The Oil Drum: Europe
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

The UK Energy White Paper: An Academic Critique

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[list all tags]

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On 25th September 2007, the BIEE, the UKERC and the Energy Institute held a seminar in London where they invited academics to critique the 2007 Energy White Paper.

Background

In 2003 the UK government released the Energy White Paper 2003: Our Energy Future - Creating a Low Carbon Economy. As we all know, events in the energy world have moved fast since 2003, and faced by falling gas supplies from the North Sea and ageing nuclear power stations, the government launched another energy consultation in 2006, details of which are available online here. The result was another Energy White Paper, published in May 2007, this time with the subtitle Meeting the Energy Challenge. It seems to me that the change in the energy world over the intervening years can be seen from the change in the tone of the titles from 2003 to 2007!

The purpose of the seminar was to bring together a range of academics to give a critique of the Energy White Paper – and they certainly were critical! So, without further ado, here are the key points form the speakers, with comments from me in italics where appropriate.

The slides are available on the BIEE website here: www.biee.org/downloads.php

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Vicky Pryce (Chief Economic Advisor and Director General, Economics and Joint Head of the Government Economic Service)

[MP: Pryce was generally supportive of the White Paper, unsurprisingly as she works for the government]

The Energy White Paper (EWP)

- Economists didn't win at every point in writing this paper! There were some statements that were non-negotiable.
- Context

    - Tackling climate change.
    - Ensuring energy is secure, clean and affordable.
- Stern review: taking action on climate change makes good economic sense.
- CO_2 emissions are forecast to rise, and the developing world will take a larger share by 2030.
- Our target is to cut 60% by 2030 – to reach this, energy (*MP: I think she meant electricity!*), heat and transport must all play a part.
- Security of supply
    - We are importing more and more energy.
    - Generation capacity is closing down: 30-35GW by 2025, much of it in the next 10 years.
    - More gas import and storage facilities are needed.
- Principles:
    - Climate change and energy security and international issues.
    - Independently regulated competitive markets are the most cost-effective and efficient way of cutting CO_2 emissions.

Action

- EU ETS (Emissions Trading Scheme)
    - Early decisions are needed.
    - CCS (Carbon Capture and Storage) must be included.
    - Aviation must be included, as must surface transport eventually.
- In the UK
    - We must save energy – this is the most cost-effective way of cutting emissions.
    - Develop a clean energy supply.
    - Secure reliable supplies at affordable prices.
    - Consumer behaviour is crucial.
- Saving energy
    - Information and advice is needed.
    - Regulation is key.
    - Transport must be tackled.
- Cleaner energy
    - Heat and distributed energy.
    - Biomass strategy.
    - More options for heat.
- Electricity generation
    - ETS will be strengthened.
    - RO (Renewables Obligation) will be strengthened and modified.
    - CCS demo plant will be operating by 2011-2014.
    - We will have new nuclear power plants.
    - There will be increased technology support and skills support.
- Transport
    - RFTO (Renewable Transport Fuel Obligation) is in place, and may rise after 2011.
    - Tackling transport is a less cost-effective way of reducing CO_2 emissions.
    - Security of supply (oil and gas), important, but is sometimes overlooked.
- Tackled by:
    - Energy saving.
    - Open markets.
    - Maximising UKCS (UK Continental Shelf) production.
    - Low carbon electricity mix.
    - Gas import and storage facilities.
    - Keeping oil stocks and having emergency arrangements in place.
- Implementation
    - Consultations are ongoing.

- Legislation (UK and EU).
- International – post-2012 carbon regime

Prof David Newbery (Cambridge University)

[MP: The key point from Newbury was that energy taxes were unmentionable, but might be essential to get CO2 cuts. The question from a Peak Oil point of view might be: do we wait for price to achieve the cuts, or do we raise taxes now to get ahead of the game, and have room to cut them later if required? Another important point he made was that carbon policy is driven by quantity of emissions, but commercial action is driven by price, and there is not a predictable relationship between the two. I feel this situation will be progressively turned on its head by Peak Oil.]

Energy White Paper Overview
What changed between 2003 and 2007 to need a new White Paper?

- Stern Review.
- Rapid growth in India and China, both of which are heavily coal-based economies.
- EU ETS, Kyoto Protocol ratified.
- High gas prices in the UK.
- Nuclear storage strategy agreed (MP: but not a storage site, as came out in discussions).

EWP03: We have a problem with energy. But don't mention energy taxes!

EWP07: The problem has got bigger! But still don't mention energy taxes!

Energy taxes

- Vary between countries, and between fuel types within countries.
- The UK effectively subsidises domestic energy consumption, as the VAT level is so low *(MP: not exactly sure how he got to this conclusion, and not everyone agreed).*
- If you increase price, demand is reduced.
- Counties with high energy prices are more efficient for fuel **and electricity**, where demand is often thought to be very inelastic.

Transport – hard to tackle
Electricity – easiest sector for CO2 reductions?
Heat – needs to be tackled, due to the size of the sector.

Domestic use is 57% of personal total energy use, but is hardly taxed at all!

Policies

- Strengthened EU ETS.
- Climate change bill.
- RO increased to 20% by 2020.
- Better planning process.

Do these policies send a positive signal to investors?

Carbon pricing

- Put a value on it.
- But policy is driven by quantity, not price.
- This does **not** result in a predictable carbon price, which is no good for investors.

Security of supply

- We are not actually very strongly connected to Europe.
- Most future gas supply will come from Norway and LNG imports.

Investment

- 30-35GW capacity needed by 2025.
- Capacity built now will last beyond 2050, so decisions are important.
- A credible future carbon price is needed to direct investment.

Nuclear

- Vague statements in the EWP.
- We have only built a small amount of nuclear over the years, especially compared to France and the USA.

CCS – this is the least economic, but the research must be done.

Wind

- We are unlikely to have new nuclear plants by 2020, so need something else.
- There are applications for 16GW onshore wind power, and 8GW offshore.
- Our track record in adding wind capacity is poor compared to the rest of Europe.

Prices

- EU ETS adds a few percent to energy prices.
- RTFO will have adverse consequences, and has already pushed up food prices. It is morally irresponsible to supply ourselves with fuel and let others deal with the consequences.

Conclusions

- Taxes and subsidies are still not mentioned in the EWP.
- There is no mention of a floor for the carbon price.
- ROCS are retained, but they are a costly solution.
- EWP is full of good intentions, but will they result in action?

Discussion

- Building nuclear plants is basically taking a bet on future gas prices, as that's what will set the price at which electricity is sold.
- We have a high tax on transport fuels, but not on domestic energy. People are prepared to pay a very high price for transport.

Prof Michael Grubb (The Carbon Trust)

[MP: Far more interesting than it might have been! The key point I took away was that a low-carbon economy needs large capital investment at the start, but because nobody knows how much carbon emissions will cost in future, they are reluctant to spend money now. Same is true for oil supply I guess, with many people still wanting to believe the optimistic official projections, so reluctant to plan for a high-price future.]

Valuing Carbon
What should the cost be?

- Estimate impacts of climate change, aggregate across the world and future.
- Debate has gone on for 15 years! "Ethical parameters" in the models have a strong influence on the value of carbon.
- With sufficient uncertainty, you can end up in a situation where no optimum solution exists. Damage from impacts of climate change tends to rise faster than the probability decreases.

How to put a price on it?

- Taxes, or rights resulting in market prices?
- If you are uncertain about damage and the cost of mitigation, you are better off with a tax.
- Stern Review says tax is best in the short term but quantity limits on emissions are needed in the longer term.
- Persistence – decisions made today will impact for decades.
- A rational scheme must be international, so must include additionality, deal with tax variations and have the capacity to evolve.
- Our current theories are not up to the task of dealing with climate change, carbon prices, etc.
- A defining feature of a low carbon economy is that it is **capital intensive**. But we don't even know what would be the correct discount rate to use...

Dr Brenda Boardman (Environmental Change Institute)

[MP: Boardman was very critical of the UK government in her presentation. She pointed out that fuel poverty (where a household spends more than 10% of its income on fuel) is on the increase, but the government has made no new plans to deal with this. She also pointed out that more efficient home appliances were not helping reduce consumption, as they tended to get bigger – refrigerators were given as an example, but it is probably true for others too. The improvements needed in domestic energy efficiency are significant, and will become more so as prices rise.]

Saving Energy

Climate change bill: 60% CO_2 cuts, requires 2.6% cut per year **Climate science:** 80%+ CO_2 cuts, **requires 3.7%+ cut per year!**

- Between 1996 and 2050, the UK is expected to have 33% more houses. But using existing technology, two thirds of the 60% cut can still be achieved through energy savings alone.
- Reducing demand could cover all the planned closures of nuclear and coal plants.
- Lighting – we should ban inefficient bulbs, LEDs will be ten times as efficient in future.
- Fridges – these have got more efficient, but have also got bigger, so the overall consumption has risen.

- From 2002-2006, gas prices have risen 65% and electricity prices 44%, which has doubled the number of people in fuel poverty.
- Fuel poverty was covered in the EWP03, but only had a brief mention in EWP07
- EWP07 says that "incomes are assumed to rise faster than fuel prices"
    - But most people in fuel poverty are on benefits, and the government sets the rate at which these rise...
    - No mention of increased funds for efficiency, which would actually help the problem.
- Policies in the EWP could achieve the climate change bill targets, but only if they all work perfectly,
- Housing energy certificate
    - Houses in the F/G bands are technically not fit for human habitation. This includes 3.9 million houses, which will be legally obliged to be dealt with in a few years.
    - Today's best practice will have to be the average case in 2050, while today's average will need to be the worst case in 2050.

Prof Goran Strbac (Imperial College)

[MP: The single most important point I learned in this presentation was that as soon as you have 10,000 homes on a grid, you have reaped 99% of the benefits of demand smoothing, or "coincidence factor" as Strbac called it. I was surprised that this number was so low, perhaps there is more hope for a cellular-style electricity grid than might have been thought?]

Distributed Energy

The EWP does not really provide a direction for distributed energy, but given the lack of information in this area, this is hardly surprising.

Today's system

- Generation is supply of energy, but is also control of the system.
- System operators coordinate the generators.
- The transmission network is fairly low-tech – there is no "intelligence" in it.
- Distribution is passive, with no control implemented.
- Demand is largely passive and uncontrollable.
- Generator utilisation is typically 55%.
- Generator efficiency is 35% or lower for coal, 50-60% for CCGT.
- Transmission network utilisation is less than 50%.
- Losses are 2% in transmission and 7% in distribution.
- Distribution networks are responsible for over 90% of customer supply interruptions.

Drivers for change: ageing assets, new forms of generation being connected, new ICT developments making intelligent power networks possible, new transmission and distribution technology, demand side response is now possible.

The future

- Bi-directional energy flow and control at different levels in the transmission and distribution network.
- Active demand management.
- Distributed generation allows for better use of waste heat, and could raise efficiency to 80%.

Barriers: cost, electricity industry (technical, commercial, regulatory), planning permission for distributed generation, lack of information.

Policy: current measures unlikely to make a big impact, apart from the RO.

"Coincidence factor"

- If you supply one home, you must be able to meet peak demand.
- As you supply a larger group of homes, the peaks in demand spread out, so you don't need to meet the combined peak of all the homes together. Typically, you only need to generate 10% of the theoretical peak demand.
- **The minimum number of homes to reach a 10% "coincidence factor" is only about 10,000.** So small cells within the network can be very effective.

Transmission networks are needed to move energy around still. For example, bringing energy from Scottish renewables down to England.

Local heat networks could prove very useful in future for distributed generation.

The UK is in a leading position on distributed generation, after its changes to network security standards and incentives. However, this is only because other countries have done almost nothing – we still have a long way to go.

Prof Jonathan Stern (Oxford Institute for Energy Studies)

[MP: Stern is very knowledgeable on gas supply security, although he is not very interested in the peak oil and gas message. He seemed almost angry that the Rough outage in 2006 did not get coverage and explanation in the UK media, and has not been addressed properly in any government documents since. He is of the view that the UK has no plan for the domestic risks to security of supply, and for external risks it simply hopes that "markets" will solve the problems]

Security of supply for the UK

- The focus in the UK seems to be all about carbon, nobody is paying any attention to security of supply.
- There are several issues: domestic/international and short/long term.
- The EWP identified some risks to security of supply, but they were mostly **externally oriented**.
- Remedies to the energy problems were suggested in the EWP, but do they address security of supply as well as CO_2 emissions?
- The UK is moving from being an oil and gas exporter to being an importer, so now feels vulnerable, and therefore is simply not talking much about security of supply risks.
- All the major UK energy disruptions of the last few years have been domestic, not international:
    - Fuel blockades in 2000, power outages in London in 2003, power outages throughout UK in Jan 2007, 2006 outage of Rough – the UK's only long term gas storage facility, July 2007 damage to CATS gas pipeline by a ship anchor.
- The Rough outage was very serious, but received little news coverage in the UK. However, everyone in Europe knows about it, and see it as an example of how the UK's energy system does not work, and is vulnerable. If it had happened a couple of months earlier that winter,

there would have been large numbers of people with no gas supply, and numerous businesses would have failed, with a resulting rise in unemployment.
    - Yet the government says nothing about it!
    - No lessons have been learnt!
- Why is the EWP silent on these issues?
- The UK keeps giving lectures to the rest of Europe on how good our energy system is, and how they should copy it. We need to stop – everyone knows about our system, and they are not impressed with it – they can see the problems we have, which are talked about so little within the UK.
- Energy geopolitics:
    - Oil: we can't do much on our own about the conflicts around the world and risks to oil supply.
    - Gas: The UK has the worst relations of any EU country with Russia.
- We have plenty of gas import infrastructure but...
    - It arrived late – we really needed it in 2005/06 when gas prices shot up, but it was not ready.
    - There are no long term supply contracts – just having a pipe is no use unless you have arranged for someone to send you gas through it.
- Our big problem in the UK is the UKCS and the fragility of the infrastructure:
    - CATS gas pipeline damaged by a ship anchor on 1/7/2007, out of action until early Sept 2007. This added 5p/therm to UK wholesale gas prices – if this had been due to an international event, it would have been big news, but as it was domestic, it was hardly covered at all.
- Gas represents 40% of UK energy use, and we have a low level of "insurance" for outages.
- In electricity we have to deal with:
    - Intermittency from renewables.
    - Nuclear outages (Japan, which has had the most reliable nuclear record, has recently been hit by many outages, and is vastly increasing its imports of LNG to replace it. The UK has also had outages).
    - Dependence on gas for CCGT
    - Only coal seems secure, but we don't want to burn that because of the CO_2 emissions!
- The EWP does not address:
    - Resilience of our production and supply networks to weather events.
    - Our ability to cope with catastrophic technical failure or accidents.
    - The fact that domestic incidents are the big problem for energy security!
- The way forward:
    - We can't solve global energy issues alone
    - Our current market framework does not help with energy security.

Discussion

- We must at least admit to the domestic and other risks to energy security, so we can have an open discussion on them. The EWP should have acknowledged the issues and made it clear that nothing was going to be done – this would be better than ignoring them.
- We have four or five years of gas surplus in the UK, perhaps up to 7 years. During this time, the US and Asia will massively increase LNG imports. When the surplus vanishes, there is a risk the UK will have been asleep on the issue, and will not be prepared.

Prof David Banister (OUCE, Oxford University)

[MP: The main point from Banister was that nobody is trying to reduce energy use by the transport sector. The only efforts are to limit growth through improved efficiency. The VIBAT project he refers to (link below) is worth a read.]

Reducing energy use in UK transport

Transport is vitally important, but it is hardly mentioned in the EWP!

- It represents 25% of UK energy use, and 27% of GHG emissions. There are no firm CO2 targets for transport.
- CO2 emissions from transport will have increased by 14.3% between 1990 and 2010.
- The Fuel Duty Escalator resulted in a shift to smaller cars, avoiding 1.9MtC between 1994 and 2000, but was abandoned after the fuel protests.
- Road pricing is focused on congestion, not energy use.
- Voluntary CO2 targets are not working, biofuels are the only mechanism being used to reduce CO2 emissions.
- In the UK, 25 SUVs are sold for every one hybrid car.
- The EU ETS must include surface transport to achieve future CO2 cuts.
- The CO2 cuts made will only stabilise emissions at levels from some time in the 1990s, they will not contribute to the 60% target.
- The way forward:
  - Make fewer trips
  - Modal shift away from cars to other forms of transport.
  - Make shorter trips
  - Improve efficiency.
- See the VIBAT project for how emissions could be cut 60% by 2030. www.ucl.ac.uk/~ucft696/vibat2.html
- The big problem is the expected growth in travel.

Prof Catherine Mitchell (University of Exeter)

[MP: Mitchell was generally critical of the ROCs system, and thought it should have been replaced with a feed-in tariff instead of being tweaked. She was particularly critical over the efforts people are making to try and ensure a "free and fair" market for energy, saying that we should just push ahead with some projects (presumably through legislation or government spending), and worry about market issues later.]

Renewable electricity

- The UK strategy is to use ROCs, but the buyout process (for suppliers with insufficient ROCs) recycles the fines back to the suppliers! This is a perverse incentive not to get the ROCs they should have.
- Production of renewable heat has actually fallen over the past few years.
- Renewable heat and electricity combined are 1.8% of total UK energy.
- Only around 60% of the ROCs target is achieved each year.
- There is a 20% target for renewable heat and electricity by 2020, but this will still only be 5% of total UK energy.
- ROC banding announced in EWP – this only makes a complex system that isn't working more complex! The values allocated to each band are probably not at the right levels for the technologies.
- Devolved administrations are adding further measures to ROCs, giving different levels of

support in different regions.
- There are infrastructure limits, for example the Scotland/England interconnector.
  - A feed-in tariff would bypass many of the problems.
- The EU Energy Action Plan is barely mentioned in the EWP!
- The central failure of the EWP is the lack of long-term strategy. The EWP only goes to 2020.
- **When it comes to renewable energy and cutting CO2, we should "just do it", and sort out the free market issues later.**

Dr Jon Gibbins (Imperial College)

[MP: Gibbins was not particularly arguing for or against CCS, simply whether the measures in the EWP would help get it built. Particularly interesting was a word count he had done for the EWP from 2003, compare to 2007. The number of times nuclear power and CCS were mentioned had increased dramatically in comparison to other keywords!]

Carbon Capture and Storage (CCS)

- The government has committed to a demo plant.
- CCS consultation is in progress.
- There are plans to cooperate with Norway in doing CCS in the North Sea, and to include it in the EU ETS.
- CCS "competition" – this is OK, but it is just one plant, and does not account for the fact that there are many technology options for CCS, and more than one needs to be tried out.
- EU "Energy Policy for Europe" supported CCS, and the EU Energy Summit in March 2007 didn't say much – they seem to have gone off the idea.
- China and India want to see a lead in CCS technology from the West before they'll do it.
- CCS will probably cost less than offshore wind power.

Prof Gordon Mackerron (SPRU, University of Sussex)

[MP: Like Gibbins before him, Mackerron was not arguing for or against nuclear power, simply discussing its viability. He felt that there was sufficient uranium for many years to come – which would be disputed by others, especially those interested in Hubbert peaks... The conclusion is important – the choice presented by the government will be between disastrous climate change and nuclear power, and therefore many people will support nuclear. However, there are still many economic and regulatory barriers to nuclear plants in the UK being completed in time to help plug the approaching electricity generation gap.]

Nuclear power
Drivers:

- High energy prices.
- Growing international investment in nuclear energy.

- Climate change
- Nuclear technology is well-established, can provide bulk baseload power and has a low carbon footprint.
- The economics of new nuclear plants should be better than the old ones – they could hardly be worse!
- Uranium will not be scarce for decades.
- Reprocessing is no longer necessary – waste will not be separated.

Risks:

- If we focus on nuclear to the detriment of other energy technologies, security of supply could be reduced.
- Nuclear power needs a guaranteed customer for the economics to work.
- Although there is a waste storage strategy, no site has yet been identified.
- There are planning and regulatory issues.
- The proposed designs have not yet been completed anywhere, and the EPR in Finland is 2 years late, after 2 years construction, and is 25% over budget. The EPR is one of the "simple" designs...
- The UK government is opposed to direct subsidies.
- The economic analysis in the EWP is flawed
    - We don't know what the future price of carbon will be, or where gas prices will be.
    - The EPR in Finland has gone over budget.

Action:

- Generic design assessment – but this could take 3 years!
- Changes to planning regulations – but past experience shows this may not speed things up!
- Operators to meet the "back end costs".
- "justification process" internationally required for new projects involving radiation.

However, not sure that all this will make nuclear power attractive enough.

The government line is to balance the risk of nuclear power (i.e. waste) against the risk of climate change.