

ELECTION ANALYSIS

Climate Change:

Consensus on the long-run targets – but will we get policies that deliver?

- To favour action on climate change is part of the political consensus across all major parties. All have signed up to legally binding targets for greenhouse gas emissions of a 34% reduction by 2022 and an 80% reduction by 2050 relative to 1990 levels.
- In line with the Kyoto protocol, compared with 1990, UK emissions have been reduced by more than 12.5%. But the UK has failed to meet its own target of a 20% cut by 2010. Things look even worse if the measure of carbon emissions includes consumption by UK residents, rather than simply emissions occurring in the UK.
- To meet the targets efficiently, carbon prices must rise. While the UK has various policy initiatives to establish such a price signal, the price incurred by different types of emitters differs widely. Even the strongest price signals are relatively weak, and there is considerable uncertainty about the future path of carbon pricing.
- The reform plans of the Climate Change Levy proposed by the Conservatives and the Liberal Democrats would address some of these concerns by creating a floor price for the European Union's Emissions Trading Scheme. The LibDems' plans are more radical – extending the levy to non-business users. Both parties stop short, however, of specifying how high this floor price should be.
- All parties have proposals for 'clean' generation technologies with varying levels of support depending on the type of technology. Labour and the Conservatives support further nuclear power plants whereas the LibDems are opposed to nuclear.
- Giving differential support to different technologies risks inefficiencies and unnecessary costs. Support for renewable technologies could be integrated with establishing a carbon price. The floor for the carbon price could be indexed to fossil fuel prices, both to hedge the risk and to avoid excessive profits in the event of future oil price hikes.
- A carbon price will be fiscally regressive and the parties lack practical proposals to address this. The simplest measure could be to channel all revenue arising from carbon back to UK residents in form of a lump sum rebate – akin to a 'poll subsidy'.

Introduction

To be in favour of action on climate change is clearly in the mainstream. This is reflected not only in the policy positions of the parties, but also in construction activity at the party leaders' homes – David Cameron temporarily installed a wind turbine on his house a couple of years back while Gordon Brown says he has been experimenting with solar panels.

Labour's plans were outlined in a White Paper in 2008, which subsequently led to various bills in parliament that were supported by the opposition parties. The Conservatives' 'Low Carbon Economy Security, Stability and Green Growth'¹ and the LibDems' 'Zero Carbon Britain – Taking a Global Lead'² papers are often hard to distinguish from similar government material.³ But there are some important differences, and a high degree of harmony between the parties does not mean that there is no room for improvement.⁴

The performance so far

The overall shape of UK climate change policy is currently outlined by the 2008 Climate Change Act, which was backed by the opposition parties. The act requires a 34% reduction in greenhouse gas emissions by 2022 and an 80% reduction by 2050 relative to 1990 levels.⁵

The act was clearly an important milestone both nationally and internationally in climate change policy-making in that it made greenhouse gas targets legally binding and established an independent expert panel – the Committee on Climate Change⁶ – to monitor progress towards these targets and propose more specific policies needed to meet them. Nevertheless, it remains to be seen if the commitment continues as the costs to UK voters increase.

Compared with 1990, the UK has reduced greenhouse gas emissions by more than 12.5%, which is in line with the target under the Kyoto protocol. But the UK has failed to meet a separate target – proposed by the government – to reduce carbon emissions by 20% in 2010.

The performance of the UK looks dramatically worse when taking account of emissions from tourism and emissions embedded in trade. Many goods imported to the UK, such as manufactured goods from China, are energy-intensive in production, and it makes sense to count the emissions that UK residents consume rather than simply the emissions that actually arise on UK territory.

¹ http://www.conservatives.com/~media/Files/Green%20Papers/Environment_Policy_Paper.ashx?dl=true

² http://www.libdems.org.uk/siteFiles/resources/PDF/Zero_Carbon_Britain.pdf

³ For example, the 'Low carbon transition plan'

(http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx)

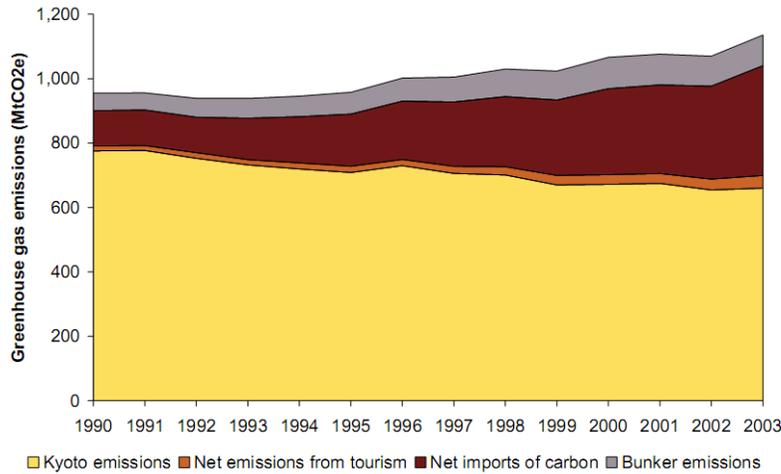
⁴ There is also some last minute repositioning. For example, 'Rebuilding Security – Conservative Energy Policy for an Uncertain World' from Spring 2010 contradicts in parts the strategy outlined in 'Low Carbon Economy Security, Stability and Green Growth'. The remarks in this briefing refer to the more recent statements in those cases (<http://www.conservatives.com/~media/Files/Green%20Papers/Rebuilding-Security.ashx?dl=true>).

⁵ 1990 is the reference year used in the Kyoto Protocol.

⁶ <http://www.theccc.org.uk/>

According to some estimates, UK greenhouse gas emissions may have risen by 19% or more since 1990. Figure 1 shows the path of greenhouse gases emitted on UK territory as well as the implied greenhouse gas emissions caused by UK residents.

Figure 1: UK Greenhouse gas emissions since 1990 by various measurement approaches



Note: Bunker emissions refer to emissions from international shipping and aviation departing from the UK
 Source: Helm et al, 2007

The quest for a stable, single and sufficiently high carbon price

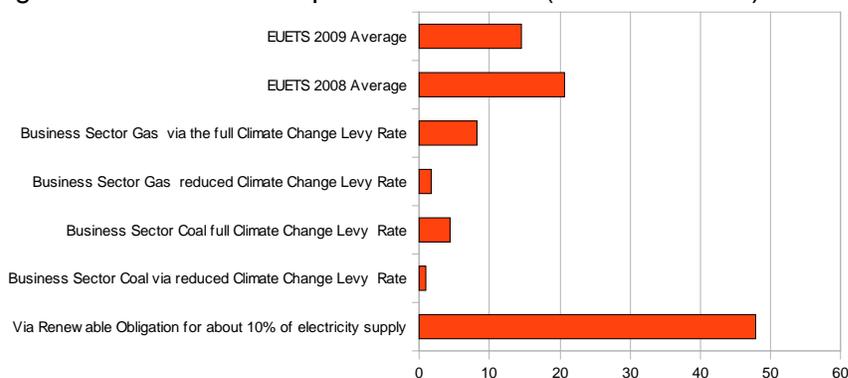
From an economic point of view, the most important policy measure to address climate change is imposing a price on greenhouse gas emissions using a carbon tax or a cap-and-trade scheme. This forces consumers and businesses rather than governments to figure out the most efficient way to achieve a given reduction in emissions using their private knowledge of costs and opportunities.

Thus consumers might choose to consume less of certain products or switch from a petrol-driven car to an electric vehicle. Businesses might decide to adjust their input mix or seize the opportunity and invest in research and development (R&D) to invent new less polluting products for which there is now a market. Because a given unit of emissions has the same effect on global warming irrespective of where it is emitted, the price imposed on a given unit should be the same globally as far as is possible.

Considering the current state of the global negotiations after the United Nations Climate Change Summit in Copenhagen in December 2009, we are still a long way from a globally harmonised price. But even within the UK, there is huge variation in the price imposed on different units of emissions.

Figure 2 shows the implied cost per tonne of CO₂ for a number of different types of CO₂ emissions by industry. The variation is even wider when other types of emissions are considered: for example, residential gas faces no carbon penalty at all.

Figure 2: Selected costs per tonne of CO2 (£/tonne of CO2) in the UK



Source: author's calculations based on EU ETS data, DEFRA data

One important argument for differential pricing is that some sectors would suffer in their competitiveness since not all countries have such stringent measures. Thus many companies enjoyed a reduced Climate Change Levy (CCL)⁷ under a scheme known as Climate Change Agreements (CCA). This explains the difference between the reduced and full rates for gas and coal in Figure 2. The most comprehensive econometric evaluation study of the CCL finds no support for this argument (Martin et al, 2009).

Generally, carbon prices in the UK are fairly low. For example, even the highest carbon cost reported in Figure 2 of £48 (buyout price under the 'renewable obligation' scheme) is only about half of the lowest similar scheme in Germany.

The renewable obligation is a requirement for electricity suppliers to source a fraction of their electricity from renewable energy. But instead of actually sourcing renewable energy, they can simply pay the government a fixed rate per kWh of electricity, which translates into the rate shown in Figure 2 using the carbon emitted on average from non-renewable electricity.

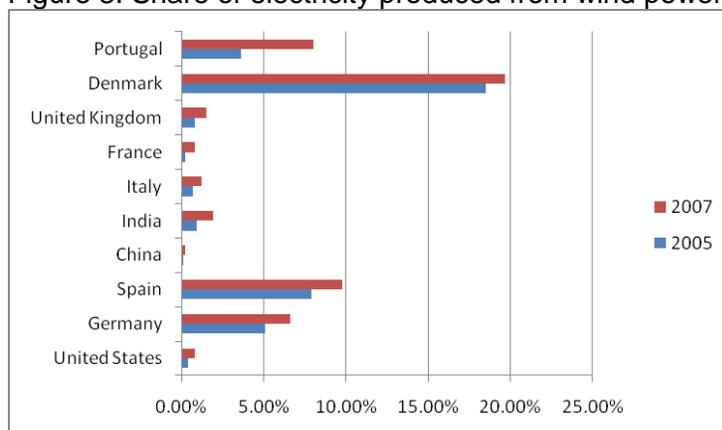
Germany uses instead a system of 'feed-in tariffs' whereby grid operators are required by a law to pay renewable energy suppliers a fixed rate for electricity that they supply to the grid. This rate varies by type of renewable energy. But even for onshore wind, which receives the lowest support, the implied cost per tonne of carbon is around £100.

The low support rate, coupled with the option of being able to buy out rather than deliver, is the likely reason why – despite having some of the best renewable resources in Europe, such as wind – the UK is not only lagging far behind other countries in the share of electricity sourced from renewables but also behind the relatively modest targets set by the government in the past (Figure 3).⁸

⁷ The CCL is a key part of the UK government's efforts to curb business sector emissions. It implies various taxes on fuel inputs for businesses and was introduced in 2001. For more details, see Martin et al (2009).

⁸ This is not to say that the UK should introduce a German-style feed-in tariff system, which has supported some types of renewable generation technologies too excessively (see http://repec.rwi-essen.de/files/REP_08_040.pdf).

Figure 3: Share of electricity produced from wind power in selected countries



Source: http://en.wikipedia.org/wiki/Wind_power#cite_note-wwea-0

Another concern about carbon prices is their volatility, in particular, within the European Union's Emissions Trading System (ETS).⁹

Figure 4 gives some idea of this uncertainty by reporting the distribution of price estimates reported in interviews with almost 800 managers in six European countries.¹⁰ Note that while the average price is almost £40 per tonne of CO₂, the 90th percentile price expectation is more than three times that of the 10th percentile.

The problem with such uncertainty is that an efficient response to climate change requires huge sunk investments, both in R&D but also in fixed assets such as new power generation plants. Private investors will rationally respond to this uncertainty by delaying investment and innovation decisions.¹¹ Reducing uncertainty of the price signal should be an important part of climate change policy-making.

There are at least three elements to this volatility:

- First, narrow carbon market uncertainty – that is, uncertainty about the carbon needs and behaviour of other carbon market participants.
- Second, uncertainty about the wider economic environment – for example, the business cycle, oil prices etc.
- And third, uncertainty over the entire future direction of climate change policy.

While wider economic volatility cannot be easily influenced by the government, the other types of volatility are directly under its remit. In particular, carbon market uncertainty would almost disappear completely if instead of using a carbon trading system, the government simply imposed a carbon tax. To reduce uncertainty over future climate change policy, government credibility is important so legally binding targets, the Committee on Climate

⁹ Figure 2 gives a flavour of this by showing that the average price for 2008 was almost 50% higher than for 2009.

¹⁰ This is based on the study reported in more detail in Anderson et al (2010).

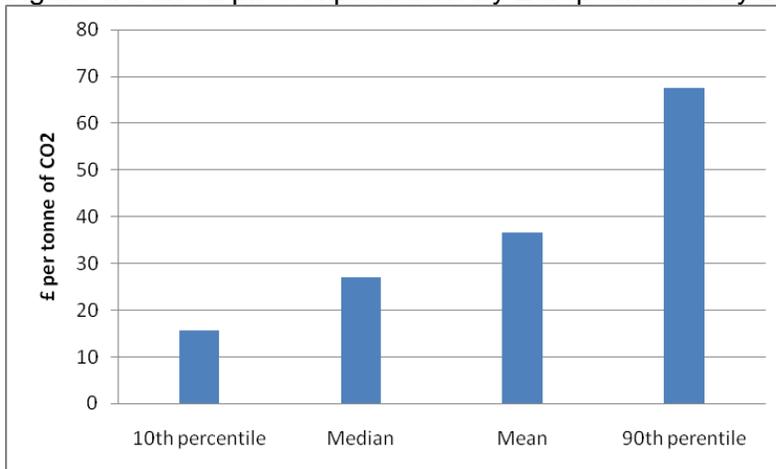
¹¹ CEP research shows large "delay" effects of uncertainty on investment and R&D (e.g., Bloom et al, 2007).

Change and cross-party support are all helpful.

Providing direct funding for particularly large and fixed elements of the required investments – for example, investments in electricity grid infrastructure – similarly send a signal of policy commitment to the private sector.

A more radical idea¹² to reduce uncertainty is for the government to issue options contracts that can be exercised if certain elements of climate change legislation are not enacted or the price of carbon drops below a certain level.

Figure 4: Carbon price expectations by European industry in 2020



Source: 800 managers were asked to estimate what they expected the price of carbon to be in 2020. Author's calculations based on CEP's climate change management interviews

In the proposals of all the main parties, there are statements suggesting that a carbon price is an important element of climate change policy-making. In the case of Labour, this is confined to support for the EU's ETS as well as maintaining the CCL in its current form.

Both the LibDems and the Conservatives¹³ go further in that they want to reform the CCL into a genuine carbon tax – that is, with the tax rate set in relation to the carbon content of energy fuels – and to use the CCL as a tool to create a floor price for carbon to the extent that the EU ETS does not deliver a meaningful price.

The Conservatives want to maintain, however, the current exemption of the non-business energy consumption from the CCL as well as the exemptions granted under the CCA. The LibDems are suggesting removing these exemptions. The LibDems' plans would therefore go furthest in establishing a more homogenous carbon price. Both LibDems and Conservatives stop short, however, of announcing what the floor price path would be or how exactly it would be determined. So it remains an open question whether any of these plans would establish a carbon price high enough to induce change.

¹² Neuhoff and Ismer (2009), Mainelli and Onstwedder (2009)

¹³ As detailed in 'Rebuilding Security – Conservative Energy Policy for an Uncertain World' (<http://www.conservatives.com/~media/Files/Green%20Papers/Rebuilding-Security.ashx?dl=true>).

There is broad support across the parties for direct government support in expanding the electricity grid – to make it more accessible for far off renewable power locations – as well as transforming it into a ‘smart grid’, easing the demand-side balancing of more volatile renewable electricity supply. As argued above, such measures can be a helpful, signalling long-term government commitment for a specific policy path, thereby reducing avoidable uncertainty.

Selling climate change policy to voters

The prime driver for climate change policy is to mitigate the risk of costs of the order of 20% of GDP or more¹⁴ arising within the next five to ten decades by spending a much smaller cost today. The fundamental problem with this is that the people who are supposed to incur that smaller cost today are not the same ones who are going to benefit in the future.

The parties are therefore motivating their push for climate change policies by suggesting that the UK can benefit even in the short run by becoming a global leader in clean technologies and reaping growth and employment benefits from selling those technologies to the rest of the world. How likely is this?

- First, there is a lot of competition for this global leader position, and the UK is coming rather late to the game as Figure 5 shows. In terms of patents in clean technologies, the UK is currently in sixth position, with innovators from countries such as Germany, Japan or the United States holding more than three times as many patents as UK innovators. Worse, when looking only at the more recent period 2002-07, the UK is even falling behind China and South Korea.
- Second, even if UK innovators are ahead in some technologies, it is not clear that this will lead to dramatic employment or productivity gains for the UK. Manufacturing of those technologies might still take place elsewhere.
- Third, employment and growth in clean technology areas, while good for people specialised in these areas, does not necessarily imply welfare gains – *in the short run* – for the population as a whole or relative to a scenario where perhaps other new sectors¹⁵ would have grown much faster. Politicians therefore need to be careful in overselling green growth arguments as it might lead to a backlash against climate change policies if these promises do not materialise.

An even more fundamental question concerns the overall effectiveness of climate change policy considering that emerging economies such as India and China may not curb emissions. Since the UK is only responsible for about 2% of global emissions, unilateral policies will have little influence if others do not follow suit.

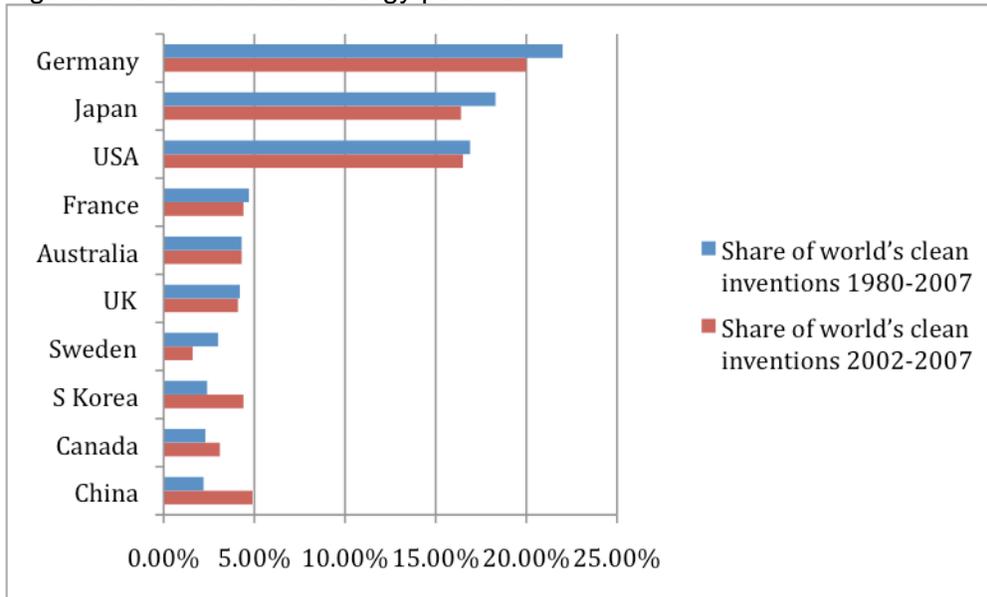
One important channel that allows the UK to punch above its carbon weight is again technology. The adoption of climate change policies will not only reduce UK pollution but

¹⁴ According to the Stern Review (2007).

¹⁵ For example, biotechnology.

also induce innovation in clean technologies.¹⁶ To the extent that this makes those technologies cheaper or more user-friendly, it also facilitates their introduction to emerging economies. While this entails the possibility of a net cost for UK voters in the short run, it could be justified on the grounds of historical responsibility and the greater current capabilities of rich countries such as the UK.

Figure 5: Share of clean energy patents



Note: the figure reports the average share in patents across 15 climate change related technology categories
 Source: Dechezleprêtre and Martin (2010)

Another important concern for political feasibility is the distributional consequences of climate change policies. It is well established that carbon prices on their own have a regressive effect because the spending of lower income groups implicitly contains more carbon.¹⁷ A related concern is that carbon-pricing schemes are perceived as yet another government scheme to extract money from taxpayers. To address both concerns, additional revenue from carbon pricing should be channelled back into the economy in a revenue-neutral and progressive way – that is, so that lower income groups benefit more.

While current carbon pricing revenues are by and large revenue-neutral, they are not necessarily progressive. The revenue from the CCL is used to lower employers’ national insurance contribution as well as to fund a number of energy efficiency programmes that the government is running.

Within the EU’s ETS, emissions permits have so far been by and large handed out for free to the most carbon-intensive businesses, rather than auctioned so that taxpayers could benefit.

¹⁶Although not necessarily for UK innovators or to the net short-term benefit of UK residents as argued earlier. Related to this, see Dechezleprêtre (2009), which shows that climate change policy in one country can have as much of an effect on foreign innovators as on domestic ones.

¹⁷ See, for example, Grainger and Kolstad (2009).

Despite the European Commission's stated goal to auction most permits, free allocation of a large share of the permits will continue for the foreseeable future under current plans.¹⁸

The UK political parties discuss the regressive implications of carbon pricing under the heading of 'fuel poverty'. To address it, they propose a variety of measures focused on making the homes of low-income groups more energy efficient. These range from outright grants (for example, the government's Warm Front Programme) and subsidised credit schemes for energy efficiency improvements (for example, the Conservatives' 'Just do it' Scheme or the LibDems' Energy Mortgages) to obligations for energy suppliers to ensure installation of a certain amount of energy saving measures among energy customers (a scheme currently dubbed Carbon Emission Reduction Target, CERT).¹⁹

Generally these schemes appear very bureaucratic with considerable effort by government to establish who is qualified and which measures qualify. There are also concerns that these programmes target the wrong people.²⁰

Moreover, these schemes can only address adverse effects related to direct energy consumption. But the regressive effects of carbon prices operate equally through the carbon content of the goods that low-income groups consume. As carbon pricing policies become more stringent, it would therefore seem necessary to have schemes in place that more broadly and more simply ensure revenue neutrality as well as correction of distributional effects. A very simple and effective measure could be to re-distribute directly any revenues in the form of a uniform fixed rebate – that is, akin to a 'poll subsidy'.²¹

Supporting technology and innovation

If supporting clean technology is a key objective of climate change policy, are there lessons for policy design? From an economic point of view, a stable and sufficiently high carbon price is the best instrument. High prices induce upfront R&D investments and allow businesses rather than bureaucrats to choose the best way to get green technologies.

Some evidence that stringent carbon pricing is likely to work comes from the much higher rates of clean innovation during the oil price hikes of the early 1980s (see Figure 6).²² In addition, directly subsidising R&D is justified on the grounds that there are spillovers associated with an innovation – that is, benefits arising from the innovation for which the innovator is not rewarded appropriately.

Another motivation for measures beyond the carbon price could be credit constraints, that is, where firms or individuals cannot pursue a high value innovation because they cannot obtain the necessary credit; importantly, not because the innovation is not promising but because creditors have difficulty establishing the potential of the innovation.

¹⁸ See Martin et al (2010) for details.

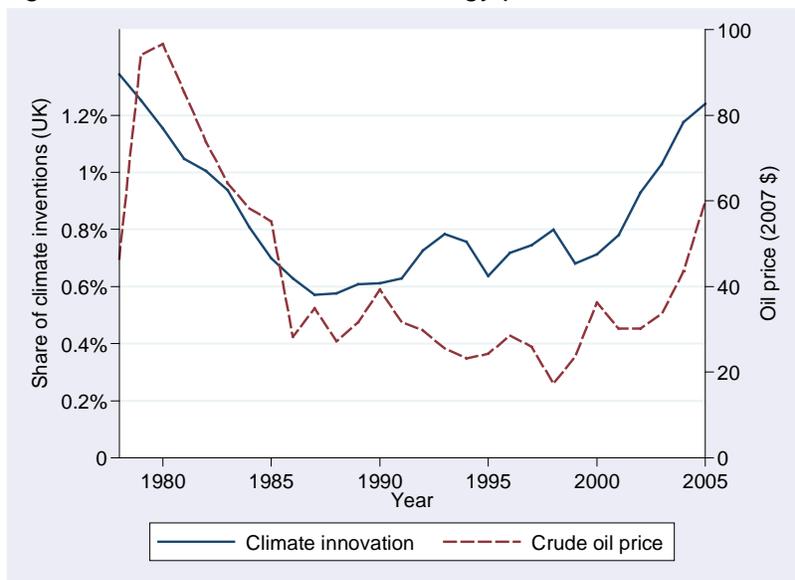
¹⁹ This legislation is the driving force behind the eagerness of a wide range of companies and charities to give away energy saving light bulbs for free.

²⁰ See the evaluation of the Warm Front Programme by the National Audit Office (http://www.nao.org.uk/publications/0809/the_warm_front_scheme.aspx).

²¹ Hence unlike Mrs Thatcher's plans for a poll tax, which would have been very regressive, a poll subsidy would give lower income groups a larger fraction of their income back, thereby acting progressively.

²² See Popp (2002) for more systematic evidence.

Figure 6: Clean innovation and energy prices



Source: Dechezleprêtre and Martin (2010)

Factors such as these would suggest that any such funding should be channelled to basic research and areas where knowledge spillovers and credit constraints are more likely to arise. A glance at the project portfolio of the Energy Technology Institute, the main government outlet for such research money, would suggest that this is not the case at the moment.²³

Another concern is that there is not much evidence that knowledge spillovers or credit constraints are more of an issue for clean technologies than other technologies. The question therefore arises why it is necessary to create new institutions that specifically deal with research funding in this area rather than channelling such funding through established channels.

All parties express the goal of being technology-neutral when it comes to supporting new clean technologies. Despite this stated objective, there appears to be quite a bit of technology tinkering in the proposals. The Labour government has recently introduced the ‘banding’ of the renewable obligation, implying that different technology types attract different amounts of ‘renewable obligation certificates’ per unit of supplied electricity.

The Conservatives are now following the LibDems in their plans to abandon the renewable obligation scheme altogether and to replace it with a system of feed-in tariffs – that is, a guaranteed price for renewable electricity supplied to the grid that is above normal market prices. Similar to the banding introduced by Labour, different types of technology would attract different feed-in tariff rates.

Either scheme implies that different types of renewable technology get different levels of support per kWh of electricity produced, depending on what the government deems a more established as opposed to an emerging technology. Such differentiation is unhelpful in that it makes it more difficult to establish which technologies are actually the cheapest, it leads to

²³ <http://www.energytechnologies.co.uk>

misallocation of investments and it creates special interests that are likely to lobby for prolonged support of those special handouts.

The same holds for plans put forward by all parties to introduce more generous feed-in tariffs for small-scale renewable electricity production (for example, via rooftop solar panels). Any bureaucratic barriers that make it difficult for small-scale suppliers to connect to the grid should be removed. But providing them with an implicit subsidy higher than for other renewable types is likely to lead to unnecessary additional costs.

Nuclear power – a dividing line between the parties

A major difference between the main parties' proposal on electricity generation technologies concerns the treatment of nuclear. Both Labour and the Conservatives support new nuclear power plants whereas the LibDems categorically oppose the nuclear option. In principle, there is no need for governments to be either in favour or against nuclear as long they create a level playing field relative to other generation technologies without government subsidies, which nuclear attracted plentifully in the past.

Labour and the Conservatives pay lip service to this idea. But there are several aspects affecting the costs of nuclear generation potentially creating implicit hidden subsidies that still have to be addressed. The first is the question of nuclear waste, where the government has not yet worked out a long-term strategy for underground storage of such waste. Costs arising from this would need to be fully borne by the operators of any new nuclear plants.

The second is the question of liability in case of a major accident in a nuclear installation. It appears that the UK has a rather lax approach by limiting operator liability at a low level compared with other countries, which often impose unlimited liability and more stringent requirements on securing these obligations (see Table 1). This would render costs of nuclear lower for the operators than they are in reality.

Besides keeping the costs between different renewable generation technologies level – that is, within the power sector – it would also be advisable for efficiency and transparency to equalise the carbon costs between the power sector and other sectors of the economy. Thus, rather than creating a separate system, such as either the renewable obligation or a feed-in tariff, clean generation technologies could derive their support from a reformed and vastly more stringent²⁴ CCL as discussed above.

To minimise uncertainty, such a tax could be designed to guarantee a minimum price for the main fossil energy carriers, that is, coal and gas. Thus the government would guarantee²⁵ that the gas price after carbon tax would never drop beyond a certain level.²⁶

To fine-tune this policy, a body such as the Climate Change Committee could tighten the guaranteed level over time if the initially suggested level turns out to be insufficient to meet

²⁴ That is, on the order of £40 or more per tonne of CO₂ rather than £6 as it is now.

²⁵ Potentially by issuing appropriate option contracts (See footnote 13).

²⁶ Indexing the carbon price to the fossil fuel price would also address recent concerns about excess profits for renewable operators in the event of oil price hikes (see Ofgem: <http://www.ofgem.gov.uk/Media/PressRel/Documents1/16662-R5.pdf>).

the challenges. Such a policy – where the carbon tax target is linked to the price of fossil fuels – would not only hedge against general uncertainty in fossil fuel markets but also against deliberate attempts of fossil fuel producers to sabotage climate policy by price reductions.²⁷ Of course as discussed above, any proceeds from such a tax should be channelled back to taxpayers in a revenue-neutral way.

Table 1: Operator liability in case of a nuclear accident in various countries

Country	Damage Limitation for Operator [million €]	Security or Insurance Requirements [million €]
UK	168	168
Germany	∞	2500
Finland	∞	700
Switzerland	700	700
Japan	∞	540
Ukraine	180	180
China	35	35

Notes: These figures are per major nuclear facility.

Source: Hore-Lacy, Ian (2009)

Risking competitiveness and jobs?

Strong unilateral climate change policy entails the risk that firms might shift production to jurisdictions without such regulation, thereby leading to job loss. This would also jeopardise the objective of inducing innovation: rather than inventing new technology, firms simply use the old technologies abroad.

Anderson et al (2010) examine the likelihood of downsizing or outsourcing arising from climate change policies, and find very few sectors where this is a big problem. What's more, compared with other major European economies such as France or Germany, this risk appears lower in the UK.

Conclusions

There is a great deal of overlap between the parties' proposals on climate change policy. The 2008 Climate Change Bill, which was backed by the opposition parties, has created a sensible overarching framework for climate change policy-making. This framework must now be filled with more detailed policy measures that can induce change.

From an economic point of view, it is central that a uniform, sufficiently high and predictable carbon price signal is established. Through a variety of policies, usage of carbon and other greenhouse gases is already costly to emit in the UK. But these prices differ greatly depending on where such emissions occur. There is also much uncertainty over what these carbon costs will be in years to come.

²⁷ See Sinn (2007) for a discussion.

There is some sensitivity in the parties' proposals to these issues, particularly with the Conservative and LibDem plans to reform the Climate Change Levy into a genuine carbon tax and use it to hedge against uncertainty in the European Union's Emissions Trading Scheme. The LibDems' plans – to extend the levy to the non-business sector and crack down on various other exemptions currently granted – are most comprehensive proposal to create a homogenous carbon price. Both parties are stopping short, however, of specifying how high this floor price should be.

The parties should be careful in overselling the short-run benefits in terms of job creation and growth from climate change policies.

All parties have proposals for differential treatment of different 'clean' generation technologies. Labour and the Conservatives support further nuclear power plants whereas the LibDems are opposed to nuclear. Giving differential support to different technologies risks inefficiencies and unnecessary costs.

Rather than creating a separate system, demand-side support for renewable technologies could be integrated with wider efforts to establish a carbon price. The suggested price floor for carbon could be indexed to fossil fuel prices, both to hedge the risk for the 'clean' technology and generation industry and avoid excessive profits in the event of future oil price hikes.

Any meaningful carbon price will be fiscally regressive unless accompanied by compensating measures. The current plans of the parties lack practical proposals to address this. The simplest measure could be to channel all revenue arising from carbon back to UK residents in form of a lump sum rebate – akin to a 'poll subsidy'.

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