



- 1. Use nuclear power to tackle climate change and breed slugs to keep down the weeds?**
- 2. Fixed Unit Guess – to guarantee utilities pay the full costs of disposal, Labour’s proposals must be withdrawn.**
- 3. A back-door subsidy for nuclear power – carbon floor price?**
- 4. Environment Agency releases consultation on new build radioactive waste.**
- 5. HSE cracks the whip at Sellafield.**
- 6. The search for a nuclear dump continues.**
- 7. Triple Global Nuclear Capacity says cloud cuckoos - IEA and OECD**
- 8. Zero Carbon Britain.**
- 9. Scotland could meet 100% of its electricity requirements from renewables**

1. Use nuclear power to tackle climate change and breed slugs to keep down the weeds?

Let’s add arsenic to lager to tackle binge drinking; breed slugs in the garden to keep down the weeds and use nuclear power to tackle climate change says poet Danny Chivers. (1)

Energy minister Charles Hendry has told the Nuclear Industry Forum the government is committed to the building of a new fleet of nuclear power plants in the UK, and outlined plans to remove “unnecessary” barriers to the construction of new reactors, provided they can demonstrate they can be built, operated and decommissioned without recourse to public subsidy. (2)

The problem, says *Business Green* Editor, James Murray, is that while the rhetoric indicates a balanced energy policy, what little action we have seen since the new government took office suggests the nuclear industry is beginning to establish itself as top dog. It was the nuclear industry that requested and got meetings with DECC ministers within days of their taking office, just as it has been the nuclear industry that has received a clear signal from energy minister Charles Hendry that the government will remove the “unnecessary” barriers it faces. Hendry’s speech to the Nuclear Industry Forum boiled down to a remarkably unequivocal message: “*don’t worry, we’ll look after you*”. (3)

In contrast, the renewables sector is still awaiting clarity on numerous issues. Huhne may have stressed his commitment to the industry and there is universal agreement that as a Lib Dem his support for the sector runs deep. But where is the clarification on how the government plans to extend the feed in tariff to all renewable projects? Where is the detail on how it will make good on its commitment to accelerate the development of marine and anaerobic digestion technologies? Where is the evidence that the promised Green Investment Bank will prove effective? Where is the information on what is going to happen to the renewable heat sector? Where is the promise to address the UK’s flawed, anti-wind farm planning regime? Where is the timeline for answering all these questions?

The Treasury did, however, confirm that it had axed the £80m loan to nuclear industry components supplier, Sheffield Forgemasters, promised by the previous government. Chief Secretary to the Treasury, Danny Alexander, confirmed the project had been cancelled as part of the review of spending commitments made since the start of the year. (4)

- (1) Tenner Films June 2010 http://www.youtube.com/watch?v=tTqob1yIFwI&feature=player_embedded
http://www.tennerfilms.com/index.php?option=com_content&view=category&layout=blog&id=39&Itemid=75
- (2) Business Green 16th June 2010 <http://www.businessgreen.com/business-green/news/2264843/government-details-subsidy-free>
- (3) Business Green 16th June 2010 <http://blog.businessgreen.com/2010/06/the-governments.html>
- (4) Business Green 17th June 2010 <http://www.businessgreen.com/business-green/news/2264936/treasury-takes-axe-80m-nuclear>

2. Fixed Unit Guess – to guarantee utilities pay the full costs of disposal, Labour’s proposals must be withdrawn.

The nuclear industry is being offered a taxpayer subsidy on the disposal costs of waste from new reactors following a secret lobbying campaign. Originally the Labour government had planned to charge the industry a high, fixed, disposal levy tied to the amount of nuclear waste it produced, and had told the industry that responsibility for the waste should be transferred to the state only once the waste had been disposed of, at least 110 years from the start of a reactor’s operations. Both proposals were deeply unpopular with the industry. In March, the Labour government published revised proposals that made significant concessions on both issues.

A consultation on setting a Fixed Unit Price for waste has now closed, but documents released under a freedom of information request by Greenpeace reveal the extent of behind-the-scenes lobbying last year in Whitehall by EDF Energy. The lobbying focused on the two key proposals which were revised in March. In one meeting with officials from the energy department in July 2009, EDF Energy’s presentation concluded that the original proposals were “*non-acceptable*” [sic]. In another meeting in October, the presentation warned: “*At current levels, [the proposed] fixed price model will significantly impact the economics of NNB [nuclear new build] in the UK and could make an investment unattractive.*” In a letter in July to the department, the company even warned that the cost calculations could “*be open to challenge in future on the grounds of prudence*”. (1)

Greenpeace accused the Government of preparing to allow a multi-million pound “handout” to new reactor builders – a move which goes against assurances that the nuclear industry would not receive any subsidies. (2)

To explore the extent to which offering nuclear operators a fixed unit price (FUP) for the cost of waste disposal represents a subsidy to new reactors, Greenpeace commissioned independent nuclear expert Ian Jackson to undertake an impartial assessment of the proposals. Using the government’s own pricing methodology as set out in the consultation document, to examine where potential subsidies might lie and what the taxpayer exposure could be, Jackson’s interactive Fixed Unit Price Simulation (FUPSIM) and the accompanying research report reveal an enormous level of subsidy which is likely to be required for nuclear waste and spent fuel disposal from new reactors. (3)

The FUPSIM model is unique in that for the first time it allows the public free and open access to explore the true costs of disposing of radioactive wastes, based on the government’s own figures and using the most accurate computer modelling programme currently available.

Spent fuel disposal will cost up to 44% of the cost of building an EPR reactor – about £1.5bn. But by transferring ownership of the spent fuel to the government around 2080 - decades before it may be

disposed of in a repository, this is discounted to £515m. There are good reasons for not discounting prices when faced with very long term nuclear liability cash flows. The discounted pricing assumes that £515m cash paid in 2080 is worth £1.53bn in 2130, but this may not necessarily be true in the real world. In other words the stock market is expected to pay around 70% of the total disposal cost.

The only way to guarantee utilities pay the full costs of disposal is to charge them the actual cost. Estimating realistic disposal prices 100 years into the future is fraught with difficulty. Moreover under present financial conditions stock market returns will not be sufficient to pay for the majority of a utility's spent fuel liabilities. (4)

The Government's pricing model is based on unpublished Nuclear Decommissioning Authority (NDA) costs for a range of different repository and nuclear power scenarios and then combines these using probabilistic techniques. These may not be very well suited to financial modelling of first-of-a-kind nuclear facilities. For example the government's 2001 financial assessment of the business case for the Sellafield MOX Plant (SMP) concluded there was a 97% probability the net economic benefit would be greater than zero and the average benefit was expected to be +£216m. By April 2009 SMP had lost £1.263bn.

The Government concedes that its estimate for decommissioning, waste management and disposal costs has virtually doubled since 2007 further undermining its claim to be able to protect the taxpayer.

Greenpeace accuses the Government of preparing to allow a multi-million pound "handout" to firms building nuclear reactors. It says the FUP proposals are totally inconsistent with the coalition Government's promise not to subsidise new reactors, and should be withdrawn. (5) Ben Ayliffe, senior energy campaigner for Greenpeace, warns that: "*billions of pounds of public money could be spent to subsidise the nuclear industry, even though the Government is warning of painful cuts ahead for the country in key areas like education and health. If the coalition Government is going to gain the public's trust, they've got to stick to their word and abandon Labour's plans for subsidies to the nuclear industry.*"

- (1) Guardian 2nd June 2010 <http://www.guardian.co.uk/business/2010/jun/02/edf-nuclear-waste-lobbying>
- (2) Independent 21st June 2010 <http://www.independent.co.uk/environment/greenpeace-slams-government-handouts-for-nuclear-industry-2006108.html>
- (3) Fixed Unit Price Simulation for Disposal of Spent Fuel from Nuclear Power Stations in the UK (FUPSIM) by Ian Jackson, Greenpeace UK June 2010 <http://www.greenpeace.org.uk/fupsim>
- (4) Hidden Subsidies and New Nuclear, Greenpeace Briefing, June 2010 <http://www.greenpeace.org.uk/fupbriefing>
- (5) Independent 21st June 2010 <http://www.independent.co.uk/environment/greenpeace-slams-government-handouts-for-nuclear-industry-2006108.html>

3. A back-door subsidy for nuclear power – carbon floor price?

There is a clear need for a cap on emissions of CO₂ that decreases year-by-year at levels that will minimise the risk of dangerous climate change. Such a cap would raise the price of emissions well above the levels currently resulting from cap-and-trade schemes such as the EU Emissions Trading System (ETS). Raising the price of carbon emissions in that way would be in accordance with the 'polluter pays principle' according to Energy Fair, provided that due account is taken of emissions from all sources such as the mining and processing of uranium ore. (1)

The Government is planning tax shifts to "support the carbon price" later in 2010, it said in the 'Emergency Budget' but without giving details. (2) Setting a floor price for carbon – a charge which is triggered when the price of European Union permits falls below a set level - would raise costs for generating electricity from coal and natural gas, which are more-immediately economical than nuclear power. But the EU ETS has had a strange life with very effective business lobbying both in Brussels

and in member states which has led to a massive over allocation of free emission permits in Phase 1. This over-supply of the right to pollute continued into Phase 2 and looks very likely to continue into Phase 3 despite the Commission's ever optimistic spin on the scheme. Sandbag, a campaigning organisation, recently estimated that to achieve the Commission's stated goal of a 30% emissions deduction by 2020 2.3 billion permits need to be removed from the scheme. The present proposed system is in effect giving €18 billion to the most polluting industries across Europe.

Setting a minimum price in one country for one industry will have practical and legal difficulties. "Has the recent history of financial market based solutions and the somewhat dubious ethical nature of the financial institutions taught us nothing?" asks Peter Shield at Natural Choices. (3) "If you create a profitable loophole in a weak market, such as the carbon market, unscrupulous actors won't creep through it, they will charge through it". It may not be called a subsidy, indeed most subsidies have a budget, this one is not a subsidy in the traditional sense of the word – it's a black hole.

One option the Chancellor might decide to use would be to reform the Climate Change Levy. (4) Apparently, DECC is looking at mechanisms that "would not penalise existing fossil fuel plants or give a financial boost to nuclear power plants near the end of their lives" (5). Any scheme that does not penalise existing fossil fuel plants is clearly not a straightforward raising of the price of CO₂ emissions.

Another possibility is some kind of 'low carbon obligation' instead of a 'renewables obligation' (6). Any such scheme would almost certainly be a form of subsidy for nuclear power. The renewables obligation may be justified on the grounds that renewables need that kind of support until they are well established. Extending the scheme to include nuclear power is certainly not justified because nuclear power has been established for many years and should be commercially viable without that kind of support.

An Early Day Motion (No.150) on Nuclear Power and Public Subsidies has been tabled by Paul Flynn MP <http://edmi.parliament.uk/EDMi/EDMDetails.aspx?EDMID=41069&SESSION=905> (7)

- (1) A back door subsidy for nuclear power, Energy Fair 27th June 2010 <http://www.energyfair.org.uk/actions/government/backdoorsubsidy>
- (2) Business Week 22nd June 2010 <http://www.businessweek.com/news/2010-06-22/cameron-boosts-nuclear-incentives-with-carbon-fee-update2-.html>
- (3) Natural Choices 28th May 2010 http://www.naturalchoices.co.uk/New-article.690?id_mot=10
- (4) Business Green 22nd June 2010 <http://www.businessgreen.com/business-green/news/2265263/budget-promises-wave-autumn>
- (5) Utility Week 17th June 2010 <http://www.utilityweek.co.uk/news/uk/panutility/hendry-promises-carbon-floor-p.php>
- (6) The Engineer 17th June 2010 <http://www.theengineer.co.uk/news/edf-approves-nuclear-build-policy/1003008.article>
- (7) See also Paul Flynn MP's Blog 6th June 2010 http://paulflynnmp.typepad.com/my_weblog/2010/06/nuke-subsidies-galore.html

4. Environment Agency releases consultation on new build radioactive waste

The Environment Agency has released its assessments of two new reactor designs for consultation. This is part of the Generic Design Assessment (GDA) which the Agency is carrying out with the Health and Safety Executive. The consultation runs until 18th October 2010. (1)

The Areva EPR and the Westinghouse AP1000 reactor designs could be granted statements of design acceptability, the Agency said, subject to more information from the designers of both reactors on the long-term storage of spent nuclear fuel in order to "understand whether there is any potential for degradation for the fuel that might affect its disposability." Current plans would have the operators of

the new reactors storing spent fuel in "interim" storage facilities for as much as 100 years after the reactors close before a deep geological disposal facility (GDF) is available. The GDF has yet to find a site, but is expected to open in 2080. However, it could take 50 years to emplace so-called legacy waste from existing reactors.

The Environment Agency's request for more information may help to explain why the Nuclear Industry Association (NIA) has contracted the NDA's Radioactive Waste Management Directorate (RWMD) to undertake initial feasibility studies on several key issues associated with spent fuel management. The contract is only expected to take about three months. The feasibility studies will have the following four strands: consideration of alternative Geological Disposal Facility (GDF) design options for new build spent fuel; issues associated with centralised spent fuel storage; issues associated with centralised spent fuel packaging; consideration of alternative spent fuel cask designs. It is intended that the feasibility studies will provide a better understanding of the issues and provide a basis for future consideration of possible alternatives to the current baseline scenario (storage and encapsulation of spent fuel at each new build site). (2)

The NDA has already carried out so-called "disposability assessments" on spent fuel from the two reactor designs. (3) These were used in the Draft Nuclear National Policy Statement to justify the conclusion by the Government that it is "*satisfied that effective arrangements will exist to manage and dispose of the waste that will be produced from new nuclear power stations. As a result the IPC [Infrastructure Planning Commission] need not consider this question*" (para 3.8.20). These disposability assessments should have been reviewed by the Environment Agency with its conclusions being made available for public comment as part of this consultation exercise, but the EA critique of the assessments is quite limited. Given the public concern regarding, in particular, plans by nuclear operators to use 'high burn-up' fuel which will produce hotter, more radioactive spent fuel this is a particular concern. (4)

Meanwhile, *World Nuclear News* reports (5) that the latest progress report on the GDA from the nuclear regulators has made the best-case completion of the process seem unlikely. The Health and Safety Executive (HSE) says, although detailed examination of the two reactor designs is well underway there remain some plant systems and features that could potentially have to be dealt with under separate processes after the June 2011 deadline for completion of the GDA process. Regulators remain confident that Areva will be able to demonstrate sufficient independence of safety and operational control and instrumentation in the EPR, saying the company has proposed changes that are expected to lead to an "acceptable position". For AP1000 there remains a regulatory issue requiring more evidence that civil structures are sufficiently robust and Westinghouse has "a considerable amount of work to do" on the safety case for the control and instrumentation system.

The Environment Agency Consultation Documents are available here: <https://consult.environment-agency.gov.uk/portal/ho/nuclear/gda?pointId=1277285023953>

HSE and Environment Agency GDA Progress Report, 1st Quarter 2010:
<http://www.hse.gov.uk/newreactors/quarterly-updates.htm?ebul=newreactor/23-Jun-2010&cr=1>

- (1) Environment Agency Press Release 28th June 2010 <http://www.environment-agency.gov.uk/news/120997.aspx?page=2>
- (2) NDA Press Release 15th June 2010 <http://www.nda.gov.uk/news/spent-fuel-feasibility-study.cfm>
- (3) NDA 9th November 2009, Disposability Assessment for New Build Waste <http://www.nda.gov.uk/news/disposability-assessment.cfm>
- (4) See Section 16.0 of the Nuclear Waste Advisory Associates submission to the Justification Consultation for more on the NDA Disposability Assessments. <http://www.nuclearwasteadvisory.co.uk/uploads/6900JUSTIF~2.DOC>
- (5) World Nuclear News 23rd June 2010 http://www.world-nuclear-news.org/RS_UK_reactor_assessment_update_2306101.html

5. HSE cracks the whip at Sellafield

According to *The Guardian* the Health and Safety Executive (HSE) is cracking down on Sellafield after a series of radioactive leaks and safety blunders. (1) The HSE has closed down the Waste Vitrification Plant Line 3 after finding its safety case was inadequate. (2) It has also taken enforcement action after cooling water needed to prevent highly radioactive waste tanks from overheating leaked twice in 10 months. Sellafield was been ordered to rectify an alleged breach of its safety licence – failing to give staff proper training – by 18 June. HSE has taken further regulatory action over a leak of radioactively contaminated water from a pipe during nuclear fuel reprocessing operations. Along with the Environment Agency, it has ordered Sellafield to correct breaches of radiation rules that enabled the leakage to occur. The HSE has also rejected the latest Lifetime Plan for cleaning up Sellafield because of proposed delays in dismantling ageing and potentially hazardous facilities.

Britain is facing a £4bn black hole in unavoidable nuclear decommissioning and waste costs. The NDA's shortfall is due to slowly rising expenditure on nuclear decommissioning, and falling income due to the closure of ageing power plants. In the current financial year the NDA's budget is expected to be in balance. From 2011-12, the deficit suddenly rises to £850m, in 2012-13 the gap increases further to £950m and then to £1.1bn in the two subsequent years. Energy Secretary, Chris Huhne, has told the Treasury it will be very hard to avoid the expenditure: "*There are genuine nuclear safety issues here that means it has to be paid for.*" (3)

An announcement by the NDA that 60 posts are to be cut at its headquarters on the Westlakes Science Park, near Whitehaven does not bode well for the future. (4)

- (1) Guardian 31st May 2010 <http://www.guardian.co.uk/business/2010/may/31/sellafield-hse-nuclear-radioactive>
- (2) HSE Quarterly Report to West Cumbria Sites Stakeholder Group, 1st Jan to 31st Mar 2010 <http://www.hse.gov.uk/nuclear/llc/2010/wcssg1.htm>
- (3) Guardian 1st June 2010 <http://www.guardian.co.uk/politics/2010/jun/01/chris-huhne-black-hole-nuclear-power-budget>
- (4) BBC 24th June 2010 <http://news.bbc.co.uk/1/hi/england/cumbria/10390806.stm>

6. The search for a nuclear dump continues.

The West Cumbria Managing Radioactive Waste Safely (WCMRWS) Partnership has asked DECC to commission the British Geological Survey (BGS) to carry out a geological screening study on the whole of West Cumbria (Copeland and Allerdale), and a peer review of the screening study. The desk study has now started. (1) It is envisaged that the output from the screening study, including the peer review process, will be ready for publication in September. The study will not be a detailed site identification process. It will simply determine whether it's worth continuing with an area at all based purely on the geology – in other words it will determine areas that are unsuitable for a Geological Disposal Facility (GDF). It has also been agreed with the Crown Estate that the study will include sub-surface areas out to sea, up to 5km offshore from Allerdale and Copeland.

Elaine Woodburn, the leader of Copeland Borough Council told a meeting of the Partnership in February that building a GDF in West Cumbria is "*not a done deal.*" She stressed that Copeland, Allerdale and Cumbria County Council had expressed an interest in the possibility of hosting a deep underground repository - that's all. A decision about whether or not west Cumbria should participate in the Government siting process is likely to be taken in the second half of 2011. (2)

Britain may not find a suitable place to bury radioactive waste, according to the Committee on Radioactive Waste Management (CoRWM), and it is still "unclear" what will happen to waste in the

long-term - “insufficient attention” has been paid to public confidence in disposal of radioactive materials. While “some plans exist” to deal with the UK’s high-level waste, whether they are effective is “a matter of judgment”. It also raised fears that the Government may try to impose a giant waste storage facility on a hostile community, if no UK region agrees to take on the waste. (3)

- (1) Carlisle News and Star 4th June 2010 <http://www.newsandstar.co.uk/news/survey-will-identify-west-cumbrian-sites-unsuitable-for-nuclear-waste-dump-1.716430?referrerPath=/1.50001>
- (2) Whitehaven News 24th February 2010 <http://www.whitehaven-news.co.uk/news/underground-dump-not-a-done-deal-1.676384?referrerPath=news>
- (3) Telegraph 4th March 2010 <http://www.telegraph.co.uk/finance/newsbysector/energy/7362372/UK-faces-struggle-to-find-site-for-12bn-nuclear-waste-storage.html>

7. Triple Global Nuclear Capacity says cloud cuckoos - IEA and OECD

The International Energy Agency (IEA) and OECD Nuclear Energy Agency have jointly launched the new Nuclear Energy Technology Roadmap. Almost one quarter of global electricity could be generated from nuclear power by 2050, making a major contribution to cutting greenhouse gas emissions, according to the Roadmap. Such an expansion will require nuclear generating capacity to more than triple over the next 40 years, a target described as ambitious but achievable.

Nuclear generating capacity worldwide is presently 370 gigawatts electrical (GWe), providing 14% of global electricity. In the IEA scenario for a 50% cut in energy-related CO₂ emissions by 2050 on which the roadmap is based, nuclear capacity grows to 1,200 GWe by 2050, providing 24% of global electricity. (1) Such a programme would require a new Yucca Mountain-sized nuclear dump to open somewhere in the world every three or four years. (2)

- (1) Commodities Now June 2010 <http://www.commodities-now.com/reports/power-and-energy/2853-nuclear-energy-technology-roadmap.html>
- (2) Insurmountable Risks by Brice Smith, IEER 2006, page 280 <http://www.no2nuclearpower.org.uk/reviews/review01.php>

8. Zero Carbon Britain

Britain could cut greenhouse gas emissions to zero in 20 years, creating new jobs in the process, if a range of measures are introduced, including an 80% reduction in livestock numbers. A vision of a Zero Carbon Britain in 2030 is set out in a report published by the Centre for Alternative Technology (CAT), and backed by organisations including four universities and the Met Office, and experts including Sir John Houghton, former co-chair of the United Nations Intergovernmental Panel on Climate Change.

In just two decades the report says the UK can eliminate greenhouse gas emissions equivalent to 637m tonnes of carbon dioxide in 2007. 90% of this would be achieved by eliminating the most wasteful uses of energy, increasing renewable electricity and heating, and transforming land use and farming. The remaining 10% or 67m tonnes would be “offset” by capturing the equivalent emissions from the atmosphere by growing willow, ash, pine, oak and other trees on land freed up by almost abolishing animal grazing. Despite setting more ambitious timetables than demanded of Britain, the pace and scale of transition is “entirely possible”, said Viki Johnson of the New Economics Foundation and one of the report’s authors. “*The solutions exist, what has been missing to date is the political will to implement them.*”

The blueprint is divided into three key areas: mass insulation of homes and offices, smaller easier-to-heat rooms, electric or biofuel vehicles, much less flying and driving and more public transport should cut energy from buildings and transport by 57%; generating a lot more renewable electricity using a range of clean sources, especially off-shore wind, but no nuclear power, should cut another huge tranche and generate millions of new jobs; and free up land to grow biofuels and crops which

"sequester" the remaining emissions from industry, soil degradation and other harder to eliminate sources. (1)

Paul Allen, of the Centre for Alternative Technology, said: "Zero Carbon Britain 2030 shows how with the right mix of wind power, hydro, solar, biomass - plus an intelligent grid to manage demand - we can 'keep the lights on' and supply the energy the country needs - with major win-wins across the economy." Andrew Simms, policy director of the New Economics Foundation, said: "We have the lifetime of this Parliament to break Britain's fossil fuel addiction. The BP fiasco underlines how important it is we act now".

Download the report here: <http://www.zcb2030.org/>

Audio of presentation to Transition Towns Network - Indy Media 14th June 2010

<http://www.indymedia.org.uk/en/2010/06/453523.html>

- (1) Guardian 16th June 2010 <http://www.guardian.co.uk/environment/2010/jun/16/centre-for-alternative-technology-eliminate-carbon-emissions>
- (2) 24 Dash 16th June 2010 <http://www.24dash.com/news/environment/2010-06-16-Report-reveals-how-UK-can-become-a-zero-carbon-nation-by-2030>

9. Scotland could meet 100% of its electricity requirements from renewables

It has been clear for a while that Scotland is well placed to meet 100% of its electricity requirements from renewables in the not too distant future. (1) A paper by Scottish Natural Heritage (SNH) last November suggested this might be relatively easy. (2)

The Scottish Government's target is to produce 50% of Scotland's electricity from renewables by 2020 - around 8,000MW (8GW). There is already an installed renewable capacity of around 2834MW, plus 3739MW with planning permission but not yet built, bringing the total to 6573MW.

A further 9,000MW is awaiting planning consent, with an additional 8,500MW of offshore wind and between 500MW and 2,000MW of marine renewables under development and scheduled for completion by 2020. Thus, says SNH, Scotland can easily meet its 2020 target, and could even meet 100% of electricity requirements.

Offshore Wind

A few years ago there was hardly any mention of offshore wind in Scotland. Apart from the Solway Firth, waters around the Scottish coasts were thought to be too deep. Now offshore wind in Scotland is recognised as having a huge potential in depths greater than 50 metres. Scotland was ignored in Round 2 of the Crown Estate's site allocation process, but then received a whopping 6.4GW of potential capacity in February 2009 through the Scottish Territorial Waters (STW) Round, (3) which covers waters out to 12 nautical miles.

Then, in January 2010 the Crown Estates announced it was granting rights for the biggest expansion in offshore wind seen so far. (4) The so-called Round 3 granted rights to energy companies for nine offshore areas, including the Firth of Forth and the Moray Firth, with around 850 turbines being built across the two Scottish areas with a combined capacity of 4.8 gigawatts (GW). (5) When combined with the 6.4GW in the STW this brings the total to more than 11GW capacity, which is 2.5GW more than the SNH estimate.

In May 2010 the Scottish Government earmarked 25 new potential sites for offshore wind development after 2020. The locations were revealed in the Strategic Environmental Assessment and Development Plan for Offshore Wind, which was published for consultation. (6)

Scottish Renewables - 8,000 MW = 50% target for 2020

Already installed (Nov 2009)	2834 MW
With Planning Permission	3739MW
Awaiting consent	9000 MW
Offshore Wind under development	11000MW
Wave and tidal by 2020	up to 2000 MW
Total	28773 MW = 179%

Wave Power

Scotland's total potential renewable capacity is thought to be at least 60GW. (7) Harnessing this will depend partly on developing wave and tidal capacity as well as offshore wind. The Crown Estate awarded an unprecedented 1.2GW of wave and tidal energy project leases in March 2010 consisting of six wave energy projects totalling 600MW and four tidal projects amounting to 600MW in the Pentland Firth and Orkney Waters Strategic Area leasing round. (8) The sites were awarded to a number of utilities and advanced technology developers including Marine Current Turbines, Pelamis Wave Power, SSE Renewables Developments – joining forces with Aquamarine and Open Hydro, Scottish Power Renewables and EON. In order to facilitate the transition from research and development to scaling up and delivery, and in response to the Government's Marine Energy Action Plan, the trade body, Renewable UK published a document entitled "*The Next Steps for Marine Energy*" which maps out how the industry can achieve a target of 2GW by 2020. (9) The Crown Estate announcement heralds the "dawn of a new era" because Scotland has the potential to become a world-leader in the fledgling industry, which has huge potential for growth. The stretch of sea between Caithness and Orkney is the first around the UK to be opened up for the development of marine renewables and almost 40 companies applied for leases. (10)

The Scotsman described marine energy as a windfall within Scotland's grasp which could power the country seven times over by 2050, (11) after a study undertaken by the Boston Consulting Group for the Offshore Valuation Group was published. (12) Currently the lion's share of renewable capacity is allocated to fixed wind turbines, with small amounts allocated to tidal stream and wave power. The study predicts that floating wind turbines have the most potential, possibly being able to generate 1,533 terawatt hours a year; 2,100 terawatt hours would have been enough to power the UK six times over in 2009.

The world's largest wave power device was switched on to the national grid in Orkney in November 2009. The Oyster machine marked a "key milestone" in renewable energy - with three linked devices contributing up to 2MW of power by 2011. The Oyster was developed by Edinburgh-based Aquamarine Power's researchers at Queen's University, Belfast. (13) In May 2010 a new prototype wave power machine which can produce 750kW was unveiled. The Vagr Atferd was manufactured by the Leith-based firm Pelamis Wave Power (PWP) for E.On. The device's development and construction was part funded by the Carbon Trust. It will be transported to Orkney, where it will be tested for three years to prepare it for commercial use. (14)

Tidal Power

Sheffield-based company Pulse Tidal aims to have the "world's first" tidal station producing 1.2MW of renewable electricity in 2012 and has begun a year-long environmental study ahead of applying to Marine Scotland for a licence. It is looking at the straits between the Isle of Skye and the Scottish mainland for its site. The company must apply for planning permission from the Highland Council to build its first commercial generator at the site: Pulse successfully tested a trial device in the Humber

estuary in Yorkshire and the company received an eight million euro (£6.8M) EU grant to develop its first commercial generator. (15)

Fuel Poverty

The Scottish Government is required by the Housing (Scotland) Act 2001 to end fuel poverty, as far as is practicable, by 2016. The most recent figures from the Scottish House Condition Survey show that 618,000 households were living in fuel poverty in 2008, representing 27% of the total. (16)

At the same time, Ofgem has estimated that renewing infrastructure and meeting carbon targets is likely to require an investment of up to £200 billion which will mean significant increases in domestic energy bills of between 14% and 25% by 2020. (17) Clearly fuel poverty needs to be central to climate and energy policy. Without an integrated strategy for both there is a danger that climate policy will end up worsening the situation with regard to fuel poverty. There are concerns about the achievability of the 2016 target with numbers of those suffering still growing, so policies which focus on energy efficiency for the fuel poor, including insulation and appliances are necessary and urgent. (18)

If the Scottish Government is to meet its target to reduce carbon emissions by 80% by 2050, AND eliminate fuel poverty by 2016, it will need to implement a set of policies which can cut emissions from the domestic sector by 80% by 2050. Every house will need excellent insulation and some form of Low and Zero Carbon Technology – micro-generation or community heating schemes. This means carrying out installations in all of Scotland's 2.5 million dwellings over the next 40 years or 62,500 dwellings every year between now and 2050. (19)

Energy Efficiency

Clearly the top priority needs to be energy efficiency in buildings, and in particular, measures to improve existing buildings. This can address climate change and fuel poverty simultaneously. In Germany, which aims to deliver a 3% improvements in energy efficiency across the economy every year, there is a programme designed to systematically upgrade the entire building stock to "contemporary standards" over a 20 year period. It is funded through soft loans provided by a federal agency. Borrowers are able to take out low interest loans for measures that help older properties reach new-build standard through refurbishment. Only pre-1984 dwellings are eligible for loans: as in the UK, that was the date when building codes first mandated energy-saving standards. (20)

To date most of the policy initiatives on low and zero carbon housing have focused on new housing. It is important that building standards continue to raise the efficiency standards of new buildings quickly because otherwise increases in the overall building stock will increase carbon emissions. And building standards must be properly monitored and enforced. The low-carbon buildings strategy outlined by the Scottish Government's Sullivan report offers a good foundation. (21)

But existing houses lack the same degree of policy ambition despite the fact that 85% of homes standing today will still be lived in by 2050. Urgent investment and action is required to seize the cost effective energy savings which could be made in the domestic sector. A WWF Scotland report shows how Scotland's existing homes can be transformed into low carbon homes and emissions from the domestic sector cut by 80%. (22) A very broad range of physical measures needs to be employed in any retrofit strategy in order to make the required substantial improvements in the energy performance of existing housing. This will include much wider use of solid wall, external insulation for example. But the analysis for WWF shows that physical measures will need to be combined with consumer behaviour change, improved standards of domestic appliances, and there will need to be a significant introduction of low and zero carbon technologies including microgeneration. The WWF report also suggests making use of the Energy Performance Certificates system to further incentivise energy efficiency, by progressively raising the standard required for any house to be sold or let.

Microgeneration

The previous UK Government's Low Carbon Transition Plan only expected two of the 30% renewable target to come from small-scale renewables - whereas the solar PV industry alone expects to provide 12% across Europe. (23) *Building Magazine*, says these plans for onsite renewables will release less than one-third of the industry's potential capacity. (24) According to the Energy Saving Trust we could provide 30-40% of UK electricity demand with microgeneration by 2050, (25) implying a contribution of around 10% by 2020. The difference between 2 and 10% would be enough to save us having to replace our nuclear reactors. With some of the world's leading small wind companies based in Scotland, and with its universities leading the way in solar energy, you might have expected the Scottish Government to be particularly keen to develop this sector, but the current Government has been a huge disappointment in this regard. The Government's Energy Efficiency Plan - which would include plans for the introduction of smart meters and for kick-starting small-scale renewable and heat technologies - has been delayed six times. Its original scheduled publication date was 2005, but it now won't appear until autumn 2010. (26)

Low Carbon Heat

Heat supply makes up around 50% of Scotland's final energy use, so we need to tackle emissions from this sector too, as well as electricity and transport. The Scottish Government has set a target which requires 11% of the heat consumed in 2020 to come from renewable sources, compared with 1.4% currently. 31% of heat use is in the industrial sector, 51% in the domestic sector and 18% in the commercial sector. (27) The Scottish Renewable Heat Action Plan focuses on actions needed over the next two years to set Scotland on the right trajectory to meet the 2020 target. Unfortunately it needs to be read in conjunction with the delayed Energy Efficiency Action Plan to get a complete picture of plans for low carbon heat, because the Energy Efficiency Plan will consider the role of waste heat from non renewable sources for district heating.

An earlier energy efficiency consultation document (28) highlighted a number of successful Combined Heat and Power (CHP) district heating schemes in Scotland. Although these tend to be gas-fired, they are much more efficient than centralised electricity generation which wastes two thirds of the energy used. CHP schemes can achieve an efficiency of around 85% for the combined production of electricity and heat. (Once heat networks are established, CHP plants could be converted to biomass at a later date as biomass CHP technology develops.) Aberdeen, for example, already has three schemes run by Aberdeen Heat and Power Co Ltd – an independent, not-for-profit company established to develop and manage the CHP schemes: the Stockethill project supplies heat and hot water to 288 flats in 4 high rise blocks; the Hazlehead project supplies 4 high rise blocks, a Sheltered housing scheme, school and swimming pool; and the Seaton project supplies 503 flats in 6 high rise blocks.

There are also schemes in Clydebank (29) and Edinburgh University (30). In fact, in 2006 there were 87 good quality CHP schemes in Scotland generating over 3 GWh of electricity and 8 GWh of heat - 6% of power generated and 8% of heat used, mainly serving large process sites in the petrochemicals, chemicals and food sectors. (31)

A study by Pöyry Energy Consulting looked at industries across the UK which could generate as much electricity as 10 nuclear power stations and halve gas imports by installing or extending CHP plants. Two out of the nine sites studied are in Scotland, one at Grangemouth and one near Peterhead. (32) As part of the plans for the regeneration of the Craigmillar area of Edinburgh, a feasibility study is being carried out into the use of CHP. (33) PB Power is currently carrying out a feasibility study for the City of Edinburgh Council for schemes in Granton and Muirhouse.

But feasibility studies have not been carried out consistently in all local areas where heat networks are likely to deliver significant energy and heat savings. Nor has deployment reached the level for which there is potential. Government interventions are needed to assist, including financial support for up-front costs, support through land-use planning with positive encouragement for heat mapping by local authorities, and support to local authorities in establishing ESCOs to develop district heating schemes.

CHP tackles intermittency

As we move towards higher penetration rates for renewable electricity, the electricity supply system has to be able to manage a significant increase in periodic renewables, while still maintaining supply to the customers. The intermittency of renewables, and wind in particular, demands flexibility of response for operation from other suppliers on the grid. That is why the successful combination of CHP and renewables is attracting increasing attention. (34) Today in Denmark, when the wind speed drops by 1 metre per second the country needs to find an additional 350 MW of electric power capacity. Gas CHP has the capacity to respond quickly to such fluctuation, but to maintain high efficiency the system must also find a use for the heat produced when generating electricity. In Europe, traditional CHP users are beginning to find new ways (such as temporary heat storage or buffering) to meet this need for flexibility. Danish district heating companies are increasingly providing the grid with balancing services, and the Danish model shows how a combination of a high wind-generating capacity and CHP can run together smoothly. (35)

In Germany, micro combined heat and power (CHP) has been identified as the solution to balancing wind in the network. LichtBlick is the largest independent energy supplier in Germany and has announced its goal to place 100,000 micro CHP systems with an electric output of 20 kW each into homes and buildings in Germany. The property owner will be provided with the cogeneration unit and a heat storage unit and be guaranteed that the home will be supplied with heat as required. (36)

Micro CHP is an innovative new technology, which has significant potential to reduce carbon emissions. There are several competing technologies, but all would replace a conventional domestic central heating boiler, and produce electricity as well as hot water for heating. In terms of capacity, if all domestic gas boilers were to be replaced (as they reach the end of their useful life) with micro CHP, the UK could in theory install around 150,000 micro CHP units every year. By 2020, we could have the equivalent of a new large power station powered by the micro CHP units installed in Scotland. (37)

Anaerobic Digestion

Anaerobic digesters break down organic waste naturally into a solid that can be used as fertiliser and a gas that can be burnt to generate heat or electricity. The UK Government hopes an agreement with the National Farmers' Union will lead to the use of 1,000 anaerobic digesters by 2020. At present there are estimated to be about 20. The digesters are expected to make many farms self-sufficient in electricity. Any excess could go to the national grid. (38) In Scotland the Government is planning to require households and businesses in Scotland to separate out food waste by 2013 for separate collection and dispatch to anaerobic digesters. Already anaerobic digestion plants are springing up – one being built by Scottish & Southern Energy at Barkip, North Ayrshire, capable of processing 80,000 tonnes of waste a year, is due to be completed next year. And a £7.5m digester for Scottish Water Waste Services in North Lanarkshire, able to recycle 30,000 tonnes of waste food a year, will be operational this summer. (39)

The water industry, which has to deal with 1.73 million tonnes of sewage sludge annually, businesses which produce food waste and local authorities could all make use of digesters. If all the organic waste in Britain were recycled in this way, enough energy would be generated to provide two million homes with heat and electricity. The National Grid says waste could be used to generate enough gas to heat half our homes. (40) In North West England United Utilities (UU) has unveiled plans for its

Davyhulme sewage treatment works to be the first to inject biogas into the natural gas network. The project will allow United Utilities and National Grid to compare the relative efficiency and cost effectiveness of the three main uses for biogas - onsite CHP, gas grid injection and vehicle fuel. If successful, the gas injection project could also pave the way for the widespread adoption of grid injection facilities for other companies operating biogas plants making an important contribution to the government's renewable heat ambitions. (41)

Launching a local energy revolution

Local authorities have called for an increased role in providing the energy efficiency strategy. The Local Government Association (LGA) for England and Wales said there are too many different schemes aimed at cutting household emissions. These should be merged into a single £7 billion fund to allow councils to embark on a more cost-effective programme. Councils want to build on the example of Kirklees Council which has offered to insulate every house in its area for free. If a similar council led scheme was expanded across the country, it would save £2 billion on current plans to put basic insulation into every home. (42)

The UK Government's Low Carbon Transition Plan says the Government will explore how to unlock greater action by local authorities in identifying the best potential for low carbon community scale solutions in their areas. Chair of the Nuclear Free Local Authorities, Dundee Labour Councillor George Regan said "*Local Authorities have a crucial role to play in the local energy revolution and are keen to get on with implementing it. Yet in 2003 we were promised a step change in energy efficiency by the UK Government – and we are still waiting. We cannot afford to wait another six years while the Government 'facilitates new nuclear reactors' and tries to work out how to unlock greater action by local authorities.*" (43)

- (1) The Power of Scotland Renewed, by Paul Gardner of Garrad Hassan, and Ben Murray. FoE, WWF, RSPB, WDM, July 2009. <http://www.foe-scotland.org.uk/sites/files/Power%20of%20Scotland%20full%20report.pdf>
- (2) Facilitating sustainable development of renewable energy generation, Scottish Natural Heritage, November 2009. http://www.snh.org.uk/data/boards_and_committees/main_board_papers/2009-Dec9/FacilitatingSustainableDevelopmentOfRenewableEnergyGenerationCapacity.pdf
- (3) Scotsman 16th February 2009. <http://thescotzman.scotzman.com/scotland/Offshore-wind-farm-plans-could.4982658.jp>
Offshore Wind Update, Scottish Renewables, 26th November 2009. <http://www.scottishrenewables.com/admin/Application/DocumentEditor/MultimediaGallery/de1589e6-647c-4c34-a32e-53d438fc2bff-1.pdf>
- (4) The Crown Estate Press Release 8th January 2010. <http://www.thecrownestate.co.uk/newscontent/92-r3-developers.htm>
- (5) Scotsman 9th January 2010 <http://thescotzman.scotzman.com/news/Wind-farms-to-create-20000.5968749.jp>
- (6) Scotsman 20th May 2010 <http://thescotzman.scotzman.com/wind-power/Huge-plans-for-offshore-wind.6306709.jp>
- (7) Herald 20th November 2009 <http://www.heraldscotland.com/news/transport-environment/first-minister-makes-waves-with-60ft-oyster-1.933307>
- (8) Crown Estate Press Release 16th March 2010 <http://www.thecrownestate.co.uk/newscontent/92-pentland-firth-developers.htm>
- (9) The Next Steps for Marine Energy: The Industry View on the Marine Action Plan, Renewable UK, March 2010. http://www.bwea.com/pdf/press/RenewableUK_Marine-Action-Plan.pdf
- (10) Scotland on Sunday 14th March 2010 <http://scotlandonsunday.scotzman.com/environment/New-era-for-Saudi-Arabia.6150241.jp>
- (11) Scotsman 20th May 2010 <http://thescotzman.scotzman.com/news/Renewables-will-power-the-country.6306699.jp>
- (12) Guardian 19th May 2010 <http://www.guardian.co.uk/business/2010/may/19/wind-wave-power-north-sea>

- (13) Scotsman 20th November 2009 <http://news.scotsman.com/scotland/World39s-largest-wave-energy-device.5844251.jp>
- (14) BBC 18th May 2010 <http://news.bbc.co.uk/1/hi/scotland/8689095.stm> & Scotsman 19th May 2010 <http://thescotsman.scotsman.com/news/600ft-39sea-snake39-to-harness.6303096.jp>
- (15) New Civil Engineer 27th May 2010 <http://www.nce.co.uk/news/energy/offshore-power-station-to-be-built-near-skye/8600427.article>
- (16) Memorandum submitted by Energy Action Scotland to the House of Commons Energy and Climate Change Committee. Fuel Poverty, March 2010, Ev 76. <http://www.publications.parliament.uk/pa/cm200910/cmselect/cmenergy/424/424ii.pdf>
- (17) Renewable Energy Focus 3rd November 2009 <http://www.renewableenergyfocus.com/view/4946/uk-could-miss-target-for-renewable-energy/>
- (18) Boardman, B. Fixing Fuel Poverty, Earthscan 2010.
- (19) Boardman, B. Home Truths: A Low Carbon Strategy to Reduce UK Housing Emissions by 80% by 2050, FoE (EWNI) and Co-operative Bank, November 2007. http://www.foe.co.uk/resource/reports/home_truths.pdf
- (20) Warren, A. Bold German Energy Saving Plans Set to Shame UK's Lack of Ambition, ACE, March 2008 <http://www.ukace.org/publications/ACE%20Warren%20Report%20%282008-03%29%20-%20Bold%20German%20energy-saving%20plans%20set%20to%20shame%20UK%27s%20lack%20of%20ambition.pdf>
- (21) A low carbon building standards strategy for Scotland: The Sullivan Report, Scottish Building Standards Agency, December 2007 <http://www.scotland.gov.uk/Resource/Doc/217736/0092637.pdf>
- (22) CAG Consultants & Energy Action Scotland, Carbon Countdown for Homes: How to make Scotland's Existing Homes Low Carbon. WWF Scotland October 2008 http://assets.wwf.org.uk/downloads/retrofit_1.pdf
- (23) Business Green 22nd July 2009 <http://www.businessgreen.com/business-green/news/2246496/frustrated-solarcentury-find>
- (24) Building Magazine 16th July 2009 <http://www.building.co.uk/disappointment-at-government-onsite-renewables-plan/3145024.article>
- (25) Potential for Microgeneration: Study and Analysis, EST, eConnect, Element Energy, November 2005. <http://www.berr.gov.uk/files/file27558.pdf>
- (26) Sunday Herald 13th June 2010 <http://www.robedwards.com/2010/06/anger-over-repeated-delays-to-energy-saving-plan.html>
- (27) Renewable Heat Action Plan for Scotland, Scottish Government, November 2009. <http://www.scotland.gov.uk/Resource/Doc/290657/0089337.pdf>
- (28) Conserve and Save: A Consultation on the Energy Efficiency Action Plan for Scotland, Scottish Government, October 2009. <http://www.scotland.gov.uk/Resource/Doc/287719/0087747.pdf>
- (29) Boyle, S. Clydebank Housing Association Combined Heat and Power Scheme. <http://www.sustainabilityinconstruction.org/UserFiles/File/Sinead%20Boyle%20CHP%20Presentation.pdf>
- (30) Somervell, D. University of Edinburgh's Sustainable Future, District Energy, Fourth Quarter 2006, http://www.eauc.org.uk/file_uploads/district_energy_article_dec06_.pdf
- (31) AEA Technology, Mitigating Against Climate Change in Scotland: Identification and Initial Assessment of Policy Options, Scottish Government, November 2008. <http://www.scotland.gov.uk/Resource/Doc/244863/0068651.pdf>
- (32) Poyry, Securing Power Summary, Greenpeace, June 2008 http://www.greenpeace.org.uk/files/pdfs/climate/industrialCHP_summary.pdf
- (33) Parc Craigmillar, New plans unveiled for Craigmillar town Centre, 18th July 2008. http://www.parcraigmillar.co.uk/news/35/New_plans_unveiled_for_Craigmillar_Town_Centre.html
- (34) Cogeneration can enhance smart grid operation by balancing the intermittent availability of renewable fuels, by Fiona Riddoch, Power Services, 14th June 2010 <http://powerservices.lakho.com/2010/06/14/cogeneration-can-enhance-smart-grid-operation-by-balancing-the-intermittent-availability-of-renewable-fuels/>
- (35) The Danish Experience: Successfully Managing Renewables and Cogeneration in a smarter grid structure. Henrik Lund, Teaming up for energy renewal conference, 2nd June 2010 <http://www.conference2010.eu/presentations/HenrikLund%20-%20The%20Danish%20experience%20in%20successfully%20managing%20renewables%20and%20cogeneration%20in%20a%20smarter%20grid%20structure.pdf>

- (36) How smart grids and micro-CHP work together in the 21st Century, Dr Frits Bliet, Teaming up for energy renewal conference, 2nd June 2010.
<http://www.conference2010.eu/presentations/Frits%20Bliet%20-%20How%20Smart%20Grids%20and%20microCHP%20work%20together%20in%20the%2021st%20century.pdf>
- (37) Nuclear Energy and Micro-CHP. Micro-CHP blog, 10th January 2008.
<http://microchp.blogspot.com/2008/01/nuclear-energy-and-micro-chp.html>
- (38) Times 17th February 2009
<http://www.timesonline.co.uk/tol/news/environment/article5748797.ece>
- (39) Scotsman 10th June 2010 <http://news.scotsman.com/scotland/-SNP-plan-new-laws.6352410.jp>
- (40) Telegraph 2nd February 2009
<http://www.telegraph.co.uk/earth/greenerliving/4431157/Sewage-could-be-used-to-heat-half-the-homes-in-Britain.html>
- (41) New Energy Focus 15th June 2009.
http://www.newenergyfocus.com/do/ecco/view_item?listid=1&listcatid=125&listitemid=2741
- (42) Kyoto to Kettering, Copenhagen to Croydon: local government's manifesto for building low-carbon communities. LGA July 2009. <http://www.lga.gov.uk/lga/publications/publication-display.do?id=2399913>
- (43) Ekklesia 16th July 2010 <http://www.ekklesia.co.uk/node/9915>