



Taking Control of Energy in the 21st Century

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Greenpeace is often characterised as being anti everything. Not true but it usually makes a better story. I think its fair to say though, that like most people and most organizations, whether that be NGOs, corporations or governments, we are anti something's and pro others.

But since we, and generally speaking everyone, needs solutions, its very important for Greenpeace to spell out where it stands, on what is one of the most important issues we face in the 21st century – where will our energy come from in future.

To start with I think it's worth saying that there are no easy or cheap solutions when it comes to energy. People talk about win wins, there are a few, but it's more a question of choose your poison. An energy portfolio is basically a basket of risks: of security of supply, of cost and of environmental damage.

Differing approaches to an energy mix are determined by the differing emphasis you place on each of these risks. Understanding that any approach requires some compromise. Greenpeace understands this as much as most.

You wont be surprised to know that Greenpeace doesn't like nuclear. Other people hate wind turbines. I've yet to find a pylon appreciation society. Climate sceptics and others don't see a problem with burning fossil fuels, and I've yet to find an electricity pylon appreciation society! Everywhere you turn somebody, somewhere, has a strong view about the future of our energy mix.

And energy itself is often a much misused term in the media and elsewhere. It's often mixed up with electricity and people often miss out heat and transport fuels from the mix, even though their impact is as big, if not much bigger, in a country like the UK.

And although most of the column inches are about nuclear power, it's heat in the UK that makes up nearly 50 per cent of our final energy consumption, with the rest shared between electricity and transport.

First of all, maybe stating the obvious, why are we concerned about energy.

For Greenpeace climate change is the No 1 priority. The era we are living in is called the Holocene, but has more accurately been described as the Anthropocene, as humans are having such a profound impact on the Earth and its ecosystems.

What we decide to do this century, particularly in regard to energy and land use, will decide the nature of life on planet earth for tens of thousands of years into the future.

When humans started this global experiment with our climate they did so without knowing or understanding the consequences. That is no longer an excuse. We do now know, broadly, the damage we are doing to the biosphere.



So where and how we get our energy is an important decision, perhaps the most important decision we will make in the 21st century.

To put it in context: in 2009, the world's electricity generators emitted about 9 billion tonnes of carbon dioxide, out of an industrial total of 30 billion tonnes and a grand total, including deforestation and the effects of other gases, equivalent to some 50 billion.

To put that in perspective: in 2010 the UN Environment Programme estimated that for the world to have a reasonable chance of limiting global warming to less than 2°C, carbon dioxide emissions should be reduced to 44 billion tonnes by 2020.

If countries took the most ambitious, of the courses of action that they have outlined to the UN, their action would bring the 2020 total down to about 49 billion tonnes, leaving an "emissions gap" of 5 billion tonnes that needs to be bridged by around 2020.

The second point worth making is that there is not a scientifically "right" and "wrong" when it comes to our future low or zero carbon energy mix.

In the end, the crucial issues include contending social values, political and corporate interests and future visions.

If there was a cheap, safe, secure, environmentally benign energy source we'd be using it. But all sources – and yes, that includes renewable energy as well as fossil fuels, like oil, coal and gas as well as nuclear power – all have their problems.

Take oil as an example – it's mainly used for transport and responsible for 37 per cent of CO₂ emissions from fossil fuel use.

Aside from the climate problems from burning the oil we are chasing the last drops in fairly extreme places like the Arctic or with a heavy carbon footprint like the Canadian tar sands.

Or we are attempting to find so called solutions to liquid fuel like first generation biofuels which compete with food and put added pressure on threatened ecosystems like rainforests.

I say so called solutions because so far biofuels have been used by oil and car companies to green their image rather than green our cars by making them much more fuel efficient.

Or nuclear – it raises different risks from the climate ones. Fukushima illustrated one of those. Elemental forces at work with nuclear can never be made entirely safe throughout their lifecycle, including the safe disposal of nuclear waste for hundreds of thousands of years into the future. And Iran illustrates the political instability that the threat of proliferation – intimately tied to nuclear power - can bring.

And although there has been much talk about a nuclear renaissance, nuclear was only ever going to be a small player. China wants 70GW plus of nuclear by 2020, the most ambitious plan globally, yet this will meet less than their power demand.



Compare this to China's potential from exploitable wind power alone of 750GW offshore and 250GW onshore.

Much more - and much more problematically for all of us and our future will come from fossil fuels - especially the burning of coal in China.

And globally, even the International Energy Agency, suggests, at best, that new nuclear reactors will barely keep pace with their closure. And that was before Fukushima. Now even this modest global contribution is in serious doubt.

Today, nuclear power in the eyes of the world, looks dangerous, unpopular, expensive and risky. As the Economist pointed out after Fukushima, "It is replaceable with relative ease and could be forgone with no huge structural shifts in the way the world works."

Coal is, as everyone knows an environmental and human catastrophe in its production and the air pollution from its consumption.

Globally coal is responsible for over 40 per cent of CO2 from fossil fuel use and it's a growing problem. There seems every likelihood that this will continue in places like China, despite global efforts to stabilise and reduce GHG emissions.

With the world as it currently stands, the argument for the necessity of carbon capture and storage in places like China is strong, although to offset that argument, China's on and offshore renewable potential alone is, as we have seen, vast, as is China's ability to use energy more efficiently.

Gas is more complex. We could more accurately describe a gas renaissance happening today rather than a nuclear renaissance. It has the least climate impact out of the 3 fossil fuels and is responsible for about 20 per cent of CO2 emissions from fossil fuel use.

It is often talked about as a bridging fuel to a zero carbon world due to its relatively low carbon content and flexibility. But that doesn't mean all gas is OK or that we aren't storing up problems for the future.

Simplistically there is 'good' gas and 'bad' gas. I'm not talking about shale gas versus natural gas, we can talk about that later, but rather how we are using the gas we burn and what we are doing about its emissions.

Much energy infrastructure is long-lived, and so generating plant being built and planned now will be around and operating in 2030 and quite possibly in 2050. So gas plants being built today that do not capture the heat or are not built near places that can store carbon in the future will become stranded assets if we are to build a zero carbon energy economy.

Greenpeace would argue that a regulatory framework like, an Emissions Performance Standard (or EPS), will drive 'good' gas and prevent lock-in, and thus potentially offers a solution to all types of gas.

A well-designed EPS is important, because if we are to continue burning fossil fuels, whether it is coal or gas, then it is critical that we use the heat that is currently

wasted in order to maximise the efficient use of the fossil fuel, and ensure that the power generation is compatible with carbon capture and storage.

This means situating big power stations close to industries that require large amounts of heat, or where the carbon can be stored, for example in UK case, old gas fields under the North Sea and in some cases it means decentralising power generation so that the heat can be used in local networks – this will also help facilitate changes later, to low carbon fuels, such as biogas or gas from waste, as they become available.

The key thing, as far as possible, is to avoid lock-in of high-carbon infrastructure. At the moment the planning and siting of new gas power plants is not being thought through strategically for a low or zero carbon economy.

We are now less than two decades away from 2030, when the UK Climate Change Committee say we should have virtually decarbonised our power supply.

When it comes to renewable energy it is, like all forms of energy that is low or zero carbon, expensive. And many renewable sources are also variable ie not always available when wanted. And there are a number of problems that need to be overcome when it comes to matching supply and demand. None of these issues are technically insurmountable but they need to be recognised.

There is certainly no shortage of renewable potential as numerous studies have shown.

The offshore valuation study looked at all marine renewables, wind, wave, tidal etc. It was done by UK, Scottish & Welsh governments, supported by some of the biggest utilities including RWE and Eon, wind manufacturer Vestas and oil and gas producer Statoil, amongst others. It said that by 2030, in their middle range scenario, we could have over 400TWh which is greater than the current UK power use of 354TWh. The offshore valuation group also identified the potential for up to 145,000 jobs in offshore wind alone.

Already in Spain, during March this year, most of its electricity came from wind – which just shows the potential.

The Roadmap 2050 assessment by McKinsey, Imperial College and others showed that a fully renewable energy system is deliverable, at reasonable cost, avoiding long term liabilities of both nuclear waste and carbon dioxide storage.

And a National Grid study on biogas said it could provide nearly half our domestic gas needs. But whatever the percentage, all biomaterials in waste should be used, in either anaerobic digestion or gasification, given the UK's current dependence on gas.

Looking at all these sources of energy, oil, nuclear, coal, gas, renewables and one takes ones choice, informed by the weight one attaches to the threat of climate change, energy security, short-term and long-term costs and the wider environmental and social impacts.

Looking 40 years into the future to 2050 it is impossible to say exactly what the best mix would be.



Many different futures involving renewables, carbon capture and storage, even nuclear are all technically possible.

Much depends on your values, on politics, and on corporate power as well as unpredictable events like Deepwater Horizon and Fukushima.

A valuable part of the political debate (and it is a political debate, even if informed by technology and science) is clarity about what values one brings.

So what is the Greenpeace option? This is mainly about the UK, but in general applies, to Europe.

I have talked a lot about energy supply, but the safest and most cost effective energy, is the energy which you don't need. So we need to get very efficient and avoid wasting energy. Especially in a major area that is not straightforward like heat – which remains the biggest single energy use in the UK.

To put that wasted energy into context.

We currently waste two thirds of the energy we put in to a power station in the form of fuel before it comes out as electricity. We then waste around 10 per cent more in transporting the power down wires to our buildings and homes.

Finally, we, the public get our turn to waste some more in how we use the energy. In the end we use about 22 per cent of the energy contained in the fuel we put in to the power station. Can we really continue like that in the age of climate change?

And it's no different for our cars. Typically two thirds of the energy generated by a conventional engine is wasted as heat.

Government statistics show, cost effective energy efficiency measures, could cut UK energy consumption by up to a third.

Always the Cinderella issue in the energy debate, but given the environmental and geopolitical constraints of new fossil fuels, the failure to pluck the most cost-effective of the low hanging fruit is indefensible.

It is time for a much more dynamic approach – EU efficiency standards are set by dry technical committees instead of allowing innovation to drive the process, like the Japanese top runner policy.

Higher efficiency standards in cars, fought tooth and nail by carmakers, would overall be far better for the economy, the climate and energy security.

Efficiency standards in building are key. The government's Green Deal is a start. But the recent dilution by the chancellor for new zero carbon homes, will only leave additional expense for the householder, in both energy bills, and the inevitable, later retrofitting.

After efficiency Greenpeace not surprisingly supports the rapid development of renewables.



Renewables are often boxed in to one category, but there is a genuine portfolio of different options. Geographically and technologically diverse, and using several different fuel sources.

A key dimension of energy security is diversity. The portfolio of renewables offers this dimension in spades including biomass, tidal, wave, wind, geothermal, solar and hydro, etc.

A Carbon Trust report released on Monday found that total tidal and wave energy capacity could be 27.5GW in the UK by 2050, which would be capable of supplying to the grid the equivalent of over a fifth of current UK electricity demand.

Connected to both efficiency and renewables is our transport system.

From Silicon Valley venture capitalists reinventing the internal combustion engine to get massive efficiency improvements, to plug in hybrids and electric vehicles, oil could increasingly be driven from the system.

Instead of peak oil we could have peak demand as less of the liquid fuel is required and car companies are disconnected from oil companies.

And electrifying our transport systems could also provide the additional benefit of battery storage for renewables. The average car spends 94 per cent of its life parked.

Recent advances in the technology of balancing flows of power across the grid, have improved the prospect of harnessing this potential, for using cars, not just as modes of transport, but as storage capacity across the country.

But this needs rapid action – the Committee on Climate Change say that 1.7 million electric vehicles should be on the road, in the UK, by 2020.

For a renewable energy system to work it needs better interconnection with Europe. This would help deal with one of the problems of renewables by smoothing demand across Europe and gaining access to a wide variety of important renewable resources.

For all of this to happen, both Europe and the UK would need to get its act together.

The EU needs to set a higher target for cutting CO2 emissions by 2020 in order to drive the low carbon economy.

It needs to agree new renewable energy targets beyond 2020, new product standards for energy efficiency, improved car efficiency regulations, and a super-grid initiative to connect the whole of Europe in order to increase the resilience of the system and security of supply.

All of these issues together could provide Europe with a new vision and a new reason for its existence that would also provide millions of jobs and new industries.

In the UK, we need to open up new sources of investment in the low carbon energy sector.

The Green Investment Bank was an important achievement but the government failed to allow the bank to operate like a real financial institution, by raising money in the markets and issuing green bonds before 2015 at the earliest.

This will seriously handicap the government in persuading pension funds and other institutional investors to fund the tens of billions required for new energy finance over the coming decade.

As the FT recently said in discussing a strategy for growth: "The government should have used –it still could use – the current exceptionally low costs of borrowing as an opportunity to promote a much enlarged programme of investment in infrastructure." We agree.

Currently, the UK is dramatically slipping down the global green projects league table. The UK slumped from third in 2009 to 13th in 2010. The UK experienced the largest decline among the G20. Germany, perhaps not surprisingly, came second after China, which came first.

And in our opinion, the Government's focus on getting new nuclear off the ground has resulted in an Electricity Market Reform (or EMR) package, that works for nuclear, but could hamper the renewables investment in the UK, both in the short term and post 2020.

If the UK is to see a strong growth in renewables and attract the necessary long-term investment to develop a strong & economically sustainable supply chain, the government needs to send a strong message that renewables will play a key and growing role throughout the 2020s.

In practice, this will mean an ambitious 2030 renewable target and clear financial mechanisms specifically targeted at incentivising renewables.

We support a strong carbon price to drive green investment but are concerned that the government's current trajectory will provide windfall profits for existing nuclear stations, without stimulating any additional investment.

And while fossil fuels will remain on the agenda for the foreseeable future we believe it is important to limit their emissions from power plants with an emissions performance standard that would require the plants to either be CHP or CCS or eventually a hybrid of both.

So in conclusion, there is a perfect storm of problems around energy supply. However a few things are clear.

First, climate change is a real threat, most particularly from emissions in our energy system. As I have emphasised, the future is not decided, but depends upon choices we make now and over the next few years about how we power our industries, our buildings, and our transport system.

Second, we need to avoid the risk over the next few years of high-carbon lock-in given what we build today will be with us for decades.



Third, that there is no simple or cheap option, whether it is a suite of renewables, efficiency, CHP, CCS or anything else. And upscaling spending on R&D is an essential part of giving us more options 10 years from now.

Finally, energy efficiency, renewable energy and clean technology generally, will be a future economic battleground whether driven by climate change, security concerns or just making money and creating jobs.

If countries like the UK don't create an industrial energy future in their own interests, it will be created for us by others, but with their interests, not ours, at its heart.