11.61bn
Equivalent if IGCC with integrated CCS @ £1.452/MW	£2.32Bn	£14.19bn

EON's stance is that CCS will only happen subject to incentives - which exposes the public to costs of perhaps £1.15bn to retrofit CCS to Kingsnorth or £7.2bn to all plants. However this is only capital expenditure. CCS has ongoing costs too – operational expenditure, transportation and a loss of efficiency (because energy has to be used to strip out the CO_2). Ongoing costs on post-combustion CCS are higher than for IGCC plants because there is a much greater efficiency loss. Capex costs for an IGCC plant with integrated CCS would be cheaper than a supercritical plant plus retrofit and ongoing costs lower. Investors financing CCS have analysed the full costs (capex, opex, efficiency loss and transport) and identified a carbon price of €129/tonne CO_2 is needed to make coal with post-combustion CCS profitable. This compares to €103/tonne for pre-combustion IGCC and €90/tonne for CCS on CCGT plants[27]. This is above projected carbon prices (BERR and others are assuming €30-€40/tonne CO_2 for ETS phase III) so the difference would have to be made up through public financing of some kind. BERR's figures therefore suggest it is pursuing the most costly option for the UK which will also not guarantee carbon capture, mean less carbon is captured at lower efficiency plants and allow unabated operation for many years. BERR is also being criticised for having an insufficient resource available to support the CCS demonstration[28].

UK electricity policy context

Low carbon electricity is the foundation of a low carbon economy. Decarbonising electricity is the biggest single action the UK can take to cut carbon emissions and electrification is also the solution to the climate impact of road and rail transport and residential heating. UK energy policy is in a period of dramatic upheaval following major announcements in 2008 on renewables and nuclear.

22 MIT, 2007, The Future of Coal. http://web.mit.edu/coal/ and Marc Levinson, JP Morgan, Carbon capture and sequestration A report for the London Accord. 2007 http://www.cityoflondon.gov.uk/Corporation/media_centre/files2007/City+investment+report+says+carbon+capture+unlikely+to+help+CO2+over+next+20+years.htm

23 http://www.berr.gov.uk/energy/review/models/page32771.html

24 Compare this for instance with \$1m/MW to retrofit plants (National Energy Technology Laboratory, "Carbon Dioxide Capture from Existing Coal-Fired Power Plants," DOE/NETL 401/120106, December 2006.)

25 EON says now Kingsnorth will cost £1.7bn which is around £1.06m/MW. This latter indication is c15% higher than the BERR modelling from 2006.

26 Compare this for instance with RWE which says new supercritical plants cost €1.20m/MW unabated and €1.68m/MW with CCS Hans-Wilhelm Schiffer in International Energy Agency, "Expert Workshop on Financing Carbon Capture and Storage: Barriers and Solutions," Report 2007/9, July 2007, p. 16.

27 Climate Change Capital (2007). ZEP: Analysis of funding options for CCS demonstration plants Also here: http://ccs-association.com/docs/2008/23%20April%202008/2%20Tony%20White%20-%20Climate%20Change%20Capital%20%20%2023%20April%202008.ppt

28 BERR has previously announced £50m will be available and that was recently restated. However BP believes it will take £300m of support and Climate Change Capital even more: http://business.timesonline.co.uk:80/tol/business/industry_sectors/utilities/article3803962.ece

Climate/renewables targets changing:

The EU has strengthened its commitment to an interim near term target of a 20% reduction in CO_2 emissions by 2020. It has translated this into energy policy and allocated a share of the effort to meet this target to member states[29]. The UK must achieve 15% of energy from renewables by 2020. Because residential and transport options are limited, the UK will have to reach c45% of electricity from renewables by 2020. However, the EU has already signalled in international negotiations that it will set a 30% target if others will too. The 20% target, therefore may quickly be accelerated to 30% by the end of 2009 which in turn may mean the UK having to achieve even higher levels of electricity from renewables. The UK also has domestic CO_2 targets which will become binding with the introduction of the Climate Act in Summer 2008. There is a high likelihood that the long term target will tighten from a 60% reduction by 2050 to 80%. This will also affect energy policy. So the UK must now embark on a major investment in renewables akin to the 24GW of CCGT and £3.5bn investment in grid infrastructure built in the 1990s.[30] So far UK renewables policies have not succeeded – the UK derives just 4% of its electricity from renewables today. Energy Minister Malcolm Wickes says: "*our position is a poor one and that's because since the '60s we've been reliant on oil and gas from the North Sea*"[31]. This indicates progress on renewables is systematically undermined by availability of fossil fuel capacity. Other parts of the UK are bolder about renewables and so concerned about new fossil fuel capacity. Wales is looking to generate 138% of its present electricity consumption from renewables within 20 years[32]. But BERR is pressing for more hydrocarbon capacity in Wales instead, raising concerns about progress on renewables[33]. The Greater London Authority is against Kingsnorth because it does not want electricity from coal and instead wants to develop its own decentralised electricity networks[34].

Electricity capacity turning over:

The UK has 76GW of electricity capacity to meet a typical demand of 40GW and peak demand of 63GW[35]. There are expectations this will rise between 0.2-0.8%pa[36]. 8.5GW of coal plants and 2.5GW of oil plants are retiring by 2015. 7GW of nuclear plants are retiring by 2020. After 2016 restrictions under the Large Combustion Plants Directive on NO_x will lead to further restrictions on 20GW of ongoing coal plant[37]. Since the Energy White Paper was published in 2007, the market has, in practice, shifted mostly in favour of new CCGT and renewables 31.9GW in all: there is now 16GW of new CCGT consented or applying for consent[38]; and 10.3GW of onshore wind and 5.6GW of offshore wind in advanced development[39]. Thus the plans developed by utilities for coal are not because coal is *'needed'* to keep the lights on.

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29 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0013:FIN:EN:PDF

30 Dale, L., Milborrow, D. and Slark, R. (2003). A shift to wind is not unfeasible. Power UK, issue 109. http://www.bwea.com/pdf/PowerUK-March2003-page17-25.pdf

31 Malcolm Wickes on BBC Newsnight 20 November 2007. http://www.youtube.com/watch?v=J0hDjLW-Olg

32 See http://new.wales.gov.uk/consultation/desh/2008/renewable/guidee.pdf?lang=en

33 NAW Sustainability Committee Consultation on Carbon Reduction from Electricity Production (including renewables), Response from the Countryside Council for Wales. 13 March 2008. http://www.ccw.gov.uk/

34 Nicky Gavron AM, Deputy Mayor of London, 1 April 2008: "The Mayor and I are very clear that we cannot support the construction of any new coal fired power stations, serving London, that are built without carbon capture and storage included from the start. World cities such as London have a responsibility to reduce their carbon emissions drastically. In London, we are spearheading a lower carbon energy system, through energy efficiency, decentralised energy which uses the heat emitted when electricity is generated, and renewable energy. Allowing the go-ahead for polluting coal power stations, without capturing the emissions, will simply add to the problems we face with climate change. We urge the Government not to give the go-ahead to any new coal power stations that do not have this capacity."

35 DBERR Energy White Paper http://www.berr.gov.uk/energy/whitepaper/page39534.html

36 See: Digest of UK Energy Statistics (DUKES) 5.1.3; DTI Energy Paper 68: Energy projections for the UK (2004); DTI Updated Emissions Projection November 2005; NGT Seven Year Statement (May 2005); Oxera *'Results of Renewables Market Modelling'* (February 2004), ILEX Renewable Results Summary 2006.

37 http://www.defra.gov.uk/environment/airquality/eu-int/eu-directives/lcpd/pdf/lcpd-nationalplan-update1.pdf

38 DBERR New Build Electricity Generating Plants in Britain report 2007. http://www.berr.gov.uk/files/file41816.pdf

39 http://www.bwea.com/statistics/

Why coal?:

Given the new impetus to build renewables at a fast rate, the green light for nuclear and the large amount of CCGT in the pipeline, there is no clear case for building new coal plants on the basis of 'need'. The reason for new coal plants coming forward is that utilities are familiar with returns on coal, want a diverse investment portfolio and there is no policy bar to unabated coal plants. Furthermore there is an active BERR-sponsored lobby group, the UK Coal Forum that has the ear of ministers and works closely with officials[40]. BERR ministers have accepted the repackaging of coal as 'clean coal' and have echoed arguments from the coal sector on gas, price and flexibility[41]. The overarching case for coal made by the Forum and BERR ministers is the "risk" of gas: "*There should be a significant element of the UK's generation capacity that is coal fired ... Without such a policy there is a serious risk that the UK will be constrained to use more and more gas without reference to its sources or prices.*" [42]

Coal vs gas:

It is popularly stated that coal is sourced in Britain and therefore will protect the UK from being reliant on Russian gas[43]. In reality 70% (and rising) of coal burnt in the UK is imported and the biggest source is now Russia[44]. In contrast some gas is now imported but it is Norway, not Russia, that is the biggest source. The government's main concern, however, is to have multiple sources and the ability to store large amounts of fuel. Looking ahead the government own assessment is in fact: "*the UK is not significantly dependent on any single country supplying [gas] to the EU market.*"[45] Moreover between 2005 and 2010 BERR says £10bn will have been spent on strategic gas infrastructure such as storage capacity to reduce any risks around supply[46]. Despite this, BERR ministers continue to express concern about 'over-reliance' on gas: "*Gas is cleaner than coal, but an over-reliance on gas would leave us more exposed to the international gas market as our own resources decline.*"[47] However despite 'not being gas' being in practice the central case made in favour of coal, in reality renewables and nuclear are also 'not gas' and so there is no demonstrably exclusive 'need' for coal as an alternative to gas.

In terms of energy independence, European governments adopted the 2020 renewables in part because of the benefits over fossil fuel generation. If the UK government meets or gets close to 45% of electricity generation from domestic renewables, this would make the UK overall considerably more independent from imported fossil fuels[48]. Energy efficiency adds a further benefit through demand reduction. However, BERR favours trading in renewables which reduces potential benefits in terms of energy independence[49].

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40 The Forum was set up by the government after the Energy White Paper of 2006 to bring together coal mining and electricity companies in one coherent lobby group. It meets regularly with Ministers and has developed a case for coal and is lobbying for ministers to make policy statements indicating coal is 'needed', to back new coal power stations and to support more opencast coal mining. See http://www.berr.gov.uk/energy/sources/coal/forum/page37276.html for detailed information on the Forum.

41 Energy Minister Malcolm Wicks for instance says coal is needed: "to keep coal in the energy mix we will also **need** new, state-of-the-art power stations, which are, from the outset, both cleaner and more efficient than the stations they replace, and capable of receiving new technologies to manage their residual emissions as these become commercially feasible". Malcolm Wicks MP, Minister of State for Energy at Coal UK Awards Dinner**,** London, 08 January 2008: http://www.berr.gov.uk/pressroom/Speeches/page44565.html. See also Energy Secretary John Hutton's comments at: http://www.berr.gov.uk/pressroom/Speeches/page45211.html

42 http://www.berr.gov.uk/files/file39915.pdf

43 http://www.timesonline.co.uk/tol/comment/columnists/jeremy_clarkson/article3176456.ece

44 DBERR Energy Markets Outlook http://www.berr.gov.uk/energy/energymarketsoutlook/page41839.html Russia is now a bigger source than the UK.

45 http://www.berr.gov.uk/files/file41998.pdf

46 See John Hutton's comments in his speech of 10 March 2008 to the Adam Smith Institute. http://www.berr.gov.uk/pressroom/Speeches/page45211.html

47 http://www.berr.gov.uk/pressroom/Speeches/page45211.html

48 A very crude indicative assessment based on overall share of generation would show around 41% of electricity generation is now based on domestic sources (assuming all uranium is imported, 70% coal imported, 30% gas imported and 3% of electricity imported through the interconnector with France). A scenario with 45% of electricity from domestic renewables in 2020 would result in about 56% of electricity coming from domestic sources (assuming 75% of coal and gas is imported by then, all uranium imported and 3% of electricity coming from France). Under such a scenario the share of UK fossil fuels may in practice be higher as a lower overall volume would allow the UK share to be greater. This analysis is based on generation and not installed capacity. However, it is generation that matters most in terms of carbon emissions and fossil fuel reliance.

49 BERR is lobbying at a European level for the ability to trade in renewables to meet the target. This article includes a clip of BERR's arguments being made: http://www.guardian.co.uk/environment/2008/mar/29/renewableenergy.climatechange. BERR's concern is that the target is stretching and the UK will face extra costs. These are discussed in a BERR financed study of compliance costs: http://www.berr.gov.uk/files/file45238.pdf

Coal price:

Another case made for coal by BERR's is that it is *'affordable'* (ie cheaper than other options) especially in comparison to gas[50] - the inference being coal would help keep consumer prices low. In fact price volatility is an issue for all fossil fuels with coal no exception. Coal prices have risen 150% in two years and analysts put this down to structural undersupply owing to growth of Asian markets and so prices are unlikely to drop in Europe[51]. BERR's projections for the energy white paper were that coal price would at worst reach $70/tonne by 2015. in May 2008 that was upgraded to $90/tonne falling to $73/tonne by 2010[52]. However, spot market prices for coal arriving in Europe at the end of May 2008 were $174/tonne. Gas prices show a form of short term volatility seen less with coal and companies argue there are actions necessary to smooth gas prices such as enhanced market liberalisation in Europe.

Coal plants are also not cheap to build. A new plant costs two to two-and-a-half times a CCGT plant[53]. BERR's modelling costs set out above predate a surge in capital costs (with capex in the US approaching $4m/MW) adding considerable investor uncertainty as well as calling into question government assumptions on the relative costs of coal versus other electricity technologies.

Over the next decades the competitiveness of all fossil fuels, including coal, will continue to be in question compared to other options – especially when climate mitigation costs are taken into account (see below). The underlying volatility of fossil fuel prices is the main reason for popular concerns about the rising cost of living and electricity and petrol price rises. Strategically the government has now said it recognises price and supply-side interventions (such as tax cuts and supply measures) are not enough to steer the UK away from fossil fuel over-reliance over the long term and that demand management, renewables and nuclear are a better strategy[54]. The government is now saying it will prioritise consumer energy efficiency measures as a way of softening the impact of price rises[55]. However, the government has not yet squared this approach with policies such as BERR's support for new coal plants which would lock the UK into fossil fuel price volatility for decades.

Coal flexibility:

The other main case made for coal is its flexibility to cycle to meet peak demand. Again this function is not unique to coal – gas (natural or biogas) and decentralised approaches for instance can be a highly flexible and secure form of energy[56]. Coal proponents make this case to contrast with renewables which they dismiss as intermittent[57]. However the independent UK Energy Research Centre has concluded: "*It is clear that intermittent generation need not compromise electricity system reliability at any level of penetration foreseeable in Britain over the next 20 years, although it may increase costs… If shared between all consumers the impact of intermittency on electricity prices would be of the order 0.1 to 0.15 p/kWh.*"[58] National Grid is required to balance supply across the whole network and this requires management of intermittency from conventional sources which tend to be less smooth than wind variance. May 2008 for instance saw the biggest brownouts since the 1987 storm as a

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50 See for instance Malcolm Wick's comments to the Environmental Audit Committee on 3 June 2008.

51 See: UBS Investment Research, European Utilities "Half of coal generation shut by 2015" 22-Feb-2008 Lekander

52 See http://www.berr.gov.uk/files/file46071.pdf

53 http://www.imperial.ac.uk/energyandenvironmentoffice/newsevents/12_07_05_eonuk_read.pdf

54 The Prime Minister's arguments are made in this article from the Guardian on 28 May 2008: http://www.guardian.co.uk/commentisfree/2008/may/28/gordonbrown.oil

55 See for instance: http://www.independent.co.uk/news/uk/politics/labour-plans-green-revolution-to-slash-energy-prices-and-win-back-lost-voters-834303.html

56 See http://www.chpa.co.uk/

57 The UK Coal Forum is dismissive on renewables' contribution to filling the 'energy gap': "Part of the gap will be met by building new renewable sources (about 2 GWe according to Government estimates), although the contribution of this to meeting peak demand is less than might be expected due to intermittency." http://www.berr.gov.uk/files/file41186.pdf . To achieve the UK's renewables target, more than 30GWe would be required. Anti wind lobbyists also highlight intermittency: http://www.countryguardian.net/Case%20Intermittency.htm

58 See http://www.ukerc.ac.uk/Downloads/PDF/06/0604Intermittency/0604IntermittencyReport.pdf and http://www.bwea.com/pdf/PowerUK-March2003-page17-25.pdf

result of conventional power failures, not wind[59]. However, it is certainly the case that a high penetration of renewables will require continued conventional capacity. Strategic questions over how to maximise the benefits of renewables and what kind of conventional capacity is needed are not concluded which adds to the risk of consenting new monolithic conventional coal plants which may prove to be economically stranded assets if the UK makes progress on renewables requiring conventional capacity that can cycle readily – a role gas performs much better than coal.

Government coal policy:

BERR is committed to energy market liberalisation and so does not want to put a cap on any technology. It is also committed to a long term future for coal[60]. The intensions of the market are therefore a major influence on policy. The UK Coal Forum has developed plans for future generation which indicate very limited intensions for CCS - only for new plants (subject to incentives), not for 20GW of ongoing subcritical plants[61]. The government aims to tackle the climate impact of coal through three policies[62]: CCS demonstration; carbon trading through the ETS; and offsetting by paying for renewables or climate mitigation overseas[63]. The tougher ETS regime announced in January is curbing some coal growth in the EU[64], but is evidently not proving to be on its own a sufficient bar to most new unabated coal plants nor on the market burning more coal when it is cheaper than gas.

Economics of coal

The economics of coal are changing[65]. In the 60s and 70s when the UK's coal plants were built it was state owned capacity, a cheap and abundant fuel source, familiar technology and abundant steel and mechanical engineering capacity. Now the picture is different. The rapid growth of transition economies has created a crunch on steel and mechanical engineering for major infrastructure projects, already holding up coal build[66] and also potentially nuclear, wind turbines or CCS. Coal prices are presently volatile having doubled in two years and set to continue rising because the underlying cause is structural undersupply[67]. With continued growth in Asian consumption, European coal prices will squeeze power plant margins considerably. In addition longer term, reserves may not be as abundant as commonly asserted[68] raising further questions about security or coal as a fuel. Coal plants also face increasing carbon costs – indeed this is already halting some coal plants[69]. This commodity and carbon context is leading investors to question coal power margins[70]. CCS will add considerable further costs as set out above. Taking all this into account, California took the decision at the end of 2006 to constrain new coal plants to protect Californian ratepayers from CCS retrofitting, carbon costs and offsetting.[71]

[59] See http://business.timesonline.co.uk/tol/business/industry_sectors/utilities/article4023634.ece

[60] http://www.berr.gov.uk/energy/sources/coal/forum/page37276.html

[61] http://www.berr.gov.uk/files/file44726.pdf

[62] See Energy Minister Malcolm Wick's comments in a key Energy Bill debate (clause 18): http://www.publications.parliament.uk/pa/cm200708/cmpublic/energy/080226/am/80226s01.htm

[63] http://www.channel4.com/news/articles/society/environment/tough+european+carbon+caps+imminent/1387947

[64] http://www.alertnet.org/thenews/newsdesk/L23609671.htm

[65] MIT, 2007, The Future of Coal. http://web.mit.edu/coal/

[66] http://uk.reuters.com/article/environmentNews/idUKL3081324220080130

[67] See BERR Energy Markets Outlook for regular reporting of market conditions and UBS Investment Research, UBS Investment Research, European Utilities "Half of coal generation shut by 2015" 22-Feb-2008 Lekander

[68] http://www.energywatchgroup.org/fileadmin/global/pdf/EWG_Report_Coal_10-07-2007ms.pdf also see http://rutledge.caltech.edu/ for a detiled look at the implications of fossil fuel supply and climate.

[69] http://www.alertnet.org/thenews/newsdesk/L23609671.htm

[70] UBS Investment Research, European Utilities "Half of coal generation shut by 2015" 22-Feb-2008 Lekander.

[71] See http://www.cpuc.ca.gov/PUC/energy/electric/Climate+Change/070411_ghgeph.htm

At the same time as coal's costs rise, competitive technologies, not subject to rising carbon costs will move into maturity. For instance, onshore wind is now a mature technology that competes favourably with conventional capacity – typical costs in 2006 were 3.0p/KWh for CCGT compared to 3.2 p/KWh for onshore wind. With a full comparison of costings (see table), the Sustainable Development Commission has estimated comparative technology costs in 2020 finding a trend towards renewables being increasingly competitive – research echoed by the Carbon Trust[72].

SDC Electricity fuel source cost projections

Technology	Cost in 2020	Confidence in estimate	Cost trends to 2050
Conventional Fuels			
Coal (IGCC[xvi])	3.0 – 3.5 p/kWh	Moderate	Decrease
Gas (CCGT)	2.0 – 2.3 p/kWh	High	Limited decrease
Fossil generation with CO_2 capture & sequestration	3.0 – 4.5 p/kWh	Moderate	Uncertain
Large CHP (gas)	Under 2 p/kWh	High	Limited decrease
Micro CHP (gas)	2.5 – 3.5 p/kWh	Moderate	Sustained decrease
Nuclear	3.0 – 4.0 p/kWh	Moderate	Decrease
Renewables			
Onshore wind	1.5 – 2.5 p/kWh	High	Limited decrease
Offshore wind	2.0 – 3.0 p/kWh	Moderate	Decrease
Energy crops	2.5 – 4.0 p/kWh	Moderate	Decrease
Wave	3 – 6 p/kWh	Low	Uncertain
Solar photovoltaics	10 – 16 p/kWh	High	Sustained decrease

Why is consenting new coal a problem?

- **Climate impact:**

Tackling unabated coal is globally the single biggest climate change issue. A consent for Kingsnorth will be a green light to at least five other unabated coal plants. Notwithstanding what other countries do, these alone threaten to push the climate beyond critical tipping points. There is no guarantee carbon capture will ever be retrofitted to Kingsnorth because projected carbon prices under the ETS are falling short of all estimates of the carbon price necessary to commercialise CCS. New unabated coal plants will undermine progress towards global emissions targets and will undermine the prospects of the UK reaching near term (2020) and mid term (2050) emissions reductions through domestic action. These plants will be a considerable climate liability and in turn a contribution to global climate instability with all of the national security implications that entails

- **Energy insecurity:**

Coal price volatility has resulted in big rises in electricity costs with utilities such as SSE and EON saying they expect fossil fuel prices to be high for the foreseeable future. Building new coal plants therefore makes the UK strategically reliant on volatile imported coal prices for the next 50 years. Renewables, in contrast offer the strategic benefit of energy independence and reduce reliance on volatile imported fossil fuels. California's experience is that energy efficiency is a better buffer against rising electricity costs than building new coal plants.

- **Liability:**

Because 32GW of gas and renewables have been consented or are in advanced development, there is no demonstrated need for new coal plants to keep the lights on making them an economic liability especially because of uncertainties over construction costs. Further, given the government's intent to expand renewables, more flexible stand-by conventional capacity will be needed, not monolithic baseload capacity such as Kingsnorth.

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[72] See Carbon Trust research on renewables http://www.carbontrust.co.uk/Publications/publicationdetail.htm?productid=CTC610 and Sustainable Development Commission research on wind: http://www.sd-commission.org.uk/publications/downloads/Wind_Energy-NovRev2005.pdf . However, levelised cost estimates are a complex area and anyway the market does not base its decisions to invest on price alone, with revenue, risk and other factors weighing strongly. This is discussed in detail in: http://www.ukerc.ac.uk/Downloads/PDF/07/0706_TPA_A_Review_of_Electricity.pdf

- **Undermine renewables investment:**

  Building new coal plants will put major investment behind high carbon capacity and frustrate impetus and investment in renewables and CHP just as the government is grappling with how to achieve 40-45% of electricity from renewables.

- **Pressure on other sectors:**

  Through failing to decarbonise electricity by removing a large proportion of the most damaging fuel, pressure will be increased on other sectors of the economy to decarbonise quicker and deeper.

- **Weak 'capture ready' precedent:**

  Once the government consents coal plants on the basis of weak 'capture readiness' terms, it will face considerable costs to turn this into deployment of CCS. The lessons around how long it has taken to make sulphur capture happen have not been learnt.

- **Lack of consultation**:

  There has been no strategic environmental assessment of the impact of new coal plants on the climate, climate policy, climate targets, renewables targets and on international progress towards deep emissions reductions. There will have been no public consultation akin to that for new nuclear power.

- **Public signal:**

  While ministers encourage people to reduce their personal climate footprint, supporting the most polluting technology sends out a 'do as I say, not as I do' message. The UK public do not back coal – they favour efficiency and renewables, are against fossil fuels and are ambivalent about nuclear.

- **International signal:**

  Coal policy is critical to international climate action. The UK is not alone in planning new coal plants, China, India, the US, Germany and other countries are also planning significant new coal build[73]. Consenting Kingsnorth will send a clear international signal that the UK is not serious about tackling unabated coal and will do nothing to curb coal build elsewhere. It will undermine the UK's leadership position on climate which will reduce its ability to influence progress in international climate talks.

Solutions

Other economies have adopted practical policies to tackle coal because of its climate impact in this critical period before CCS is demonstrated at scale. Canada is the first G8 country to put an effective ban on new unabated coal plants through only allowing coal with CCS after 2018[74]. Norway is moving closer to requiring CCS (85% capture) on new power plants[75]. California has adopted a minimum CO_2 emissions performance standard for new power plant investments[76]. This works with market dynamics as it allows the market to choose which low carbon technology to deploy and encourages innovation on CCS. This solution is favoured by NGOs in the UK[77]. It also works in alignment with carbon trading, energy efficiency and renewables targets. Overall California set a clear framework that makes a carbon choice, but avoids specific technology choices. As a result utilities are now enthusiastic advocates of low

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73 See http://www.greenpeace.org/international/press/reports/coal-fired-power-stations-and and http://www.csmonitor.com/2007/0322/p01s04-wogi.html for instance

74 http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=B2B42466-B768-424C-9A5B-6D59C2AE1C36

75 The Norwegian Pollution Control Authority ("SFT") has ruled that CCS with an efficiency of 85% is considered to be Best Available Technology (BAT) for CCGT gas fired power plants (coal is not an issue in Norway), and therefore they will not allow building of gas-fired power plants without CCS. It is up to the government to decide on a case-by-case basis. But this is only "soft law" and the current government allowed the new power plant at Mongstad to start without CCS, despite the scientific recommendation from the SFT. In a recent white paper on the Norwegian climate policy, the CCS requirement has been repeated, and this has resulted in the Norwegian Energy Authority ("NVE") now blocking all new applications for gas fired power plants without CCS. http://www.regjeringen.no/pages/2065909/PDFS/STM200620070034000EN_PDFS.pdf

76 The detail on how California is delivering the standard can be found at: http://docs.cpuc.ca.gov/published/FINAL_DECISION/64074.htm

77 See joint position introduced here: http://www.wwf.org.uk/filelibrary/pdf/ngo_js_ccs.pdf

carbon electricity and efficiency and while US per capita energy use has risen 50%, California's has been kept flat for 30 years obviating the construction of 24 new large power plants[78]. Denmark has a moratorium on new coal plants and New Zealand a moratorium on new fossil fuel plants[79].

There is no silver bullet for the problem of coal or more broadly decarbonising electricity. An alternative strategy to building new unabated coal plants which secured a shift to low carbon options in the UK would comprise:

- Policy constraint now on new coal without CCS from the outset (including strengthened ETS). Market-driven R&D strategy for CCS. Legal date when CCS will be required alongside retrofit programme for CCS when deployable and/or rapid phase out of all unabated coal with forward date legislated now.
- Coherent strategy that aligns policies and incentives to achieve 45% of electricity from renewables by 2020 with rapid scale-up of energy efficiency to tackle fuel poverty and consumer price impacts.

An additional strategic imperative is to reconfigure conventional capacity by 2020 to operate in a market with 45% of electricity generated and consumed coming from renewable sources. Conventional capacity will need to cycle readily to maximise the use of renewable technologies and this will need to work economically for both renewables and conventional technologies. Additional grid infrastructure will be needed (large scale renewables being located in different places to conventional power plants and to support more decentralised combined heat and power) and development of large scale electricity storage solutions.

Political response to new coal

There is growing risk for governments and companies in pushing ahead with new coal plans.

International:

A global popular movement against coal has emerged. Following the Cheney Energy Plan of 2001 150 new coal plant proposals have come forward in the US. 64 of those have now been shelved recently following campaigning by citizens, organisations and investors[80]. Likewise in Germany where 25 coal plants are mooted, local campaigns are winning local referendums and blocking new coal plants[81]. India also has some resistance to new coal (for example at Chamalapura[82]). China is facing a fierce public response to the pollution caused by coal and other industrial pollution. In the spring of 2006 China's top environmental official, Zhou Shengxian, announced that there had been 51,000 pollution-related protests in China in 2005[83].

Scientists:

The UK's leading scientists at the Royal Society have called for all new UK coal plants to have 90% of carbon captured by 2020 or be closed down[84].

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78 See for instance http://www.pgecorp.com/investors/pdfs/080214UNClimateRemarks.pdf

79 http://www.nzherald.co.nz/section/3/story.cfm?c_id=3&objectid=10469420&pnum=0

80 See http://www.cmnow.org/ and http://www.sierraclub.org/environmentallaw/coal/victories.asp for detail on some US campaigning.

81 See for instance http://uk.reuters.com/article/oilRpt/idUKL2489486820080424

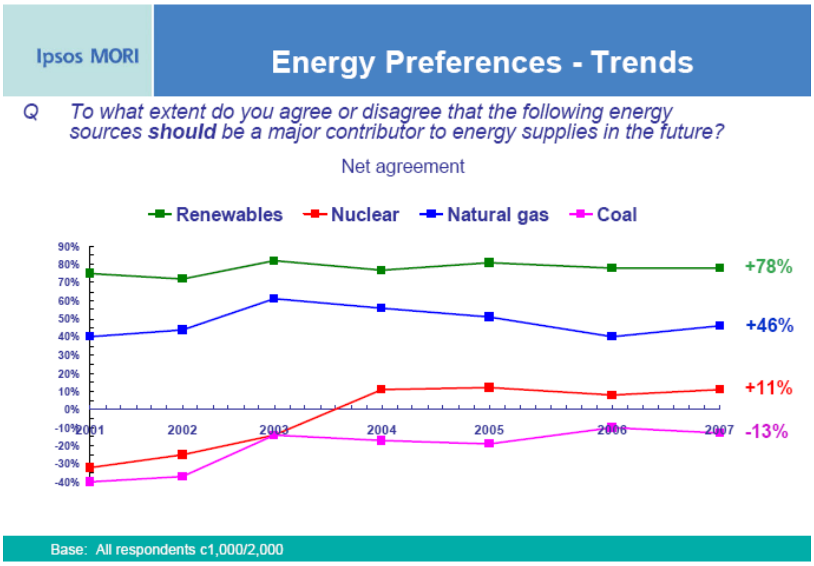
82 See http://www.petitiononline.com/coalbase/

83 See http://www.foreignaffairs.org/20070901faessay86503/elizabeth-c-economy/the-great-leap-backward.html

84 http://royalsociety.org/news.asp?id=7558

Investors & business:

In the US mainstream investors such as JP Morgan Chase, Citigroup and Morgan Stanley Bank have turned against new coal plants through developing carbon principles around investment that include enhanced due diligence around proposed coal plants[85]. In the UK The Institutional Investors Group on Climate Change, responsible for £3trillion of assets under management, have expressed their concerns that the government's coal policy is leading to a conflict between investors and climate policy and have called for coal policy to be opened up[86]. Other investors such as HGI have directly objected to Kingsnorth[87]. While reluctant to dig down into coal policy, the CBI said: "*In the run up to 2020, the emphasis must be on much higher energy efficiency together with preparations for a major shift to low carbon energy sources in the years to 2030 and beyond. The big opportunity here is that a third of our generating capacity will become obsolete over the next 25 years, and must be replaced. This opens the way to a smaller carbon footprint.*"[88]



UK NGOs:

In the UK mainstream NGOs are united in calling for Kingsnorth to be halted, coal policy to be reviewed and a for major step forward in renewables and efficiency. Organisations such as RSPB, FOE, Greenpeace, WWF, Christian Aid, WDM, People & Planet, Green Alliance and dozens of others such as Oxfam and Women's Institute organised under the banner of Stop Climate Chaos reach millions of supporters and are starting to involve then in campaigning against Kingsnorth. The activist movement organised under the 'Climate Camp' are now focusing their attention on Kingsnorth. EON now regularly experiences protests outside its offices – in Coventry, London and Nottingham for instance[89]. Protests have also been held at Parliament and outside BERR's main building. Kingsnorth itself has been occupied and there has been growing coverage of the issue in the national media.

Public opinion:

According to analysis of 23 recent opinion polls, when asked about fuel choices, the UK public place energy efficiency and renewables as their preferred options. They are against fossil fuels and are ambivalent about nuclear[90]. There are also public concerns about electricity price rises – which have been because of reliance on fossil fuels. It is clear, however, that the vast majority of the public would prefer to keep the lights on with renewables in the future rather than coal and they have felt this way for a number of years as shown by MORI in December 2007[91].

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85 See meida coverage here: http://blogs.wsj.com/environmentalcapital/2008/02/04/wall-street-tells-big-coal-not-so-fast/ . The detail can be found here: http://carbonprinciples.org/

86 http://www.iigcc.org/docs/PDF/Public/IIGCCtoJohnHuttonMarch08l.pdf

87 http://www.henderson.com/content/sri/publications/statementsletters/letterjohnhuttonmp.pdf

88 CBI (2008). Climate Change: Everyone's Business. CBI, London. http://www.avtclient.co.uk/climatereport/docs/climatereport2007full.pdf

89 See www.stopkingsnorth.org

90 Parliamentary Office of Science and Technology (2007). Public Opinion on Electricity Options. http://www.parliament.uk/documents/upload/postpn294.pdf

91 http://www.ipsos-mori.com/_assets/polls/2007/pdf/niauk2.pdf