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Affordable Energy Campaign

THE BALANCE OF POWER

The challenge of decarbonisation

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Executive summary

The UK's electricity generating capacity needs renewing, and this needs to take a low-carbon approach to meet the government's binding and ambitious carbon reduction and renewable energy targets. High upfront costs and long payback periods for investors make low-carbon electricity a risky business proposition. So policies are needed to encourage this investment.

Ultimately these get paid for by electricity consumers: the cost of promoting this investment through subsidies and carbon taxes already adds an estimated £50 to the average domestic electricity bill. And these policy costs are expected to rise sharply over the next few years: by 2020, households will be paying an average of £120 a year (and around £315 if they have electric heating) even if they reduce the amount of electricity they use. Yet only one in four people is aware that they are paying for these policies through their bills.

The government is not doing enough to ensure policies deliver value for money for consumers. Nor is there adequate transparency and scrutiny of costs and how they are passed through to households. These subsidies effectively amount to public spending and should be subject to the same level of oversight and scrutiny as spending which comes from direct taxation. For example, there has been little progress in developing a plan to introduce competition between different low-carbon technologies to give consumers value for money. And there is not sufficient transparency in the process for setting subsidy levels for all Contracts for Difference (CfDs) – the new subsidy mechanism the government is using to promote investment in low-carbon electricity. Some contracts will be agreed behind closed doors and without adequate independent scrutiny. Moreover, despite the government's rhetoric, its cost control mechanism, the Levy Control Framework, seems incompatible with CfDs so it is difficult to see what protection it gives consumers.

Current proposals for how suppliers will recover the cost of CfDs from consumers risk increasing costs and undermining retail competition. There are also no plans to help vulnerable households with electric heating bear the higher costs they face. Around 28% of electrically heated households are already fuel poor, and the average policy cost for these consumers is currently around £120, with this expected to rise to around £315 by 2020. By contrast, the government does plan to exempt industries that use the most electricity from some of their share of subsidy costs. All households, including those that are vulnerable, look set to help pay for exemptions for these businesses.

Furthermore, despite the government's claims to have affordability for consumers at the heart of its policy programme, in April 2013 it introduced an expensive new carbon tax on electricity. It is unlikely to deliver any investment in new low-carbon electricity and will add at least £30 a year to the average household electricity bill by 2015/16.

The government will also introduce a capacity mechanism, which it argues will provide an insurance policy against future blackouts for consumers. But this is an insurance policy that comes with a potentially expensive premium. There is significant uncertainty around how much it will add to consumers' bills, and current proposals risk locking consumers into long-term payments for 10 years or potentially more, even if the capacity mechanism is no longer needed.

The drive to cut CO_2 emissions from energy goes beyond subsidies on electricity bills for households. In order for the government to hit its carbon targets, millions of us will have to change the way we heat our homes – moving away from gas central heating to forms of renewable heat and to heat networks. But people like gas heating and it is currently cheaper than renewable alternatives, so achieving this shift will be a huge task. Therefore policies to promote renewable heat must be genuinely appealing to households, and all consumers must have the same standards of protection as those with gas heating.

The government should be communicating clearly and honestly with consumers about why changes are needed and the likely costs of this. Yet at the moment government messaging confusingly bundles together the costs and savings of promoting low carbon energy and energy efficiency, so the headline message is always that 'energy policies' save money. So there is little wonder that 55% of consumers say they are confused by what they hear about moving to low-carbon energy.

A lack of confidence that current market arrangements lead to fair and transparent prices for consumers goes beyond the cost of policies to promote decarbonisation, to the wholesale and retail markets. Most consumers do not trust energy suppliers to act in their best interests and doubt that policymakers are doing enough to keep retail prices in check. So it's not surprising that only 18% of consumers believe that the government can keep the costs of policy to promote low-carbon energy under control. Real action needs to be taken to overcome this widespread lack of consumer trust and confidence. As set out in our reports on the wholesale and retail markets, wider reforms are needed to promote transparency and competition across the energy sector. Otherwise consumers will view increasing costs over the decade, including those to promote low-carbon energy, through a lens of distrust, and there will be a real threat of a consumer backlash.

With so many households already struggling with their energy bills, the government must ensure consumers' interests are firmly at the heart of its plans to cut emissions from energy. Which? is calling on the government to ensure that its policies meet the following five principles:

- Policies should deliver low-carbon energy at an acceptable cost to the consumer
- Policy costs and subsidy levels should be clear and transparent
- There should be a fair pass through of subsidy costs to consumers, with targeted help for the most vulnerable households and no risk of suppliers profiting from their role
- As households move to low-carbon heat, all should remain protected and have heating that is suitable for their home
- Consumer buy-in for policies is important and government should promote this with clear and consistent messaging

This report sets out a comprehensive package of recommendations that will help ensure policies meet these principles:

Recommendation 1

the cost of policies to promote low-carbon electricity should be subject to the same levels of scrutiny as spending that comes directly from taxation

New mechanisms are needed to ensure subsidies to promote low-carbon electricity are subject to the same levels of oversight and scrutiny as spending from taxation

Government policies to subsidise low-carbon energy that are paid for through energy bills effectively amount to government spending, so they should be subject to the same levels of oversight and scrutiny as spending that comes directly from taxation. New mechanisms should be developed to ensure this is the case. The National Audit Office should be tasked with reviewing all energy policy costs on an annual basis.

There should be a simple graphic on consumers' annual energy statements, showing the cost of each policy

To promote transparency and accountability, energy companies should be required to provide a simple graphic, such as a pie chart, on annual energy statements, showing the cost of each policy. This policy cost information should be tailored to household consumption.

Recommendation 2

the government must ensure the processes for setting strike prices and allocating CfDs deliver value for money and transparency for consumers

A new Panel of Experts is needed to help ensure CfD strike prices are set appropriately

The government's small Panel of Technical Experts has only a narrow remit. To ensure that CfD support levels are appropriate, the government should establish a new panel of experts, which should advise government on the appropriateness of all strike prices. This input should extend to all negotiated contracts, including those agreed under the FID enabling process. Its membership should include the regulator, given it is the regulator's duty to ensure consumers' interests are protected.

The government must provide transparency on the contract terms agreed for all investment instruments and CfDs

To ensure the government is accountable and remains disciplined as it negotiates CfDs, transparency on all the contract terms agreed is essential for investment instruments and CfDs. For example, underwriting of any construction risk by consumers or taxpayers must be made explicit, with an explanation of why this is the case, as soon as the contract is signed. Generators may argue this could breach their commercial confidentiality, but consumers and taxpayers should know what their subsidy covers.

All generators with a CfD should be required to provide information on their construction costs to help make sure the government is in the best possible position to set future strike prices

All generators with a CfD should be required to provide information on their projected and actual construction costs to government. Which? recognises this is likely to meet with opposition from generators on the grounds of commercial confidentiality, but the data could be anonymised once collected. This information would help government develop a more robust evidence base for determining future subsidy levels.

If competition between different low carbon technologies for CfDs is not feasible, the government should acknowledge it now and focus on other ways of making sure strike prices deliver the best value possible for consumers

The government must be more explicit on when and how it will introduce competition between different forms of low-carbon electricity for CfDs. Introducing competition for CfDs would undoubtedly create some significant challenges. If technology-neutral competition for CfDs is not practical the government should acknowledge it now, and focus on other ways of making sure strike prices deliver the best value possible for consumers.

The government must set out how the Levy Control Framework will constrain CfD costs for consumers

The government must set out how the Levy Control Framework (LCF) will effectively constrain CfD costs for consumers. Given subsidy levels will be contingent on volatile wholesale prices and CfD strike prices cannot be renegotiated with generators, it is not clear to us how the LCF offers any protection in practice for consumers, despite the government's claims that it will.

Recommendation 3

the government must ensure that costs recovered from consumers under the CfD supplier obligation are fair and transparent

The central counterparty, not suppliers, should be responsible for calculating the CfD levy

The central counterparty should be responsible for forecasting the levy and then telling suppliers how much they need to collect, in the form of a monthly fixed payment per kilowatt-hour each year. This will make the recovery of costs more manageable for suppliers, particularly small independent suppliers, so should ensure competition in the retail market is not undermined by the introduction of CfDs. Importantly, this would also mean it is not left to the discretion of suppliers whether they give CfD money raised from generators to consumers when strike prices are below market reference prices. Reconciliation would be needed at the end of each year to account for differences between forecast and actual subsidy levels.

Suppliers should be obliged to recover the CfD levy according to consumers' electricity consumption

Suppliers should be obliged to pass on the centrally set CfD levy according to their consumers' electricity consumption. All suppliers should be required to report to the regulator what proportion of each tariff is the CfD levy.

Recommendation 4

domestic consumers should not subsidise the cost of policies to promote low-carbon electricity or electricity efficiency for business consumers

Domestic consumers should not subsidise the cost of decarbonising electricity for energy intensive companies

Which? is not in principle opposed to targeted help with the cost of policies to promote low-carbon power for vulnerable electricity intensive sectors of industry. But, as any exemption from these costs effectively amounts to industrial policy, if the government considers it necessary to provide exemptions, the funding should come from taxation. It should not be paid for by households, including the fuel poor, through energy bills.

If domestic energy consumers are paying for electricity demand reduction through the capacity mechanism, they must be able to benefit directly

A financial incentive for electricity demand reduction through the capacity mechanism should not be paid for by domestic consumers, if few or no households can directly benefit. Business consumers do not pay towards the cost of policies to promote energy efficiency in homes. These costs must also fall within the levy control framework.

Recommendation 5

fuel-poor households with electric heating should receive help to manage the increasing impact of policy on bills

Fuel-poor households with electric heating should receive targeted help to manage the increasing impact on bills of policy

As costs increase, fuel-poor households with electric heating should receive help to manage the rising impact on bills of policy costs. This could take the form of targeted policy to improve the thermal efficiency of their homes or grants if their home does not reach minimum energy efficiency standards. This should come from taxation, like the targeted financial support energy intensive businesses enjoy towards the cost of the Carbon Price Support (CPS).

Recommendation 6
the Carbon Price Support should be scrapped

The Carbon Price Support should be scrapped
Policies that add costs for consumers need to deliver real investments and long-term CO_2 reductions. The CPS is unlikely to achieve either aim. The government should drop this unnecessary and costly policy.

Recommendation 7
the government must minimise the risks for consumers associated with introducing a capacity mechanism

The government should proceed with caution, so maximum contract length should be for three years
The government should proceed with caution as it introduces the capacity mechanism, as this significant intervention in the market is a move into uncharted waters. The maximum length of any contract should be three years. It is not appropriate that generators with new plants can choose the length of their contract, and that this payment stream can be for up to 10 years. This would lock consumers into paying a certain price for that capacity long into the future, even if the decision is taken to go back to an energy-only market.

The cost of the capacity mechanism must be spread fairly across all consumers
The cost of the capacity mechanism must be spread fairly across all consumers. There must be no exemptions, as all consumers should benefit from lower wholesale prices.

Recommendation 8
reforms to the retail and wholesale market to promote transparency and competition are needed to increase consumer confidence that the energy system is working in their interests and that subsidies for low-carbon generators are justified

To promote consumer acceptance of policy to promote low-carbon energy, wider market reforms are needed to increase consumers' confidence that the energy system is working in their interests
Consumers' increasing distrust of energy companies and the energy sector will be the lens through which many view increasing policy costs. Reforms to the retail and wholesale market to promote transparency and competition are vital if consumers are to be convinced that subsidies for low-carbon generators are justified.

The government should clarify how it will decide whether it will use its new backstop powers to promote liquidity
Reliable wholesale markets are necessary for each reference market against which CfDs are struck. The government should provide clarity on how it will decide if it needs to use its new backstop powers to promote liquidity. This should include the government and Ofgem developing a set of standards for wholesale price indexes to provide confidence that a minimum standard of robustness and representativeness is met.

Recommendation 9

the domestic Renewable Heat Incentive to promote renewable heat should be structured as part grant, to offset higher upfront costs, and part on-going tariff to help with additional running costs

The domestic Renewable Heat Incentive (RHI) to promote renewable heat should be structured as part grant to offset higher upfront costs and part on-going tariff to help with additional running costs

Structuring the tariff in this way helps remove the most significant barrier to the take-up of renewable heat, the higher upfront cost of purchasing the heating system.[1] This should make renewable heat more accessible for households without capital. Likewise, it should also be more appropriate for the private rented sector and it could be structured so that a landlord receives the support towards the upfront cost, while the tenant (if the bill payer) directly receives support towards the on-going running costs. A significant proportion of private rented homes are without gas heating, and therefore in the group where the government rightly wishes to focus RHI support.

Although this tariff structure could result in larger payments during the first few years, it would reduce the overall cost of the RHI to the government as it would no longer need to pay the 7.5% compensation for finance that it proposes to include in the tariff.[2]

Recommendation 10

government must ensure advice around the RHI is clear and consistent to avoid households being mis-sold the RHI subsidy

Advice should come from a qualified heating engineer, and those selling renewable heat must make it clear to households that the RHI subsidy is not expected to cover the full difference in cost of a renewable form of heating compared to a gas heating system

Advice should come from a qualified heating engineer and be clear and consistent. Assessors and those selling renewable heat must make it clear to households considering replacing gas heating that the RHI subsidy is not expected to cover the full difference in upfront and running costs of choosing a renewable form of heating over a new gas boiler or gas heating system. Likewise, it must be explained to prospective buyers of solar thermal that even with the RHI subsidy the technology is unlikely to pay for itself. The accreditation bodies should carry out regular and rigorous mystery shopping to ensure the agreed sales and marketing standards are being met.

Households should not be pushed into a Green Deal assessment or into taking out the Green Deal for the RHI

To meet the energy efficiency requirement for the RHI, consumers should not be forced to have a Green Deal assessment. An up-to-date EPC demonstrating that all lower-cost energy efficiency measures are in place (such as loft insulation), should be sufficient to meet the eligibility criteria. Consumers who wish to take out the Green Deal can do so, but the choice should be theirs. Any protections available to people taking out the Green Deal should be open to all.

Recommendation 11

government and industry must demonstrate that more rigorous monitoring is improving installation quality and heat pump performance, and this needs to be underpinned by a more consumer friendly route to redress when problems do arise

Government and industry must demonstrate that changes to the Microgeneration Certification Scheme (MCS) have improved the quality of renewable heat installations in practice

In its recent policy paper on heat, government stated that MCS will increase the number of inspections it carries out to ensure compliance with the scheme rules.[3] Government and industry must also demonstrate that changes to the MCS have improved the quality of renewable heat installations in practice. Robust enforcement of these tighter standards by the MCS and the certification bodies is also vital.

Government and industry must ensure that access to redress for customers with renewable heat technologies is consumer friendly

Consumers with renewable heat technologies under the RHI should have access to a clear route to redress and installers should be accountable for their selling techniques and installation. There

should be a one-stop-shop for consumer complaints. The current process is confusing for consumers as it is not clear when the customer will be covered by REAL, the MCS Certification Board or both. There should be a single ombudsman scheme to help enforce this.

Recommendation 12

Ofgem should be given the powers to explore and consult on whether regulation is needed to ensure households on heat networks are protected

All consumers should have recourse to the Energy Ombudsman (EO), including those with district heating

All consumers should have recourse to the EO, including those with district heating, regardless of whether their heat supplier is signed up to the new Independent Heat Customer Protection Charter.

Research with consumers on district heating should be carried out to understand their satisfaction levels and what problems they are currently facing

There is no publicly available research into current household experiences of district heating. Consumer research with people who are already on existing networks should be carried out to identify what key problems they currently face. This would also help provide an evidence base for establishing whether consumer protection regulations are necessary.

Heat suppliers should collect and publish consumer complaints data

Heat suppliers should routinely collect and then make publicly available data summarising the complaints from their consumers. This will help identify problems consumers are currently experiencing. It will also help assess the effectiveness of the new voluntary consumer protection Charter. Data collected by the EO can also feed into this process.

Ofgem should be given the power to explore and then consult on the introduction of consumer protection regulations for heat networks

Building on the District Heating Customer Protection Scheme and new consumer research and complaints data, Ofgem should explore and consult on the options for consumer protection regulation for homes on district heating. This should include new and existing networks, and those which are owned by local authorities and privately. Any regulations should then be introduced as appropriate, and these should be standardised across schemes as far as possible. In order for consumer protection rules to function properly there must be effective enforcement and robust sanctions in place.

Government and Ofgem should explore how companies can be incentivised to reflect cost savings in consumers' bills

The price of heating a home on district heating is likely to be the primary concern for household customers.[4] In the absence of retail competition, the government should work with Ofgem to develop a strategy which incentivises companies to pass on cost savings to their consumers on heat networks so that they are paying a fair price to heat their homes. Ofgem should also explore whether there is a need for price controls and if so how they could work.

The challenge of low-carbon renewal for electricity and heat generation

1.1 The UK faces the expensive challenge of renewing its power stations, and consumers will pay for this low-carbon investment

Energy is essential for many daily household activities: heating our homes, washing, cooking dinner, watching TV and ordering shopping online would all be impossible without it. When we turn on a light or our cooker we take for granted the energy will be there to make it work. But to make sure this continues to be the case, the UK must tackle the expensive challenge of renewing its power stations. Around a fifth of existing generating capacity will be lost by the end of this decade. Oil and some of the oldest, most polluting, coal power plants will close as European regulations to protect air quality come into force.[5] Meanwhile, eight of the UK's existing nine nuclear power stations are expected to be retired by 2023 due to age.[6]

This electricity generation will need to be replaced and this renewal needs to take a low-carbon approach in order to meet the UK's binding and ambitious carbon reduction and renewable energy targets (see Box 1).[7] According to government estimates, this new low-carbon generation could require around £75 billion in capital investment by 2020 alone.[8] The cost of policies to promote this investment is shouldered by electricity consumers, including households, through higher bills. Analysis of government data suggests these policy costs will add around £118 to the average domestic electricity bill by 2020, up from £53 today.[9] The average dual fuel household energy bill stands at £1,420 in July 2013,[10] and our research shows energy prices are one of consumers' top financial concerns, so it is crucial policy costs are kept in check and consumers are on board.

1.2 The challenge of low carbon renewal is huge, as most of our electricity in the UK is currently produced from fossil fuels

Just over three quarters of electricity currently comes from fossil fuels, principally gas and coal, with UK power stations producing around a third (32%) of total UK CO2 emissions.[11]

So to hit carbon targets as capacity is renewed, fossil fuel plants will have to be replaced by generation that does not emit CO_2.[12] In fact, the Committee on Climate Change has advised the government that electricity should be almost completely 'decarbonised' by 2030 to meet the target.[13] Successive UK governments have adopted this approach, making electricity decarbonisation a key pillar of their strategy for reducing

Around a fifth of existing generating capacity will be lost by the end of this decade

Table 1 – Renewable energy as a share of energy consumption across European Countries.
Source: Eurostat Newsrelease, 26 April 2013

	2008	2010	2011	2020 target
Sweden	43.9	47.9	46.8	49
Latvia	29.8	32.5	33.1	40
Finland	30.5	31.0	31.8	38
Austria	26.9	30.4	30.9	34
Estonia	18.9	24.6	25.9	25
Portugal	22.3	22.7	24.9	31
Denmark	18.6	22.0	23.1	30
Romania	20.1	22.9	21.4	24
Lithuania	16.9	19.8	20.3	23
Spain	10.1	13.8	15.1	20
Bulgaria	9.5	13.4	13.8	16
Germany	7.3	10.7	12.3	18
Greece	8.0	9.2	11.6	18
France	9.9	11.4	11.5	23
Italy	6.3	9.8	11.5	17
Poland	7.2	9.3	10.4	15
Slovakia	7.5	8.5	9.7	14
Czech Republic	7.2	8.4	9.4	13
Hungary	5.6	7.6	8.1	13
Ireland	3.6	5.6	6.7	16
Cyprus	3.7	4.6	5.4	13
Netherlands	2.7	3.3	4.3	14
Belgium	3.0	4.0	4.1	13
UK	1.9	3.3	3.8	15
Luxembourg	1.8	2.9	2.9	11
Malta	0.0	0.2	0.4	10

Box 1 The UK's Carbon Reduction and Renewable Energy Targets

The UK's Carbon Reduction Targets

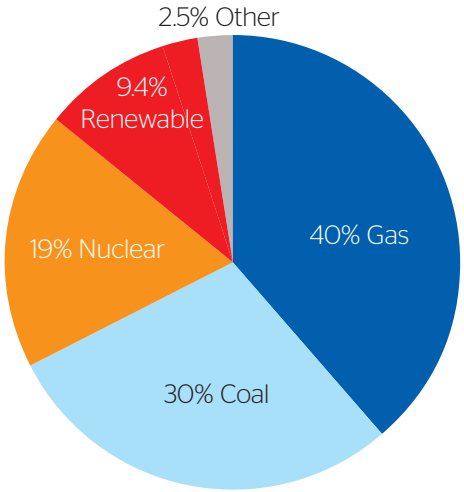
Scientific consensus about the threat posed by climate change led the UK government to put in place stretching greenhouse gas reduction targets. The 2008 Climate Change Act set in place statutory targets for cutting emissions by at least 80% by 2050 (compared to 1990 levels). Legally binding carbon budgets are also in place to drive progress in the interim, including a target to cut UK emissions in half by 2027, again on 1990 levels.[14]

Achieving these carbon reduction targets has major implications for how electricity and heat is generated in the UK, as around 42% of total UK carbon dioxide (CO_2) emissions (191 $MtCO_2$) came from producing heat and electricity in 2011.[15] Household heat and electricity use alone was responsible for 30% of total UK CO_2 emissions in 2010 (149 $MtCO_2$) and 27% of CO_2 emissions in 2011 (123 $MtCO_2$).[16]

The UK's Renewable Energy Targets

Like other EU member states, the UK also has a binding renewable energy target for 2020 to drive progress on European emissions reduction and promote energy security.[17] As the UK started from such a low base, its renewable target is 15%, lower than the EU average target of 20%. This means 15% of the total UK energy used for electricity, heat and surface transport will need to come from renewable sources by 2020. Given this figure stood at just 3.3% in 2010, this represents a fivefold increase in 10 years.[18] It is the most ambitious renewables target relative to its starting point of any member state. It is expected that renewable electricity will make by far the largest contribution to achieving this 15% target. According to some government scenarios 30% of electricity generated in 2020 will be renewable.[19] Renewable heat will play a far smaller role in meeting the target, with the government anticipating it will make up around 12% of total UK heat demand by 2020. However, even this is a major increase on the 1% of heat that comes from renewable sources today.[20]

Figure 1: Fuel mix for UK electricity[21] generation in 2011



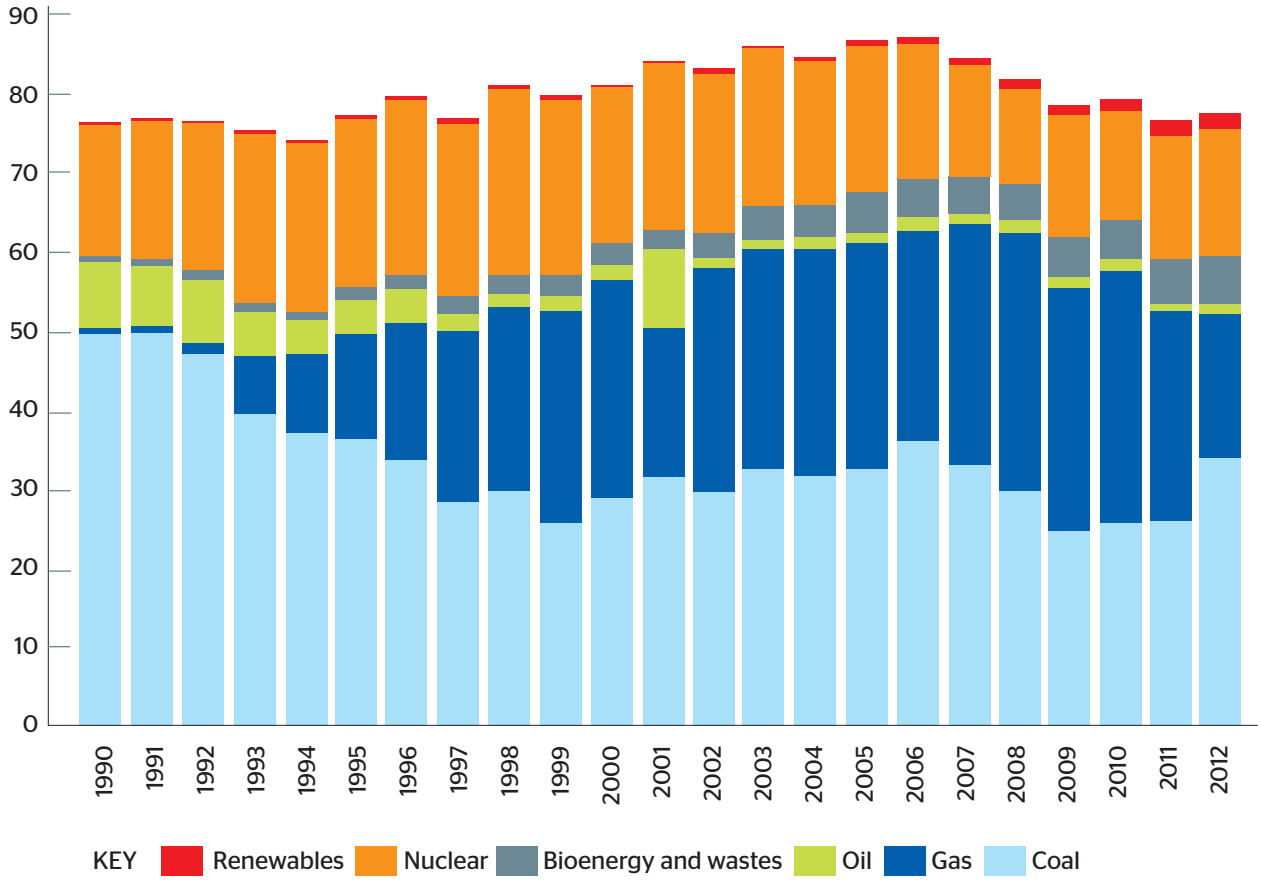
emissions across the economy.[22] This will involve moving away from the carbon-based fossil fuels that currently dominate electricity production in the UK to low-carbon forms of electricity such as renewables and nuclear (see figures 1 and 2).[23]

1.3 The challenge of slashing the carbon emitted from heat production in the UK is also considerable, as most of our heat currently comes from fossil fuels

A similar carbon reduction challenge faces heat production. Space and water heating account for 78% of final household energy consumption.[24] Almost all domestic space and water heating comes from fossil fuels, either directly from natural gas or oil, or indirectly from electricity (see figure 3a and b).

Even the most efficient gas boilers and significant improvements in the thermal efficiency of homes are unlikely to make the current sources of heat in homes compatible with the UK's stretching CO_2 reduction targets.[25] So the amount of CO_2 emitted in supplying heat will need to be cut significantly by moving to low-carbon forms of heat (see box 3). The government and the Committee on Climate Change suggest the CO_2 emitted from heating buildings should be cut to almost zero over the next four decades.[26]

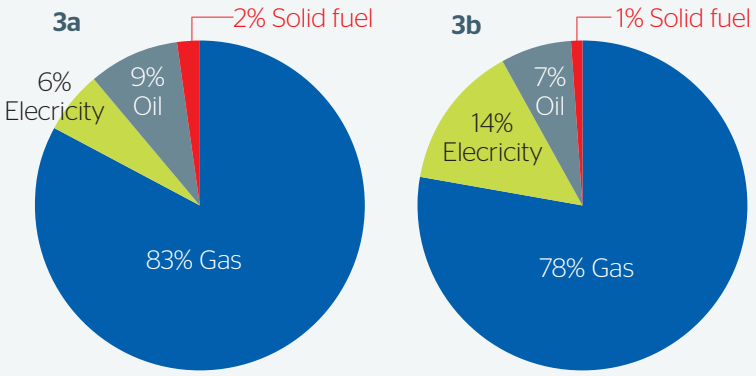
Figure 2: The changing fuel mix for UK electricity generation, 1990-2012, (Million tonnes of oil equivalent)[27]



Box 2 How people heat their homes and water [28]

These pie charts show the proportions of different fuel types used for heating rooms in homes and heating water. Natural gas currently dominates the supply of domestic heat and there is an extensive gas infrastructure already in place. Indeed, 84% of UK homes are on the gas network, and around 83% of domestic space heating comes from gas. The use of gas is almost as widespread for the provision of domestic hot water, with around 78% of demand met in this way.

Figure 3: 3a Space Heating and 3b Hot water



Space and water heating account for 78% of final household energy consumption and 99% of household carbon emissions.

Box 3 Options for low-carbon heat for homes

There are a range of options for low-carbon heat. These include the injection of bio-methane into the gas network; biomass boilers; combined heat and power (CHP), for example for heat networks, and also micro CHP; solar thermal heating systems; and heat pumps of varying sizes fed by low-carbon electricity, the two major variants of which are ground-source and air-source.

Box 4 The popularity of gas central heating

The vast majority of consumers report high levels of satisfaction with their gas central heating. According to 2007 BRE data, 93% of households with a central heating system consider it to be either fairly or very effective.[29] Consumers believe that gas central heating is reliable and flexible. Despite recent price rises, the economics also continue to make gas popular, particularly for those who already have this form of heating. Replacing a gas boiler costs substantially less than installing a new renewable heating system. For example, the average cost to replace a gas boiler is around £2,450 (including the related renovation costs and heating control costs).[30] Moving to an air source heat pump involves a typical system installation cost of around £6,000 to £10,000 and for a ground source heat pump it is between £9,000 and £17,000.[31] Cost is not the only issue for households. For example, keeping with gas heating when the system needs replacing, rather than moving to a ground source heat pump, generally involves less disruption for the household, and there is no need for planning permission or additional space. Heat pumps are also not suitable for many properties (see chapter 4).

1.4 Consumers will have a crucial role to play in moving to lower carbon forms of heat

As box 2 shows, most UK households get their hot water and space heating through a gas-fired central heating system, and they are generally very satisfied with this type of heating (see box 4). Moving to the low-carbon forms of heat described in box 3 will generally require direct consumer involvement. For example, households will need to purchase a heat pump or move onto a heat network.[32] This can be contrasted with the decarbonisation of electricity: electricity consumers ultimately pay for investments in low-carbon generation, and consumer 'buy in' is clearly important, but this transition can largely take place without direct consumer engagement and action.

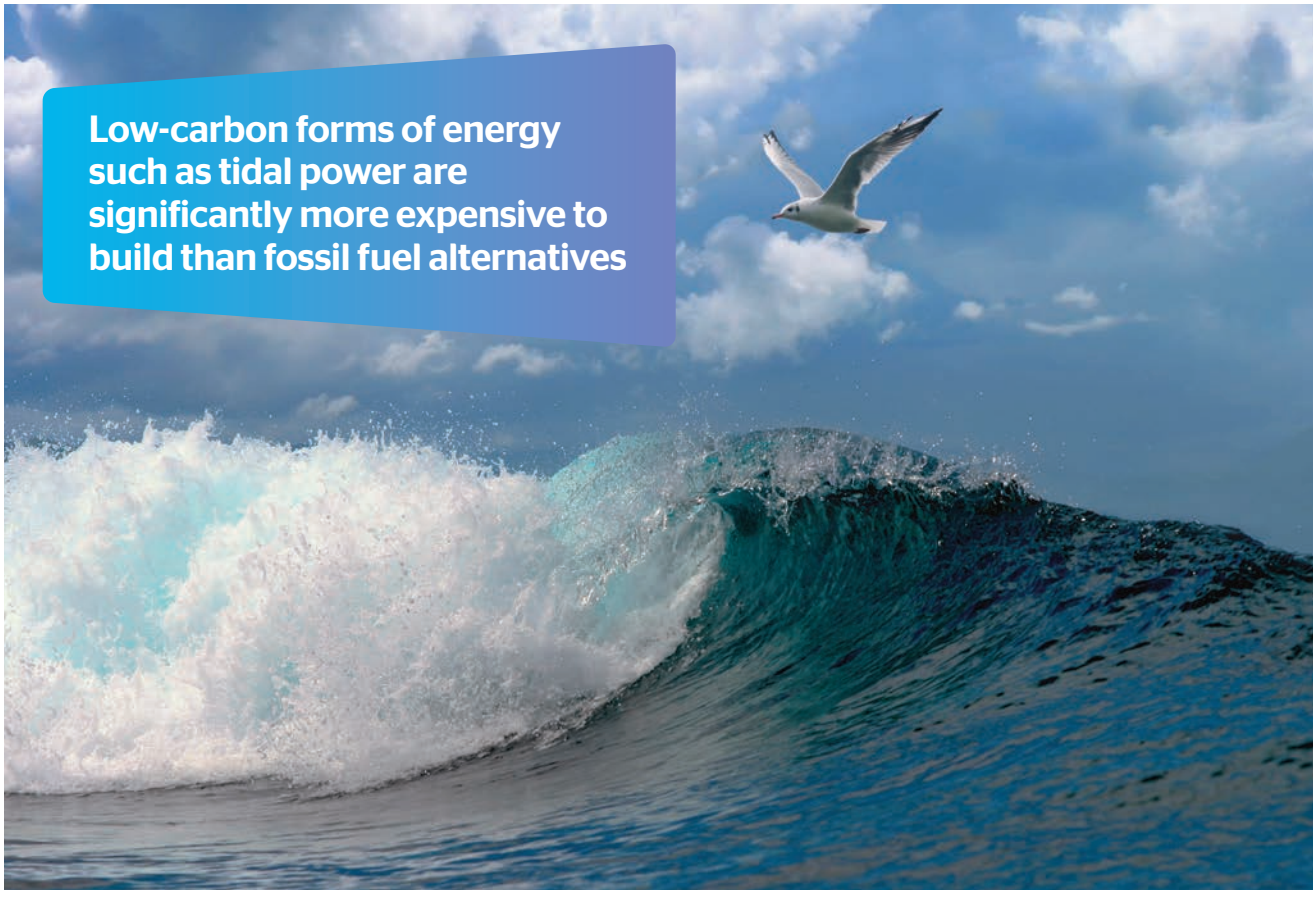
But if large numbers of homes are to move from gas to low-carbon forms of heating as the government hopes, it will be essential that there is widespread household acceptance of the need for this transition. Consumers will also need to have confidence in low-carbon heating and feel assured they remain protected.

The consumer's role is also not confined to deciding which heating system to purchase. Once installed, consumer behaviour remains important. In fact, if they are to be used effectively, heat pumps tend to require more engagement and information on the part of the consumer, compared with boilers.

1.5 But low-carbon forms of energy are significantly more expensive to build than fossil fuel alternatives

Renewable forms of energy such as wind or solar thermal, and nuclear power tend to have far lower operating costs than fossil fuel generation because they need little or no fuel to run. This means they should also provide a useful form of insurance against future rises in volatile global coal and gas prices. But building and installing low-carbon forms of electricity and heat are currently more expensive than their fossil fuel equivalents (see boxes 4 and 5). They require very large upfront investments, with long payback periods. These costs feed through to consumers, for example through subsidies added to bills, or larger upfront costs for installing renewable heating systems. As consumers are picking up the bill, it is essential that this necessary low-carbon renewal is delivered affordably and that the costs are transparent.

This report focuses on the twin challenges of cutting emissions from power generation and domestic heat supply, and how this can be done cost effectively and in a way that ensures all consumers are protected. Although beyond the scope of this report, the related renewal and expansion of the electricity distribution and transmission networks are also crucial for the future of the UK's energy. This will have an estimated cost of around £30 – £35 billion over the next decade.[33] As with investment in low-carbon generation, these costs will feed through to consumers through higher bills.[34]



Box 5 The uncertainty around the future costs of building new electricity generation

Of the core low-carbon forms of energy generation, onshore wind and nuclear power are currently the cheapest options. According to the most recent government estimates, onshore wind projects starting in 2012 have modelled levelised costs[35] of around £94/MWh, and the first new nuclear plants have modelled costs of around £80/MWh[36](see figure 4a). In reality, however, there is significant uncertainty around the actual cost of building a new nuclear power station.[37] The history of overruns and overspends in constructing nuclear power stations in Europe and the US suggests there is reason to exert caution as to whether the modelled costs are an accurate reflection of the actual costs.[38]

In contrast the costs for onshore wind are well understood, and take into account how much of the time on average wind turbines are producing electricity.[39] However, issues surrounding the availability of suitable sites and planning, including local opposition, limit how much onshore wind is being built.

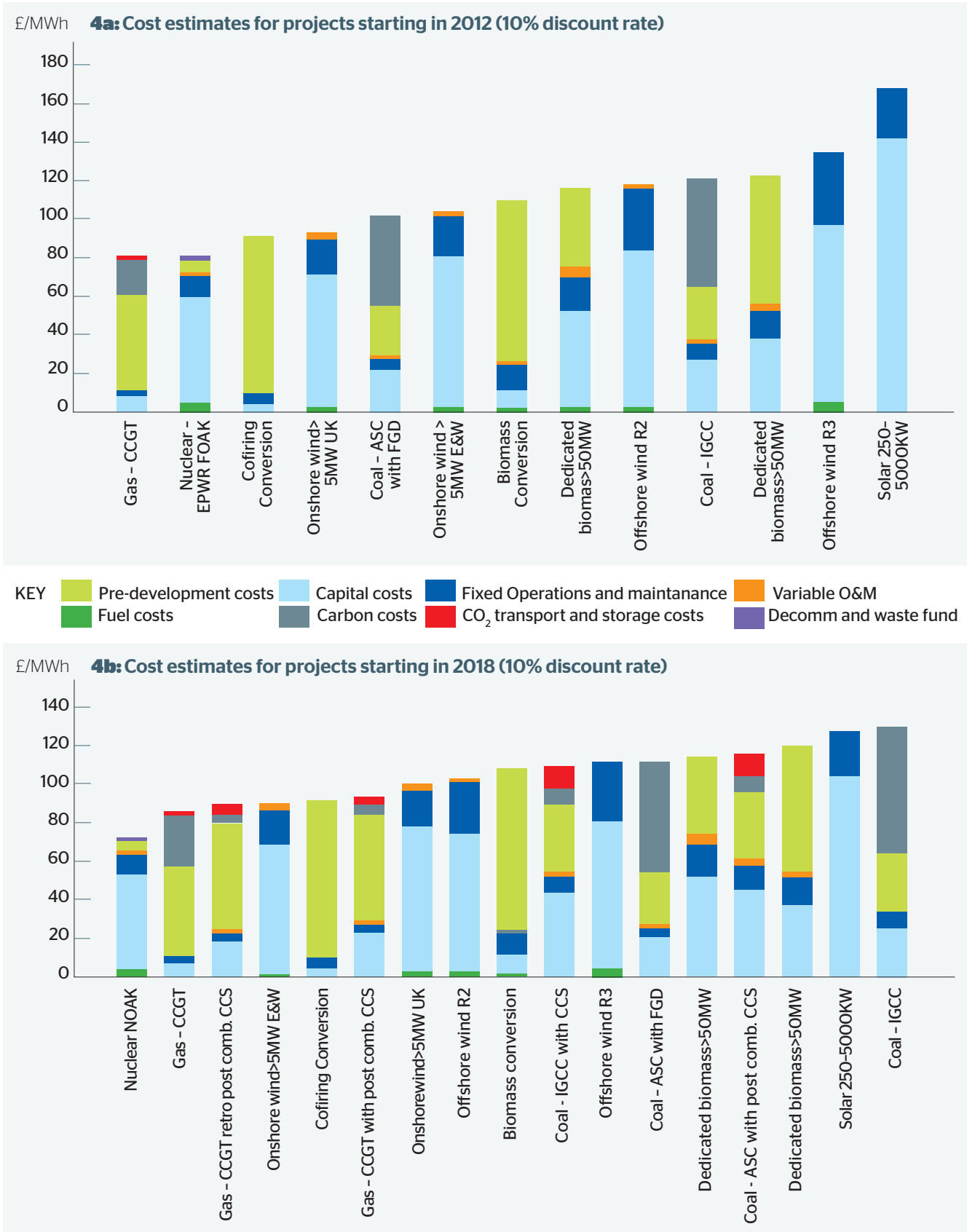
DECC estimates offshore wind projects starting in 2012 will have a levelised cost of between £118-£135/MWh.[40] Recent projects suggest that offshore wind carries a levelised cost of around £140/MWh[41], but costs for offshore wind are projected to fall to around £110 to £125/MWh by 2025. Unlike onshore wind, offshore wind is a fairly immature technology and costs have fallen less than initially expected. This is because there have been bottlenecks in the supply chain, in part with the rate of deployment undertaken to meet the EU renewables target (See box 1). As more offshore wind has been built, newer developments have tended to be further out at sea in deeper waters, making construction and maintenance more difficult – again pushing up costs. The greater wind speeds that are achievable further out at sea can offset some of these increased costs, but the extent to which offshore wind costs fall will be a crucial factor in determining the cost of decarbonisation. A 2012 Crown Estate Report concluded that there is 'strong potential' to bring the cost of offshore wind down to £100/MWh by 2020.[42] Building on this, in June 2012 the industry-led Offshore Wind Cost Reduction Task Force put forward 28 recommendations to industry and government for achieving such cost reductions.[43]

A further option for reducing emissions from electricity is the addition of Carbon Capture and Storage (CCS) technology to fossil fuel plants. This will increase the cost of coal and gas generation – modelling suggests this could add around £32 to £38/MWh in the near term. An increasing carbon price will help make these CCS costs more competitive, as the production of electricity from fossil fuels (particularly carbon intensive coal) plants without CCS will become more expensive. Again there is significant cost uncertainty as CCS is not yet a commercially proven technology on a full-size power station.[44]

Gas in combined cycle gas turbines (CCGTs) is currently the cheapest form of new electricity generation to build. CCGT plants have lower upfront investment costs and lower levelised costs than alternative forms of baseload power, at around £80/MWh.[45] The cost of this form of electricity is heavily dependent on wholesale gas prices, which are uncertain. The impact of unconventional forms of gas, including shale gas, on future European gas prices is unclear. There is also heated debate around the environmental impacts of extracting shale gas on the communities where this takes place. The UK gas price stands at around 60p/therm.[46] Gas is likely to remain the cheapest form of new generation for the foreseeable future.

Figures 4a and 4b provide DECC's most recent estimates of the cost of building and producing electricity from different forms of large-scale power generation, for projects starting in 2012 and in 2018.[47] These figures take into account how much time on average they produce electricity (the load factor). They also include the impact of carbon taxes through the EU emissions trading scheme and carbon price support (based on DECC's projections), which make unabated fossil fuel generation (i.e. coal and gas plants without CCS) more expensive to run (see box 8 and 11 for a description of these policies). In reality, levelised generation costs will vary on a project by project basis. As DECC recognises there is significant uncertainty around these estimates, and financing costs are kept the same for all projects (at a 10% discount rate.) FOAK refers to 'first of a kind' projects, and NOAK later projects of the same type.

Figures 4a and 4b Cost estimates for electricity generation[48]



CCGT – Combined Cycle Gas Turbine, IGCC – Integrated Gasification Combined Cycle Coal plants, ASC with FGD – Advanced Super Critical coal plants with Flue Gas Desulphurisation, EPWR FOAK – European Pressurized Water Nuclear Reactor (first of a kind)

The approach so far and its impact on bills

2.1 The UK's policies and approach so far

2.1.1 Policies to encourage investment in low-carbon energy are necessary as the market will not deliver sufficient investment alone

Higher upfront costs and long payback periods make low-carbon electricity a risky business proposition for would-be investors.[49] Given the economics, gas power stations have tended to be the natural choice for prospective electricity developers, rather than the low-carbon electricity needed to reach long-term carbon reduction targets.[50] The electricity market itself will not deliver the level of low-carbon investment needed.

Policymakers hope that in the long term, low-carbon power should not require targeted subsidies. This is because the costs of building low-carbon electricity are expected to fall as these technologies mature, so they should become more competitive with fossil fuel generation, particularly as gas prices are likely to rise. If the EU Emissions Trading Scheme (EU ETS) becomes a more effective price signal for would-be investors, this should also help remove the need for specific subsidies for low-carbon energy because the EU ETS carbon price will make fossil fuel generation more expensive to produce (see box 8). But, as with much in energy costs modelling, none of this is guaranteed. In any case, in the short to medium term, governments need to put in place policies to provide financial support to encourage investment in low-carbon electricity and heat.

2.1.2 The Feed-in Tariff and Renewables Obligation are in place to promote renewable electricity

The UK is currently offering subsidy to small-scale renewable electricity through the Feed-In Tariff (FIT) (see box 6). Through this scheme eligible generators, including households, are paid for the renewable electricity they produce, even if they use it themselves. They also receive a payment for any surplus power they export to the grid. Meanwhile the Renewables Obligation

Box 6 The Feed-in Tariff for microgeneration

The Feed-in Tariff (FIT) was introduced in April 2010 by the government to promote the uptake of small-scale renewable and low-carbon electricity, giving householders the opportunity to generate their own renewable electricity. The scheme requires suppliers to pay a guaranteed generation tariff and an export tariff (when electricity is exported) to small-scale low-carbon generators for the electricity they produce for a fixed period of 20 or 25 years, depending on the technology. Nearly all – 99% – of the 247,951 FIT installations by March 2012 were for solar PV, which represented 92% of installed capacity under the scheme.[51] Small-scale wind, hydropower, micro CHP and anaerobic digestion are also supported.

Different rates of tariff support are given to different installation sizes. For example, the bands for solar PV range from less than 4 kW (which receives the highest level of support) up to 250 kW – 5 MW. As of the end of March 2012, 69% of installed capacity under the scheme was domestic.[52]

Box 7 The Renewables Obligation

Since 2002 the key policy to encourage an increase in renewable power has been the Renewables Obligation (RO). Under the scheme, Renewables Obligation Certificates (ROCs) are awarded to generators for each unit of renewable electricity they produce. The RO requires electricity suppliers to take an increasing proportion of their electricity from renewables or pay a penalty. In this way renewable generators receive income from the power they produce as well as the sale of their ROCs. To meet their obligation, suppliers can a) have their own, eligible electricity generation, b) purchase renewable electricity with its ROCs directly from the generator, or c) buy the ROCs on the ROC market. Alternatively, suppliers can pay a 'buy-out price'.

At the end of each obligation period, the buy-out fund is shared among suppliers relative to the number of ROCs they have submitted. Financial support lasts for 20 years for the generator and the scheme will close to new entrants in 2017.

Since the introduction of 'banding' in 2009, the different forms of renewable electricity have varied in the numbers of ROCs they receive per megawatt hour of generation. To reflect changing costs, new banding came into effect in April 2013.[55] Technologies that are currently eligible include anaerobic digestion (which receives 2 ROCs/MWh), biomass (1.5 ROCs/MWh), onshore wind (0.9 ROCs/MWh), offshore wind (2 ROCs/MWh), solar PV (1.6-1.7 ROCs/MWh) and wave power (5 ROCs/MWh).[56] In other words, wave power enjoys over five times the ROC subsidy of onshore wind.

Box 8 The EU Emissions Trading Scheme

The EU Emissions Trading Scheme (EU ETS) is the central EU-wide policy to reduce carbon emissions. It was launched in 2005, and entered its second phase in January 2008 and third in 2013. The logic behind emissions trading is that by giving participants the flexibility to trade allowances, emissions cuts take place where the cost of carbon reduction is cheapest.

The EU ETS places an overall cap on the level of emissions that can be produced, and currently covers the energy sector and carbon intensive industries (such as cement producers). Companies from sectors covered by the scheme receive or buy emission allowances (known as EUAs), which they can trade as needed. During the second phase of the EU ETS, the vast majority of allowances were given to companies free of charge - 93% in the case of the UK. The third phase began in 2013 and runs until 2020. This saw some important changes. These include: the introduction of an EU-wide central cap (as opposed to National Allocation Plans); an increase in the amount of allowances auctioned, rather than being given away for free by governments (in 2013 over 40% of allowances will be auctioned and this percentage will increase progressively each year); and a full auction for the power sector in the UK.[57]

There is currently an over-supply of EUAs and there has been a significant fall in the EU ETS auction price for EUAs, which are currently trading at around 4€/tCO2 (see box 8).[58] Low and uncertain EUA prices mean the EU ETS is only a very weak price signal for investment in low-carbon electricity.

(RO) has been in place since 2002 to support large scale renewable generation (see box 7). It does this by requiring electricity suppliers to get an increasing amount of the electricity they supply to customers from renewable sources. Despite the fact that these policies have been in place for a number of years and electricity consumers are paying for them, only 35% of consumers are aware these subsidies exist.[53]

Electricity generation is also included in the EU ETS, which places an overall cap on European CO_2 emissions (see boxes 8 and 11). In theory, this EU-wide measure should encourage investment in low-carbon technologies as it makes carbon intensive fossil fuel electricity more expensive to produce.[54]

2.1.3 The government has been slow to develop a clear strategy and set of policies for achieving emissions reductions in heat

Despite its importance, the supply of heat has not enjoyed the same level of attention from policymakers as electricity. There are far fewer officials in the Department of Energy and Climate Change (DECC) with a heat focus and there has been no equivalent of electricity market reform (EMR) for heat. The start of the Renewable Heat Incentive (RHI) for the domestic sector has also been delayed (see box 9). Heat's relative neglect is partly due to the view held by policymakers that a shift to low-carbon forms of electricity should be immediately prioritised with this then facilitating a shift towards more electric heating (and surface transport) to meet carbon targets.

In March 2012, DECC published *The future of heating: a strategic*

Box 9 Renewable Heat Incentive and the Renewable Heat Premium Payment

In November 2011 the government introduced the non-domestic phase of the Renewable Heat Incentive (RHI). Through tariff payments lasting 20 years, the RHI supports a range of technologies and fuels, including biomass, solar thermal, heat pumps and bio-methane.[59]

The domestic phase of the RHI has twice been delayed. It is now expected to start in spring 2014. In the interim, DECC has introduced a Renewable Heat Premium Payment (RHPP) which provides one-off small grants to householders to help with the upfront cost of solar thermal heating, air-source heat pumps (ASHP), ground-source heat pumps (GSHP) and biomass boilers.[60] To participate, consumers must agree to provide data on their system use and performance.

Box 10 The challenge of meeting seasonality in heat demand

Demand for heat varies considerably across the year. The current winter peak demand (satisfied by gas) is almost eight times the minimum level of demand.[61] This degree of seasonal difference in heat demand is a challenge, as there needs to be sufficient capacity to meet maximum demand (with all of the associated costs), even if some of this is only very rarely needed. If heat supply is to be increasingly reliant on electric heating, the existing peak in electricity demand will increase as heat and electricity demand tends to coincide, as both are at their greatest between 4pm and 6pm on a winter weekday. This would mean significant additional investment in electricity generation and network infrastructure to ensure demand is met at peak times. The challenge of meeting peak demand is compounded by the fact that electricity generation will become less flexible with decarbonisation, as fossil fuels are replaced by inflexible nuclear power and variable renewable electricity. The successful development and deployment of technologies that store electricity and heat will therefore be a crucial factor in allowing the electrification of heating at reasonable cost.

framework for low-carbon heat. This provided a set of trajectories for an increase of low-carbon heat up to 2050, and was followed a year later by DECC's policy paper, *The future of heating: meeting the challenge* (March 2013). This sets out a few new policies to help remove some of the barriers to low-carbon heating but some significant gaps and policy decisions remain, for example, on the domestic RHI and consumer protections for district heating.

2.1.4 Government policies for heat and electricity should be planned together as an increase in the electricity used for heating will increase the peak electricity demand and therefore the amount of generation needed

Any increase in the amount of electricity used for heating, for example to power heat pumps or more conventional electric storage heating, will increase the amount of electricity consumed at times of peak demand (see box 10). This has clear implications for how much overall electricity capacity and network capacity is required, and its cost,[62] so it is important the strategies for reducing CO_2 emissions from heat and electricity are planned together. At a high level the government seems to recognise this, but it is not at all clear that this is being translated into joined-up policies across heat and electricity.

2.2 The current and future cost of policies

2.2.1 In 2013 the impact of policy to support low-carbon electricity on bills is estimated to be around £50

The cost of policy to support low-carbon power is paid for through electricity bills, either directly through levies or through carbon taxes, which increase the wholesale electricity price. DECC estimates that in 2013 policies to promote low-carbon electricity will add around £53 to the average household electricity bill, equivalent to around 8% of the bill (see figure 5).[63] This is made up of £30 for the RO, £8 for the EU ETS, £5 for the new Carbon Price Support (CPS, see box 14) and £7 for FITs, with 5% VAT then added.[64] Yet research for Which? shows only 23% of consumers are aware these subsidies are being paid by households and business consumers through bills, with 39% thinking these policy costs are paid for through general taxation.[65]

Small grants for households to support renewable heat through the Renewable Heat Premium Payment (RHPP) are funded through taxation, and the domestic Renewable Heat Incentive (RHI) (see box 9) will also be paid for in this way up to 2020.[66, 67] As there are no other policies to decarbonise heat supply, there is currently no impact on consumers' gas or electricity bills from policy to support low-carbon heat.

2.2.2 But the impact of these policies on household electricity prices and bills will grow over the next decade

As the amount of low carbon electricity with subsidy increases and the carbon price rises, the impact on prices and bills will grow over

Figure 5 a: Estimated average household electricity bills in 2013 and 2020, including a breakdown of subsidy costs for low-carbon electricity [68]

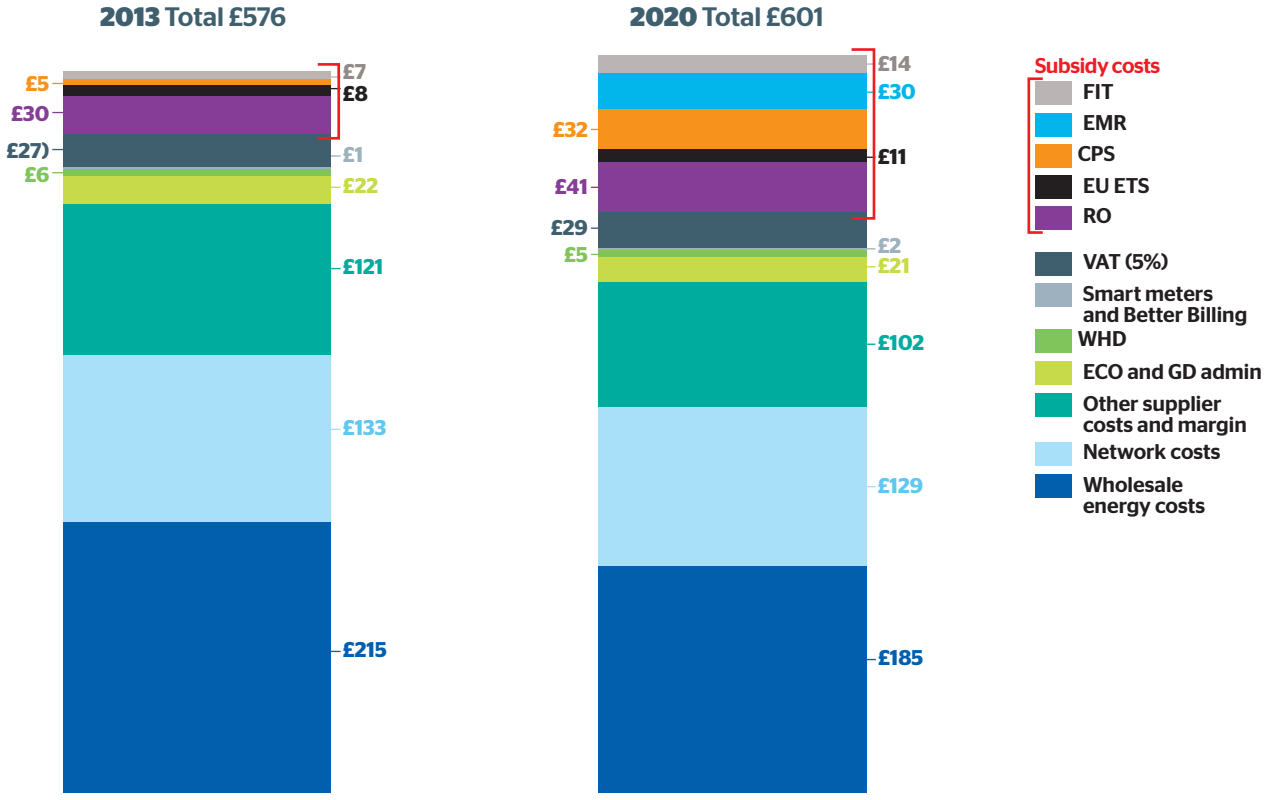
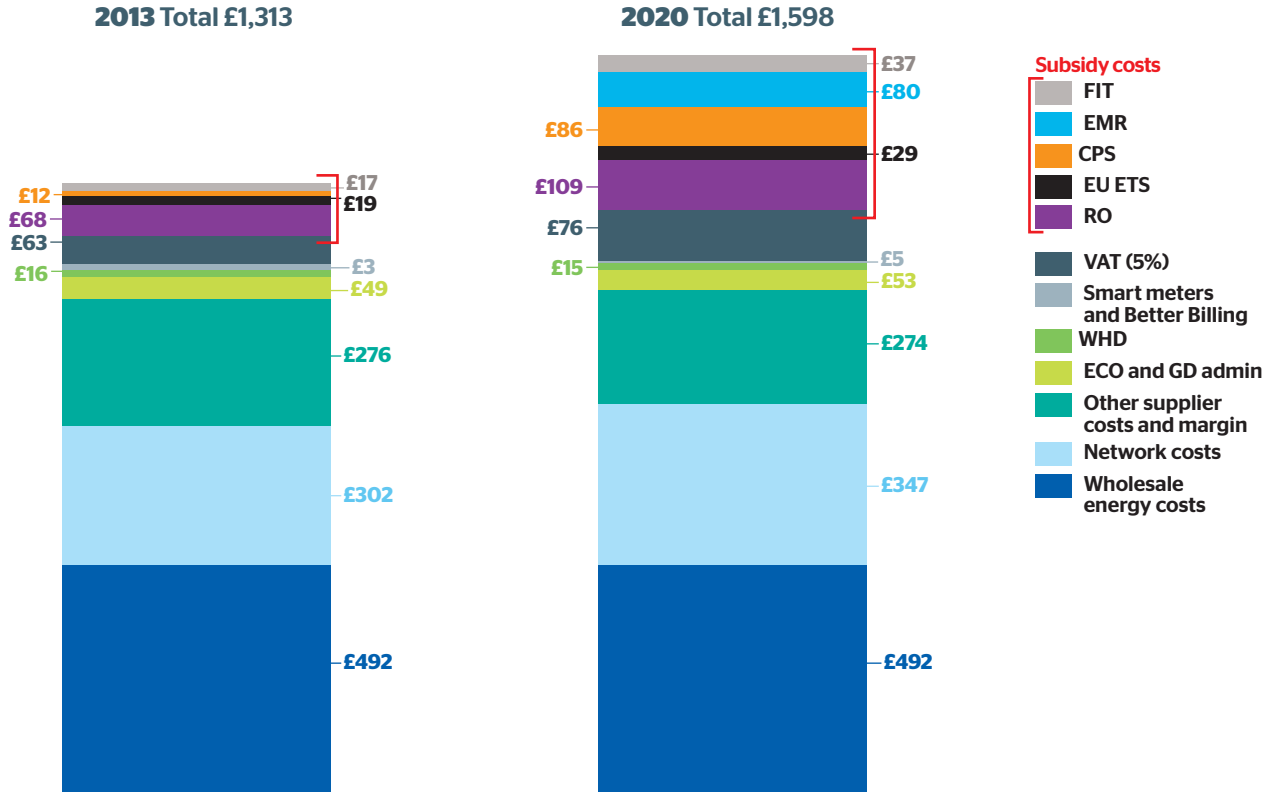


Figure 5b: Charts showing estimated average electrically heated household bill, including subsidy costs for low-carbon electricity [69]



the next decade.[70] The Committee on Climate Change estimates that by 2020 these charges will add around an extra £100 (making a total subsidy of £132) to the average electricity bill, with a further £25 increase expected by 2030 (making a total of £157).[71]

Analysis from DECC in March 2013 is broadly similar, estimating that by 2020 policies to promote low-carbon electricity will add around £128 to the average household electricity bill, equivalent to around 21% of the bill.[72] This comprises £41 for the RO (7%), £11 for the EU ETS (2%), £32 for the CPS (5%), £30 in Electricity Market Reform support costs, i.e. Contracts for Difference (CfD) (5%) and £14 for FITs (2%).[73] This £128 will be partially offset by a reduction in wholesale electricity costs through having more low-carbon electricity on the system. This is known as the merit order effect and it is estimated that this will reduce the average bill by £16 in 2020.[74] So, when taking into account VAT, in total these policies are expected to add £118 to the average domestic electricity bill.

DECC's estimates assume average household consumption falls to 3,030 kWh in 2020 from 3,800 kWh in 2013, because of improvements in the energy efficiency of products and homes. Of course this is not guaranteed, and savings can involve extra costs for consumers too, for example more energy efficient products can have higher upfront costs. So, for the sake of clarity, if we assume average household demand is the same in 2020 as now, the cost of these policies would be £153 – in other words £25[75] more. Again, this would be partially offset by the merit order effect, which is expected to reduce the wholesale electricity cost component of the bill by around £16.[76] When taking into account VAT, these policies are expected to add £144 to the average electricity bill.

2.2.3 Homes with electric heating generally face much higher policy costs because they consume more electricity

These estimates are for the average home. Electrically heated homes – around 9% of total households in Britain – will on average face higher policy costs because they consume more electricity.[77] Our analysis, based on DECC data from March 2013, suggests that the average cost of policy for those households with electric heating is currently around £122 (compared to the £53 subsidy cost paid by the average home with gas heating). This comprises £68 for the RO, £19 for the EU ETS, £12 for the CPS and £17 for FITs, plus 5% VAT.[78]

Already there are more households with electric heating in fuel poverty than with gas heating: 26% of electrically heated households are fuel poor in England, 37% in Scotland and 40% in Wales, respectively (see Table 2).[79] Between 13% and 21% of households in the bottom three expenditure deciles heat their home with electricity, compared to just 3% – 6% of homes in the top three expenditure deciles.[80] Based on analysis using DECC data, and taking into account the merit order effect (expected to be a saving of around £39), the average cost of subsidy for households with electric heating is expected to increase to a substantial £317 by 2020, even assuming average electricity consumption falls to 8073 kWh in line with DECC projections.[81] (see Figure 5b). There is a clear risk these costs could push significantly more electrically heated households into fuel poverty.

2.2.4 It is impossible to say definitively just how much subsidy for low-carbon electricity will increase retail prices and household bills, and this becomes even more difficult after 2020

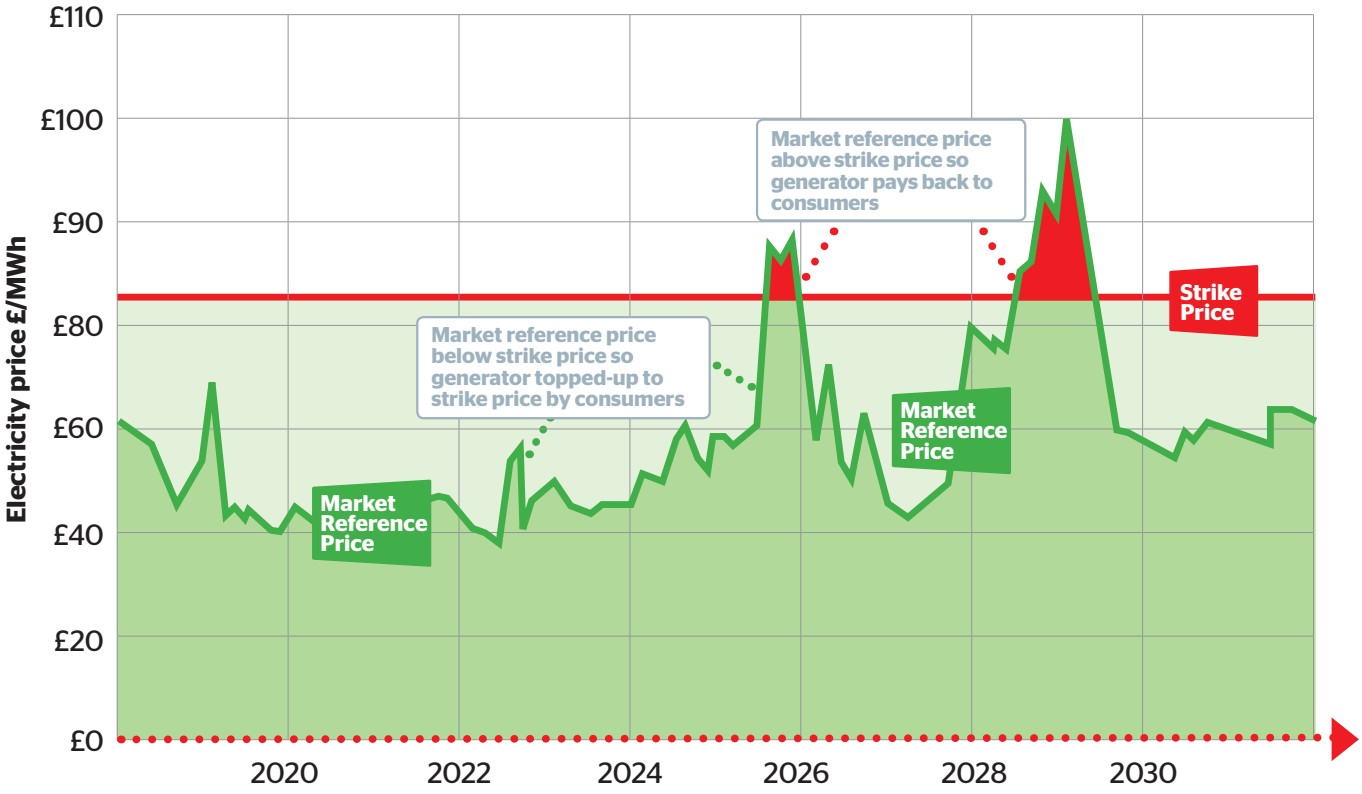
DECC estimates provide an indication of the future impact on bills of policies, but it is impossible to say definitively by how much subsidy costs will rise by 2020. For example, the EU ETS price is volatile, so its cost is uncertain, and although the government has set out a trajectory for the carbon price, it only set the CPS rate two years in advance.[82] Likewise, the cost of the FIT and Contracts for Difference (CfDs, see box 12) will be influenced by how attractive the subsidy levels are to households and developers, and therefore how much they invest.

With CfDs, subsidy levels for generators will depend on fluctuating wholesale electricity prices (see box 12). Higher electricity prices mean lower subsidies for low-carbon electricity from consumers and vice versa.[83] But market prices are

Table 2: Levels of household fuel poverty across different heating types (households in thousands) [84]

	Total households in fuel poverty	Mains gas	Electric heating	Heating oil	Solid fuel	Communal	LPG and Bot .gas
GB	4314	3046	649	360	139	30	90
	17%	**15%**	**28%**	**33%**	**45%**	**11%**	**52%**
England	3336	2410	494	236	102	27	67
	16%	**13%**	**26%**	**29%**	**42%**	**10%**	**52%**
Scotland	646	427	130	57	19	3	10
	28%	**24%**	**37%**	**43%**	**57%**	**18%**	**54%**
Wales	332	209	25	67	18	0	13
	26%	**21%**	**40%**	**47%**	**48%**	**5%**	**53%**

Figure 6: Contracts for Difference – how the support works for generators



inherently uncertain and significantly affected by what happens to the price of gas. So it is impossible to estimate with confidence what proportion of the bill will be made up of subsidy (see figure 6). Once CfDs have been agreed it will be clear how much the generator will receive for that electricity if they sell it, and therefore the cost to consumers of the low-carbon electricity with a CfD. What will not be clear is what proportion of that cost will be in subsidy and what proportion will be from the market price for electricity.

Looking out beyond 2020 it becomes even harder to estimate policy costs with confidence, as there will be more generation with variable CfD subsidy. Total subsidy will depend on the level at which financial support is set for each of the different forms of low-carbon power over the coming decades. There is significant uncertainty around this, and more generally around how much the cost of low-carbon forms of energy will fall (see box 5).[85] Again, the cost of the EU ETS is uncertain, and the CPS could be reversed at any time by a future government. Nor is it known just how much low-carbon electricity will be built.

The government has also not yet said whether policies to promote low-carbon heat in homes will continue to be funded through taxation after 2020 so any impact on consumers' energy bills is unclear.

2.2.5 Some policies to promote low-carbon power will also bring in significant new revenue for the government

The EU ETS and the CPS (see boxes 8 and 15) are taxes on electricity generation, and in turn, taxes on electricity consumers. At the same time as they increase costs to consumers, they also bring in new revenue for the government. In fact, in the five-year period beginning 2013/2014, these taxes are expected to be worth around £11 billion to the government. By 2020 they are expected to be worth around £3 billion per year.[86]

The EU ETS and the Carbon Price Floor are expected to be worth around

£3bn

in tax revenue per year by 2020

Principles to guide policy to promote low-carbon energy and an evaluation of existing policies

3.1 There are five principles that should guide policy to promote low-carbon energy

There is no perfect mechanism for providing subsidy to encourage low-carbon energy. But as consumers are paying for these subsidies and many will be directly affected by policies to promote low-carbon heat in homes, from Which?'s perspective there are a set of important principles that should guide policy. These also serve as tests for assessing what constitutes good policy and an effective approach:

- Policies should deliver low-carbon energy at an acceptable cost to the consumer
- Policy costs and subsidy levels should be clear and transparent
- There should be a fair pass-through of subsidy costs to consumers, with targeted help for the most vulnerable households and no risk of suppliers profiting from their role
- As households move to low-carbon heat, all should remain protected and have heating that is suitable for their home
- Consumer buy-in for policies is important and government should promote this with clear and consistent messaging

1) Policies should deliver low-carbon energy at an acceptable cost to the consumer

This means policies should give the minimum level of subsidy necessary to generators to incentivise sufficient new low-carbon energy. This seems obvious, but in practice it has been a major challenge for policymakers. There should also be a focus on supporting the cheaper forms of low-carbon energy to meet renewable and decarbonisation targets, whilst also taking into account the needs of local communities. With so many people struggling with their energy bills, every additional cost, even if it is relatively small, must be scrutinised carefully and deliver value for money.

81%

of consumers believe energy suppliers should be required to clearly report how they pass-through subsidy costs in bills

2) Policy costs and subsidy levels should be clear and transparent

There are a number of dimensions to this. First, it means the level of subsidy given to each form of low-carbon energy should be transparent, along with the process for determining that level of subsidy. This should extend to policies to encourage households to take up low-carbon energy. Second, it should be clear on what basis policy costs are passed through to consumers by their energy suppliers. An overwhelming majority of consumers – 81% – believe energy suppliers should be required to report clearly how they pass through subsidy costs in bills.[87] The government should also provide clear information on the likely future cost to consumers of subsidies. This should not conflate subsidy costs for low carbon energy with savings from policies to promote energy efficiency, and it should use clear and appropriate points of comparison.

Low-carbon generators only receive subsidies because it is government policy to promote these forms of energy. As such these policy costs effectively amount to government spending and should therefore be subject to the same levels of oversight and scrutiny as spending which comes directly from taxation.

3) There should be a fair pass-through of subsidy costs to consumers, with targeted help for the most vulnerable households and no risk of suppliers profiting from their role

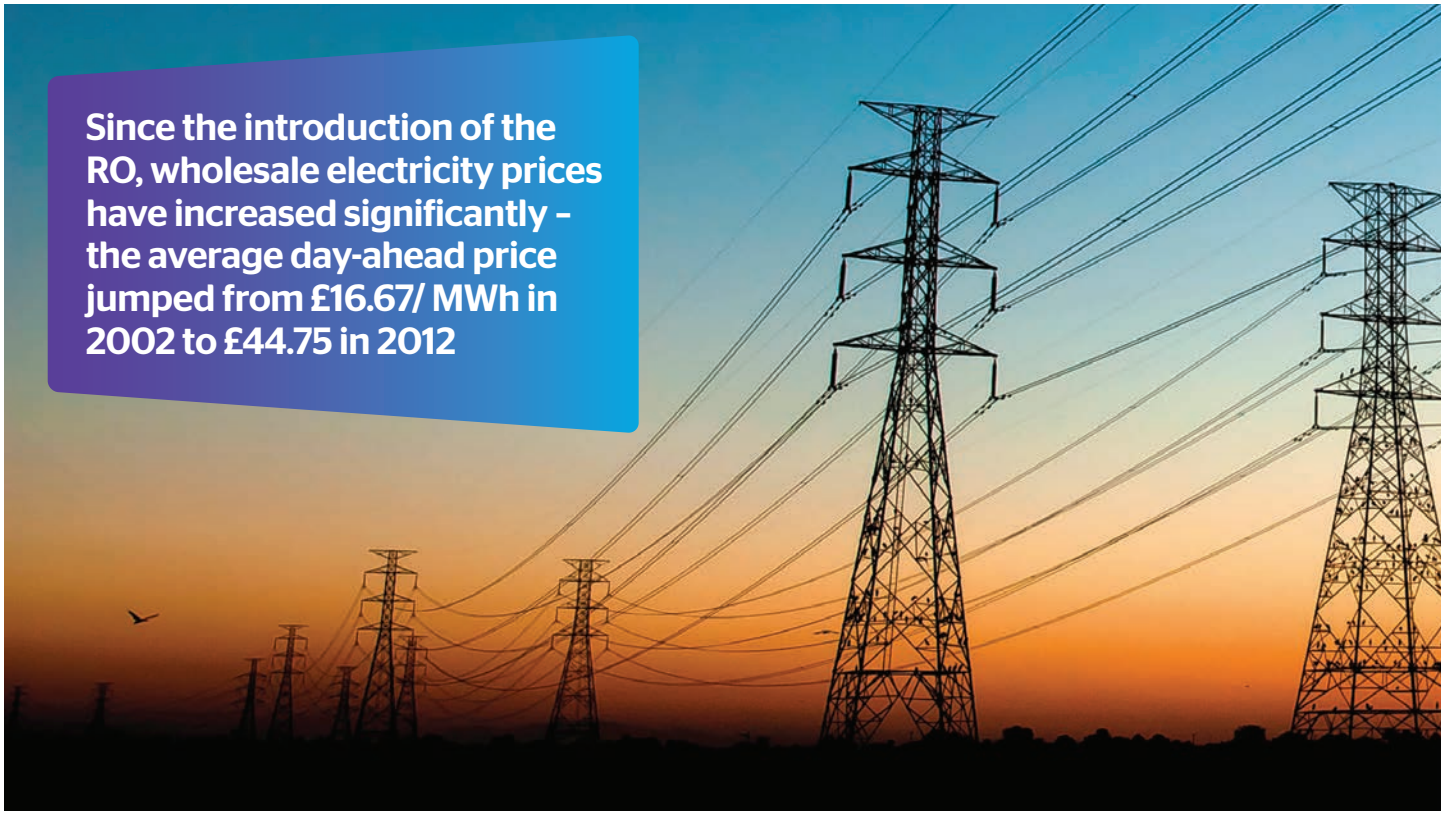
Suppliers should not be able to profit from their role in passing through policy cost to consumers. Policy costs should be passed through to consumers on the basis of how much energy they consume. This is in line with the "polluter pays" principle and gives the clearest signal on the value of energy efficiency. This approach also tends to be the most progressive, as lower income households on average spend a larger proportion of their income on basics such as energy, compared to households with higher incomes.[88] However, it does leave poorer households who consume a lot of electricity, e.g. because they have electric heating, exposed to high policy costs. Targeted action will be needed to help these households.

4) As households move to low-carbon heat, all should remain protected and have heating that is suitable for their home

Effective consumer protection should be in place for all households, and consumer satisfaction is essential, regardless of how heat is supplied. Consumers moving to lower carbon forms of heat should enjoy the same level of protection as those with gas heating.

5) Consumer buy-in for policies is important and government should promote this with clear and consistent messaging

It will be consumers who pay for investment in low-carbon electricity. Many households will also be directly affected by the anticipated move away from gas to low-carbon forms of heat. So consumer acceptance of the need for change will be crucial. Clearly, this will not be easy – these are complicated messages, and the benefits are medium to long-term. Consumer buy-in for low-carbon investment is unlikely ever to be universal,



Since the introduction of the RO, wholesale electricity prices have increased significantly – the average day-ahead price jumped from £16.67/ MWh in 2002 to £44.75 in 2012

particularly as it has costs, in the short term at least. But the government must work hard to ensure there is broad support for its policies. To achieve this, clear and consistent messaging and information from government is vital. The government should also promote a clear and evidence-based conversation about the relative cost and level of subsidy needed for different forms of low-carbon generation, including onshore wind.

Policies that deliver on the first four principles will also be crucial for achieving buy-in. After all, if consumers do not feel subsidy costs are being kept to a minimum, or if they do not feel confident that these costs are being passed through in a fair and transparent way, their acceptance of subsidy will undoubtedly be harder to come by. Likewise, if consumers think they could be mis-sold renewable heating or that they will have less protection if they move away from gas, they will be less willing to change to low-carbon heat.

3.2 Lessons from the RO and FIT

An analysis of the RO and the FIT – the key existing policies to promote low-carbon energy in the UK, highlights some important lessons for how to meet these principles better and also what policies should avoid. This analysis also reveals little action from government to ensure there is transparency and a fair pass-through of subsidy costs.

3.2.1 Uncertain returns under the RO have increased the cost of capital for developers and in turn the amount of consumer subsidy needed to get investment

Since the RO's introduction in 2002, the amount of renewable electricity has increased significantly, up from 1.8% of electricity generated to 9% in 2011 (see box 7) for an overview of the RO).[89] But the RO is a complicated policy, and, from the perspective of value for money for consumers – principle one – there have been some problems with the scheme. The first of these is widely recognised and relates to the cost of capital for investors using the scheme. ROCs are tradable commodities with no fixed value. So the price of a ROC fluctuates, along with volatile wholesale prices.[90] Both of these factors mean renewable developers lack certainty over their future returns from the scheme, increasing their risk premiums.[91,92] In other words, the rate at which they can borrow capital tends to be higher than in schemes where subsidy levels are fixed or more certain, such as fixed feed-in tariffs. Ultimately these higher costs are passed through to consumers. In fact, this is one of the key issues prompting the government to replace the RO with CfDs in 2017. (CfDs help remove the long-term wholesale price risk for developers, see chapter 4).

3.2.2 Sharp rises in wholesale power prices since the RO's introduction have increased the combined revenue generators enjoy from selling their ROCs and renewable electricity

A second issue, again to be addressed by the move to CfDs, is that the level of subsidy generators enjoy does not fall when wholesale electricity prices rise. With the RO, eligible renewable

Box 11 The impact of the EU ETS in promoting low-carbon electricity generation

Heavy lobbying by industry has led to a generous allocation of free allowances by national governments in some member states. This is because governments have sought to protect the profitability of their energy intensive industries and prevent 'carbon leakage'.[93] This, coupled with a fall in output as a result of the global economic downturn, has led to an oversupply of allowances and a significant fall in the EU ETS auction price, known as the EUA (see box 8). As a result of low and volatile prices, the EU ETS is currently only a very weak price signal for investment in low-carbon electricity. The impact of the carbon price from the EU ETS has encouraged some fuel switching to gas generation away from coal plants. This is because burning coal produces more carbon and therefore means these generators have to pay more in carbon tax. But the current profitability of burning gas to produce electricity (the spark spread) is low, while coal prices have become more competitive meaning the profitability of burning coal to produce electricity has increased (the dark spread). As a result, despite the cost impact of the EU ETS carbon price, there has been a shift back to coal generation over the last year.

Throughout, the UK government has been a strong advocate of emissions trading. As an EU-wide policy, which now has an EU-wide emissions cap, the UK government is limited in how much it can shape the scheme.

In March 2013, the European Parliament rejected proposals to restrict the number of EUAs, which would have increased the EUA price and confidence in the scheme. But despite the government's commitment to the EU ETS, some Conservative MEPs voted against these proposals, which ironically could damage the UK economy because the impact of the CPS on bills will be greater.

generators sell the ROCs they are issued to suppliers or traders, and in this way generators receive a premium on top of the wholesale electricity price. Since the introduction of the RO, wholesale electricity prices have increased significantly – the average day-ahead price jumped from £16.67/ MWh in 2002 to £44.75 in 2012, and has been even higher at times.[94] This means generators' combined revenue from selling their ROCs and renewable electricity has risen sharply.

RO generators, like all low-carbon generators, will also benefit from a further uplift in the wholesale price since the introduction of the CPS in April 2013 (see box 15). These generators would not have been expecting this increase when they decided to build.[95] This suggests generators are enjoying revenue significantly higher than they anticipated when they took the decision to invest in renewables.

3.2.3 Recycling revenue from the RO buyout clause creates unnecessary complexity and additional cost for consumers

The third issue relates to the RO buyout clause. As explained in box 7, suppliers can choose to pay a buyout price rather than purchase ROCs to meet some or all of their obligation. Each supplier will have its own strategies for meeting the obligation. All revenue collected from the buyout is then recycled back to suppliers[96] according to how many ROCs they have submitted.[97] Suppliers do not know how much they will get from the buyout fund in advance, as they do not know what proportion of the RO will be met through it.

Those lending to renewable developers are unlikely to take into account the recycled value because it is not guaranteed. This recycling therefore represents unnecessary complexity and cost. There is no mechanism for ensuring any of these recycled revenues are returned to consumers,[98] and it is unlikely they are. So this process simply makes the scheme more expensive to bill payers. The value of the buyout fund changes every year, but the sums at stake are significant - over £116 million was recycled to suppliers for the 2011/12 RO period, and over £331 million the previous year.[99] A clear lesson from the RO buy-out fund is to avoid unnecessary complexity and cost.

To reduce the risk that the ROC price will collapse because the number of ROCs generated exceeds the size of the obligation on suppliers, in 2009 the government introduced a headroom of 10% above the obligation. This headroom

The unexpected rate of take-up has increased the cost of the FIT to consumers, who pay for the subsidy through their electricity bills.

effectively raises the obligation by 10%, increasing the cost to consumers of ROCs by 10%, with no additional renewable generation. This demonstrates that too much focus has been placed on what investors and lenders want and not enough on the costs to consumers.

3.2.4 Government has not used the RO to gather as much data as it could have to help it set future subsidy levels

Low-carbon developers are naturally the individuals and organisations best placed to understand the likely costs of constructing this infrastructure. This puts them at a distinct informational advantage compared to government and other stakeholders when subsidy levels are set. Renewable generators enjoying RO subsidy have not been required to provide information on their actual construction costs to the government or regulator to help policymakers set future support levels and ensure the best value for money for consumers. This has been a wasted opportunity, as this information would have been useful. For example, it would help establish whether developers are systematically conservative or optimistic in what they expect construction costs to be, and if so, for which kinds of projects. It would also provide useful information to government on the trajectories of cost reduction as technologies mature. Of course there would still be uncertainty around the future costs of building low-carbon electricity: commodity prices and exchange rates would still be volatile, and the level of competition in supply chains and cost reductions going forward is unclear. But this kind of information should mean the government is better placed to set subsidy levels appropriately, delivering the best value for money for consumers.

3.2.5 Generous subsidy levels and higher-than-expected uptake of solar PV increased the FIT's cost to consumers - an effective system for cost control should have been in place from the start

To promote investment in small-scale low-carbon electricity the government introduced the FIT in April 2010 (see box 6). Uptake of the scheme for solar PV significantly outstripped initial government projections. This was because an over-generous tariff combined with a fall in solar panel costs made the long-term FIT subsidy very attractive to investors, including households. Subsidy costs spiralled, prompting the government to cut the level of support given under the FIT, with the first reduction for small-scale PV taking effect from March 2012. Which? supported the principle of tariff reductions made by DECC, although insufficient notice was given and this led to a scramble to install panels before the lower rates took effect.

The unexpected rate of take-up has increased the cost of the FIT to consumers, who pay for the subsidy through their electricity bills.[100] Annually the cost is quite small, with the FIT (all technologies) expected to add around £7 to the average domestic electricity bill in 2013.[101] But this is estimated to rise to £14 by 2020.[102] With so many people struggling with their energy bills, all cost, even if relatively small, should be scrutinised and provide value for money.

DECC has now significantly reduced the level of subsidy and introduced a new system of staged cuts in future tariff rates, known as degression.[103] This forward plan of tariff reduction is important for keeping costs under control, minimising bill impacts and providing investor certainty. But it came too late to stop a large increase in costs for consumers. This highlights the importance of having an effective system for cost control from a policy's launch, and this seems to be a lesson that DECC has taken on board as it is developing the domestic RHI.

3.2.6 There has not been enough focus from governments on ensuring the cheaper forms of renewable electricity get built

Any strategy for ensuring policies deliver investment at an acceptable cost to consumers will focus on promoting and building the lower cost forms of low-carbon energy. The FIT has been an expensive way to reduce CO_2 emissions and generate low-carbon electricity, particularly for solar PV. Consumers paid £151 million in FIT subsidy in the year 2011/12, with just 498.2GWh of electricity being generated from FIT installations.[104] This equated to revenue for generators of around £302/MWh. This is more than three times the average revenue for onshore wind generators getting ROC subsidy over the same period, which from the wholesale and ROC revenue was around £93/MWh.[105] Solar PV was not one of the eight technologies identified in the 2011 UK renewables energy roadmap as having the greatest potential to help meet the renewables target in a cost-effective way. Despite this, by March 31 2012, 99% of the renewable installations and 92% of installed capacity under the FIT had been solar PV.[106]

3.2.7 It is not known how the cost of the RO and FIT are passed through to consumers as suppliers are not required to report how they do this

Both the RO and FIT clearly score poorly against the second of our key principles – transparency – and because of this it is also unclear whether costs are being passed through fairly (principle three). Electricity suppliers have their own strategies for meeting the RO, as discussed. Ofgem 'assumes' the cost of the RO is passed onto consumers through bills, and in line with their electricity consumption. But it is at suppliers' discretion how they pass through the cost of the RO and the FIT, and they are not required to report to Ofgem how they do this. So it is not known whether RO or FIT costs are passed through on a per-unit or a per-household basis, or what percentage of costs are borne by business customers relative to domestic consumers. As part of their segmental accounts requirements, suppliers provide high-level information on environment costs according to their domestic and small and medium enterprise customer segments, but this is grouped together with other direct costs so is not useful. This is clearly inadequate.


Only
18%
currently feel confident that the government can keep the cost of its low carbon energy policies under control
55%
of consumers say they feel confused by the messages they hear about moving to low carbon energy

3.3 The government could do more to ensure policies to promote low-carbon electricity meet the five key principles

This chapter has put forward five key principles that we believe should underpin policies to promote low-carbon energy. The government clearly recognises that achieving our first principle – ensuring subsidies deliver investment in low-carbon energy at an acceptable cost to consumers – is important. In fact, this chapter has highlighted how the government's desire to keep costs down is currently motivating the move from the RO to CfDs (see box 12). It has also driven government action to lower FIT subsidy costs and bring in cost control, albeit belatedly.

But the government could have done more. For example, problems remain with the RO, such as the complex and expensive recycling of revenue from the buyout clause, and the government has not used the scheme sufficiently to improve its evidence base for setting future subsidy levels. When it comes to ensuring transparency and a fair pass-through of costs to consumers, there is little evidence from the RO and FIT that these are important principles for government. As chapter four will illustrate, this lack of focus continues to be an area of concern as the government develops new policies to promote low-carbon electricity and heat.

Headline messaging from DECC on current and future policy costs continues to conflate the costs to consumers of policies to promote low-carbon electricity with the savings from energy efficiency policies. Its headline message is that overall its policies will lead to lower bills. In March 2013, for example, the government argued 'today's householders are paying on average £64 or 5% less for their gas and electricity bills as a result of energy and climate change policies compared to if no policies had existed, and in 2020 the net saving against the do-nothing scenario will reach £166 or 11%'.[107] Secretary of State Ed Davey stressed 'our strategy of shifting to alternatives like renewables, and of being smarter with how we use energy, is helping those that need it most save money on their bills'. It is of course important to make clear that policies to promote energy efficiency can lead to significant savings for those households who take measures up or buy more energy efficient products. However, it is misleading to conflate the costs and savings of these two sets of policies. Irrespective of the challenge of decarbonising energy and any policies to achieve this, energy efficiency is clearly desirable in itself as it saves money on bills and means less investment is needed in new generation. Moreover, while all consumers feel the price increases, their ability to benefit from energy efficiency policies varies significantly. This depends on a range of factors, including property type and a household's ability to purchase the more energy efficient appliances. If such bill savings do not materialise, it is likely to increase consumer distrust towards the government's low-carbon agenda.

More generally the government has not done enough to win consumer support for cutting emissions from energy; 55% of consumers say they feel confused by the messages they hear about moving to low-carbon energy.[108] Research suggests there is some appetite for more information, with 37% of consumers saying they would like to know more about the cost of the government's policies to subsidise low-carbon electricity.[109]

Increased consumer confidence that the government can keep subsidy costs under control is also important for promoting consumer buy-in, particularly as these policy costs rise. But most consumers question the government's ability to accurately predict how much energy subsidies will add to bills in the future – only 24% think the government is able to do this.[110] Fewer still – only 18% – currently feel confident that the government can keep the cost of its low-carbon energy policies under control,[111] so clearly more needs to be done by government to reassure consumers that costs will be manageable.

New UK policies to encourage investment in low-carbon energy

The government is deep in the process of developing new policies to encourage investment in low-carbon electricity and low-carbon heat in homes. This chapter will provide an overview of these policies and highlight the key risks in getting these policies to work effectively for consumers. This assessment again draws on the five key principles that should underpin policies to promote low-carbon energy:

- Policies should deliver low-carbon energy at an acceptable cost to the consumer
- Policy costs and subsidy levels should be transparent
- There should be a fair pass-through of subsidy costs to consumers, with targeted help for the most vulnerable households as costs increase and no risk of suppliers profiting from their role
- Regardless of how their energy is supplied, consumers should be satisfied and protected
- Consumer buy-in for policies is important and government should promote this with clear and consistent messaging

4.1 Electricity Market Reform

Electricity Market Reform (EMR) is a programme of policies aimed at reforming market arrangements to encourage investment in low-carbon electricity and 'keep the lights on' in the period to 2050. It centres on a complex package of four new measures – Contracts for Difference, Carbon Price Support, a Capacity Mechanism, and an Emissions Performance Standard.[112]

4.1.1 Contracts for Difference

In theory Contracts for Difference should mean subsidy for low-carbon electricity is lower for consumers but this is a complicated model with a number of challenges

As part of its EMR package, the government is replacing the RO with CfDs, with the aim of keeping subsidy costs down (see box 12). CfDs will support new nuclear power, renewable power and CCS technology by providing greater certainty of revenue to potential investors through the introduction of long-term contracts. By guaranteeing the low-carbon generator a certain price for the electricity they sell, a CfD removes the long-term wholesale price risk, and in theory reduces the cost of capital for developers.[113] Given the high upfront investment needed for low-carbon electricity, the cost of capital has significant implications for overall costs. These savings should result in lower overall support costs for consumers as the levels of subsidy needed to encourage investment should be lower. This is the reason why modelling for DECC has suggested that continuing with the RO, or moving to a more straightforward Premium Feed-In Tariff,[114] would be a more expensive way of supporting low-carbon power for consumers than the CfD model.[115] CfDs are intended to remove the wholesale price risk, to bring down subsidy costs. Their introduction is not – and should not be – about removing all risks generators and developers face.

Key aspects of CfDs and how they will work are still to be decided

The primary legislation needed to introduce CfDs is currently going through parliament in the Energy Bill, which is expected to achieve Royal Assent by 2013. CfDs are developing into a very complex instrument and some significant questions remain around how they will work in practice. For example, it is not clear how the Levy Control Framework (LCF) (see box 13)

Box 12 Feed-in Tariffs with Contracts for Difference (CfDs)

Fundamentally, CfDs, like EMR more generally, are about risk: transferring risk from investors and electricity generators to electricity consumers, to help reduce the cost of capital and encourage new investment in nuclear, renewables and CCS. Ultimately, consumers should benefit from these lower costs as lower levels of subsidy will be needed to attract investors.

CfDs are quite different to a traditional Feed-in Tariff, where generators receive a fixed level of revenue for their electricity. Under a CfD agreement, for the duration of their contract low-carbon generators will receive a variable payment, to the level of an agreed 'strike price', on top of the income they get from selling their power on the wholesale market. So the revenue a CfD generator receives from selling their power on the wholesale market combined with their CfD subsidy should remain broadly constant for the length of their contract (see figure 7). The CfD mechanism is two-way: should the market reference price rise above the agreed strike price, generators will be required to pay back the difference to the central counterparty, and ultimately this should be passed through to consumers via their suppliers.

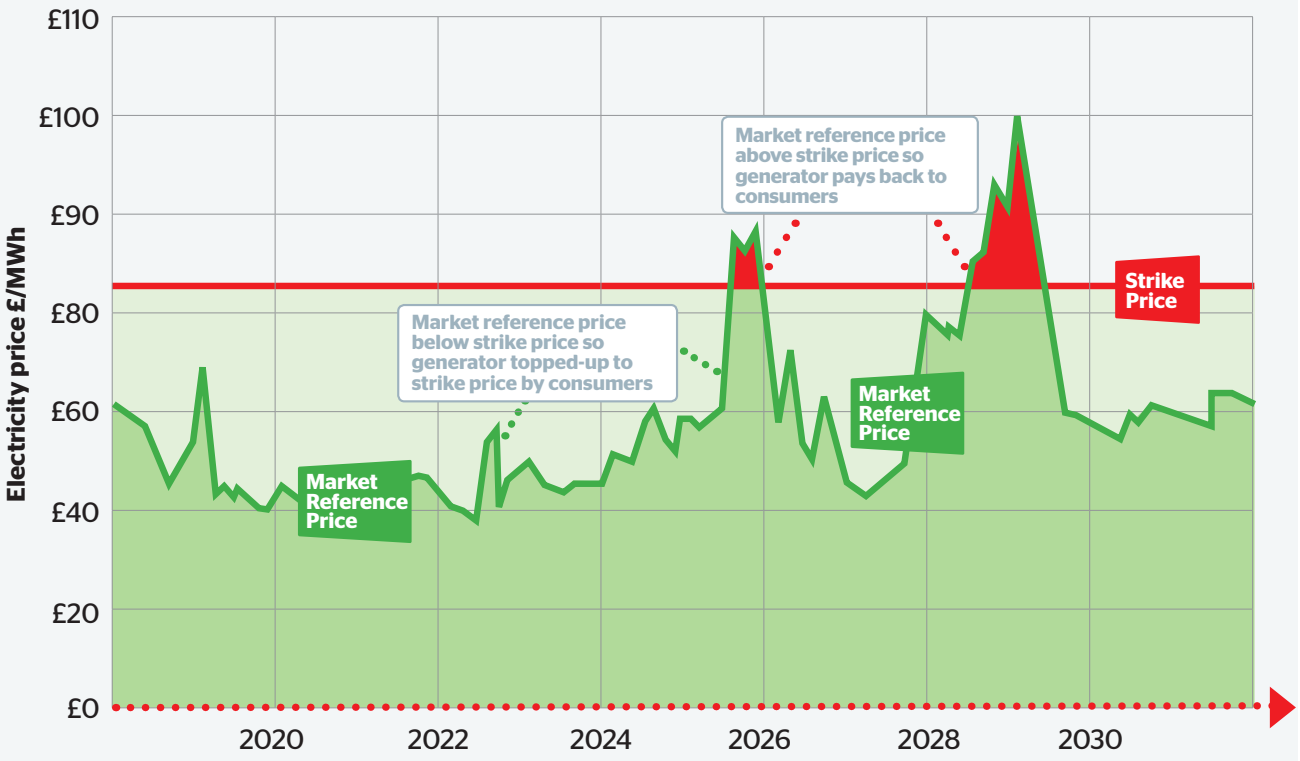
Most renewable strike prices will be 'off-the-peg', with the level of subsidy set following a public consultation process. However, strike prices for nuclear CfDs and CCS, and potentially some of the more immature renewable projects, will be negotiated privately between government and the low-carbon developers.

There is no guarantee for the generator that their low-carbon electricity will actually be purchased, even with a CfD, and at a price similar to the respective market reference price. In fact, this is an area of concern for independent renewable generators.

Suppliers will be required to recover the cost of CfD support from their consumers and these will be transferred to the generator via a central counterparty, owned by government.

National Grid has an important advisory and delivery role for CfDs, for example providing analysis to inform the government's key decisions, including on strike prices. It will be responsible for allocating CfDs.

Figure 7: Contracts for Difference – how the support works for generators



will affect how many CfDs are allocated and effectively keep costs in check, or how costs will be recovered from consumers through the supplier obligation. Nor has the government decided what the length of contracts for nuclear CfDs will be. Much of the detail will be set out in the secondary legislation. A draft EMR delivery plan providing more explanation of how CfDs will work is expected from government in late July 2013, with the final plan published at the end of the year, including strike prices for renewable technologies.

Strike prices will be crucial for determining whether CfDs are value for money for consumers but setting these at the right level will be a major challenge for government

Ultimately whether consumers get value from CfDs will hinge on the contract strike prices agreed and how much electricity prices rise or fall over the length of the CfD, as this will determine the level of subsidy. CfDs could prove a cost-effective way of encouraging new generation, meeting our first principle, and affordability was the key reason the government opted for the CfD model. But setting strike prices for the different technologies at appropriate levels will be an enormous challenge for government. After all, there is significant uncertainty around the future cost of low-carbon generation (see box 5) as well as what future gas prices will be. As discussed in the previous chapter, developers naturally have the greatest understanding of the likely costs of these electricity projects and this gives these companies important informational advantages over the government and other stakeholders, including consumer groups, during any consultation or negotiation. The initial rates of support under the RO and the FIT give us cause for concern as these policies have proved generous to electricity generators and not electricity bill payers (see 3.2).

Competition between low-carbon generators and different low-carbon technologies for contracts should be important for driving down support costs. DECC does not believe competitive auctions are a viable option in the near term, or even in the medium term, for nuclear and CCS projects. In fact, in its most recent update, DECC provided no firm date of when competitive auctions will begin for nuclear electricity. Nor does the government appear to be developing a plan for this transition. Embedding transparency in the strike price setting process will be important for making this transition possible.

Extensive and open input from independent experts is needed to have confidence all strike prices are appropriate, but the new Panel of Technical Experts has only a narrow remit

The first set of 'off-the-peg', non-negotiated strike prices for renewables will be set by the government in late 2013. In June 2013 the government published five years' worth of draft strike prices for renewable technologies for public consultation. These drew on advice from National Grid.[116] But the assumptions and analysis underpinning these will be released in late July in the draft delivery plan. Consultation on strike prices is obviously

Box 13 The Levy Control Framework

Announced in the 2010 Spending Review and introduced in 2011, the Levy Control Framework (LCF) places a cap on the total policy costs that DECC can levy on consumers' energy bills. The government states its aim is to make sure DECC meets its 'fuel poverty, energy and climate change goals in a way that is consistent with economic recovery and minimising the impact on consumers bills.'[117] The RO, FIT and the Warm Homes Discount[118] fall within the current cap, which runs until the end of the Spending Review period in 2015.[119] The cost of the EU ETS and CPS does not come under the cap.[120] DECC is allowed to exceed the cap providing it does not go above the 'acceptable headroom' (initially 20%), agreed with the government at the start of each period. In the financial year 2012-2013 this stood at £2.35 billion.

CfDs will also fall within the LCF. In November 2012 the government agreed the cap would increase to £7.6 billion in the financial year 2020/21,[121] and stated that the allocation of CfDs will depend on ensuring affordability within it.[122] In June 2013 the government set out what the annual LCF caps will be up to 2020/21.

welcome so the government can publicly gather evidence.

Consumer groups are not developers of low-carbon electricity, and do not know the exact levels at which strike prices should be set for the various low-carbon technologies to deliver investment cost effectively. Instead, to have confidence strike prices are appropriate and that consumers will not pay over the odds, there needs to be a process involving extensive and open input from a wide range of independent experts. The government set up a small and temporary Panel of Technical Experts in February 2013 to review National Grid's evidence and analysis, and any conflicts of interest it has.[123] But the panel's remit is very narrow, with the government stating that explicitly the body has no role in advising on the level of CfD strike prices.[124]

The process for determining bespoke, negotiated strike prices lacks transparency

Before the Energy Act becomes law, low-carbon developers are able to enter into negotiations with government with a view to agreeing strike prices and terms under the Final Investment Decision (FID) enabling process (see box 14). Which? has significant concerns around how much transparency there will be in setting these 'bespoke' strike prices. It is through this process that EDF Energy is currently in negotiations with the government over its potential investment in nuclear at Hinkley Point C, an investment likely to be worth over £10 billion.[125] Negotiating fair and appropriate strike prices for nuclear will be a particular challenge, given the level of uncertainty around construction costs. The reactors currently under construction at Olkiluoto in Finland and Flamanville in France are significantly over budget and time.[126] As only EDF Energy is seriously considering investing in nuclear in the UK in the short term, this will undoubtedly give this firm a strong bargaining position during contract negotiations.[127] Even next year when the Act is passed, any CfDs for nuclear power or CCS will continue to be negotiated privately between government and developers.

The government has said it is committed to transparency - our second key principle. But in the Energy Bill the only information the government has committed to publish for investment contracts are the strike price and reference price, and even then after the contract has been agreed and as 'soon as is reasonably practical'.[129] Anything deemed commercially sensitive could be redacted from published contracts. Potentially this could even include important aspects of contract terms, such as whether consumers or taxpayers are underwriting any of the construction risk (as well as the wholesale price risk). This lack of transparency is particularly concerning as these early contracts are likely to set the terms of future CfDs. The Panel of Technical Experts also provides no input or oversight with regards to these negotiated contracts.

Box 14 The Final Investment Decision (FID) Enabling Process

To prevent delays in investment on projects before the Energy Bill is enacted, the government has introduced the so-called 'FID enabling process'. Under this, the government can enter into discussions around strike prices and contract terms with interested developers, with the Secretary of State potentially issuing an 'investment contract' to that generator. Any investment contracts will then be laid before Parliament as part of the Energy Bill, in turn becoming a CfD when the Bill is enacted.[128] The contract will only not enter into force if the entire Bill is voted down or if it is deemed illegal under European State Aid rules.

It is unclear how the government's cost control mechanism, the Levy Control Framework, will protect consumers in practice

The government has said that affordability for consumers will be ensured as CfD subsidy will need to remain within the LCF cap (see box 13). But in reality it will be impossible to predict how much support costs for CfDs will be each year, as the level of this support will depend on the market price, which is inherently volatile. These contracts will be legally binding, so strike prices cannot be revisited. To our mind, this makes the policy incompatible with the LCF.[130] The government has yet to clearly explain how the LCF will determine and constrain which contracts are signed. This in turn can also undermine the willingness of generators to develop projects as they may be uncertain as to whether funds will be available. This increases risk and therefore potentially the cost to the consumer.

Confidence that the government can keep subsidy costs in check is important for promoting consumer support for policy - the fifth key principle. Consumers currently doubt the government's ability to keep the cost of its low-carbon energy policies under control, with only 18% feeling confident the government can do this effectively.[131]

Reliable wholesale market reference prices are very important, as they determine how much subsidy generators get each month, but establishing a robust forward market for nuclear CfDs will be a challenge

As explained in box 12, the amount of subsidy the generator will get in any given month is variable. It will be determined by the

difference between their contract strike price and the fluctuating market reference price for that type of CfD.[132] So when the wholesale market reference price falls, the subsidy which tops this up to the level of the strike price will rise to compensate. Likewise, when the market reference price rises, the level of CfD subsidy falls back. If the reference price rises above the strike price the generator will have to pay the difference to the counterparty, and in theory, this should ultimately be fed back to consumers. From the consumer perspective this is clearly an attraction of the CfD model.

Market reference prices will be instrumental in determining how much financial support a CfD generator receives. Liquid wholesale markets and reliable reference prices will be essential for ensuring that the payments made to generators are appropriate and not easy to manipulate.[133] In a market with low liquidity it could be relatively easy for a generator to move or 'game' the reference price up or down by just a few electricity trades, or even a single one, in turn influencing the size of its CfD subsidy payments.

CfDs for different forms of low-carbon generation will have different market reference prices. For intermittent CfDs (wind) the government is planning for this to be the hourly day-ahead auction price. Liquidity in this market has been improving over the past few years, with a notable increase in exchange trading over the platform N2EX.[134] This is expected to continue with the formation of the GB hub and is expected to be the focus of on-going monitoring by Ofgem.[135] The government wants the reference price for baseload nuclear CfDs to be taken from the forward markets. This is to give these baseload plants the incentive to schedule their maintenance away from periods of peak demand and thereby help manage the system. In June 2013 the government announced this would be the seasons ahead price, rather than the year ahead price as originally intended because of low liquidity in the longer term markets.[136] As a result of widespread concerns around the lack of robust reference markets, government has put backstop powers in the Energy Bill so it can act should it feel Ofgem's ongoing work to improve liquidity is not effective.[137] As yet it is unclear what any form of intervention would look like, but the government must be prepared to use these powers if Ofgem's reforms do not deliver.

The proposed CfD Supplier Obligation risks increasing costs for consumers both directly, and indirectly, through undermining competition in the retail market

All licensed electricity suppliers will be required to recover the cost of CfD subsidy from their consumers; most likely in accordance with their market share. Suppliers will transfer this to a central counterparty, which will then distribute it among those generators with a CfD. How this supplier obligation will work will be set out in secondary legislation. But the government has proposed that suppliers will be required to pay their CfD levy on a monthly basis, just after the end of the month.[138] This would mean suppliers have to forecast in advance the likely size of their CfD payment, and translate this into an appropriate tariff increase for consumers to cover the cost. The size of the obligation will vary every month in line with changes in the various volatile reference markets and the amount of the different forms of low-carbon generation supported during that period. Clearly this will not be straightforward. Faced with unpredictable levy costs and a largely sticky customer base, it would also not be surprising if suppliers tend to over-recover from consumers to ensure they have enough to cover their levy costs.

This, along with requirements on suppliers to post collateral to cover their CfD payment,[139] could be particularly challenging for independent suppliers, undermining the already weak competition in the retail market. After all, many of these suppliers already struggle with the collateral requirements for trading and generally only have small trading teams compared to their vertically integrated competitors. These forecasting challenges would also be likely to deter new entrants. Given the inherent uncertainties and difficulties in making these calculations, and the risk suppliers will over-collect from consumers as a result, Which? does not think this forecasting should be the responsibility of suppliers.

The government has said it will be at suppliers' discretion how they pass through CfD costs and whether they give CfD funds raised from generators to consumers as is intended

As chapter 3 outlined, transparency in subsidy costs should be a key principle underpinning any policy to promote low-carbon energy, yet with the RO and FIT there is little transparency in how costs are passed through to consumers by suppliers. This looks set to continue with CfDs, even though the costs are likely to be higher as more low-carbon generation will be supported. The government has said it does not plan to specify how suppliers recover CfD costs from their consumers, nor have suppliers report on how they do so. This also means it will be impossible to tell if costs are passed through fairly according to households' consumption, in line with our third key principle.

From the consumer perspective, the two-way nature of the CfD is a key attraction of the CfD model. (If the reference price rises above the strike price the CfD generator will have to pay the difference to the counterparty, and in turn consumers.) But the government has no plans to oblige suppliers to distribute any money raised from generators to consumers when market reference prices go higher than CfD strike prices. The government has said that suppliers will have a strong incentive to use these funds to reduce consumer bills because of competitive pressure in the retail market from customers. Yet as Ofgem recognises and as set out in the Which? report *The Imbalance of Power: The Retail Market*,[140] competition in the retail market is ineffective. Thus, challenging the assumption that competitive pressure from consumers will incentivise suppliers to pass through any savings. Despite consumers being worried about prices, 60% of consumers have never switched and three quarters languish on the most expensive 'standard' tariffs. To date we have seen that less-engaged 'sticky' customers, who include the more vulnerable consumers, meet

more than their fair share of existing policy costs.[141] There is no reason to believe this will not also occur with the recovery of CfD costs. It is wholly inadequate to leave it up to suppliers whether they give this money to consumers as is intended with the design of the CfD. The expected lack of transparency will also mean it is impossible to tell whether they have.

The government intends to exempt some electricity intensive industries from CfD costs and it looks like domestic electricity consumers will foot the bill

The government has said that it intends to exempt some electricity intensive industries from most of their share of CfD subsidy costs.[142] However, these industrial consumers are still expected to benefit from any fall in wholesale prices associated with having more low-carbon power on the system in the future. Exactly how these exemptions will work is uncertain, but the government is proposing this will be through the CfD levy on suppliers. The implication is that domestic consumers and other consumers who do not have exemptions will cross-subsidise low-carbon power costs for heavy industry. This would clearly push up policy costs for households, including the fuel poor, and means the policy fails on our third key principle, ensuring a fair pass-through of subsidy costs. In July 2013 the government published a consultation on the scope of the exemptions. Its preferred approach is that eligible electricity intensive companies are exempt from 80% of their share of CfD costs.

Electrically heated households will bear a disproportionately large share of the cost of any exemptions as they consume more electricity. An illustrative example given in the consultation document indicates that if the government goes for the cheapest of its proposed options (with the fewest exemptions and currently its preferred approach) it will push up EMR costs by around a further £8 a year for the average electrically heated household in 2020.[143] An Impact Assessment is expected in the autumn alongside the consultation on secondary legislation to implement the Supplier Obligation.

Domestic consumers and other business consumers look set to cross-subsidise low-carbon power costs for heavy industry

Box 15 Carbon Price Support

The Carbon Price Support (CPS), or Carbon Price Floor (as the government refers to it), came into effect in April 2013. The CPS is essentially a tax on electricity generated from fossil fuels, which, in theory, will help make low-carbon generation more attractive to investors. It is not a carbon price floor but works by topping up the carbon price in the EU emissions trading scheme to a pre-agreed level, increasing the wholesale cost of electricity. This rise is expected to be passed through to consumers. The government's trajectory for setting the CPS rate is a target carbon price of £30 per tonne of carbon dioxide (tCO2) in 2020 and £70/tCO2 in 2030, beginning at £16/tCO2 in 2013 (see figure 8). The rate is set two years in advance on the basis of the futures market for the EU ETS carbon price for the year in question. The Government has set the rate for 2013/14 at £4.94/tCO2.

The government needs to have a clear idea of how much heat will be provided by electricity so it can award CfD contracts for an appropriate amount of new low-carbon generation

More generally, it is crucial that the challenge of drastically reducing CO2 emissions from heat and electricity are planned together. Peak electricity and heat demand already coincide (see box 10), so any increase in the amount of electricity used for heating, for example to power heat pumps, will further increase the peak electricity load. This impacts on how much new electricity capacity and network capacity is needed, and in turn the overall cost of investment for consumers. So a firm idea of how much heat is expected to come from electricity is necessary to award CfD contracts for an appropriate amount of new low-carbon generation. However, as yet the government has no clear targets for how many households should have heat pumps or be on heat networks.

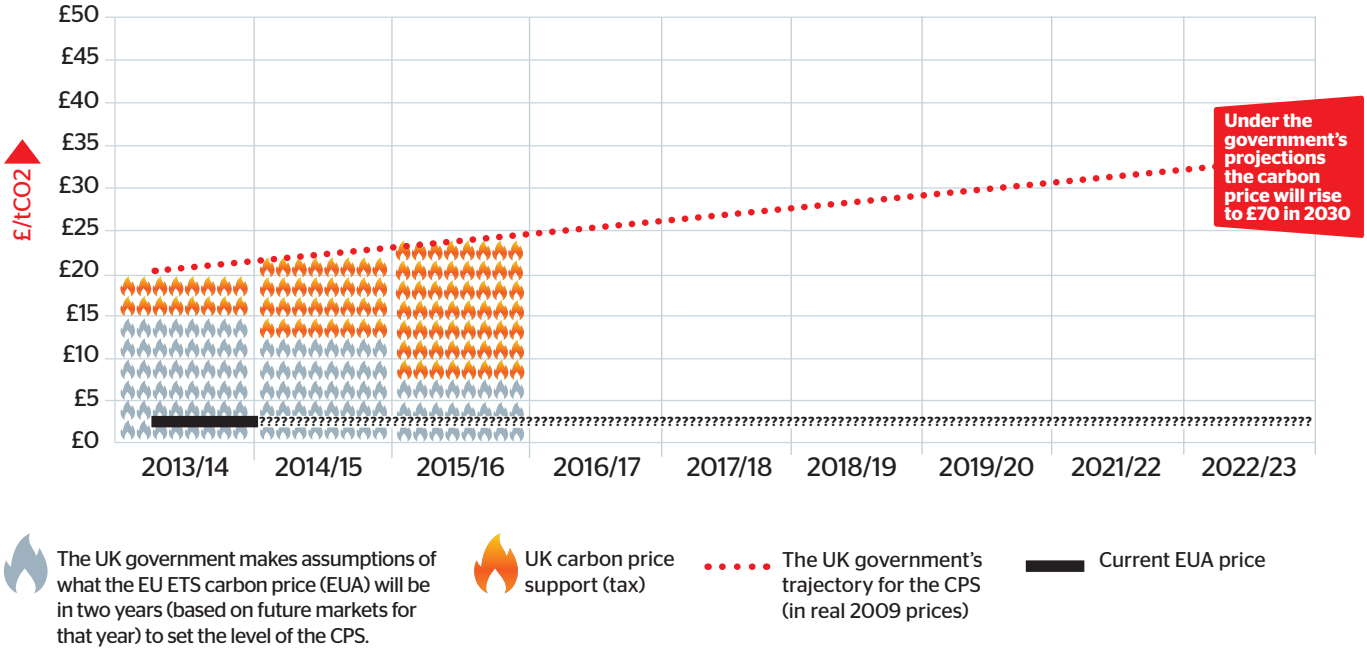
4.1.2 The Carbon Price Support will add to bills but is unlikely to deliver new investment in low-carbon electricity

The government has also introduced Carbon Price Support (CPS) as part of its EMR programme alongside CfDs. The government argues that the CPS will encourage new low-carbon generation by giving 'an early and credible long-term signal to investors' (see box 15).[144]

The CPS will increase electricity prices for consumers. In its Impact Assessment from December 2010, the government estimated it will add between 1% and 2% (£2-£7) to consumer[145] bills in 2013-14, rising to between 1% and 6% (£4-£28) in 2016 and between 1% and 5% in 2020.[146] In the 2013 Budget, the government announced that the rate for 2015/16 would jump to £18.08/tCO2, up from the indicative rate of £9.86/tCO2 it had forecast in the 2011 Budget.[147] This rise has come about because the carbon price under the EU ETS has fallen significantly over the last few years (see box 15 and figure 8),[148] so the government has made the future CPS rate higher to

Figure 8: How the carbon price support gets set by the UK government

If the UK government stays on its planned trajectory for a carbon price of £70/tCO2, a lower EU ETS carbon price will mean the UK CPS is higher.



make up the difference to reach its target carbon price for the year. We estimate this will collectively cost domestic consumers £924 million in 2015/16.[149, 150] The impact on the average consumer electricity bill in 2015/16 will be a rise of at least £29 and as much as £68, depending on how much gas and coal set the price of electricity during the year, which is more than initially expected because the CPS rate is higher.[151] Because they use on average significantly more electricity, the impact will be even higher on households with electric heating, at between £67 and £156.[152] The government is giving the most electricity intensive companies rebates to help with the increased costs from the CPS, worth around £250 million over the Spending Review period,[153] but no help is in place for fuel-poor or electrically heated households.

However, as a tax subject to annual review in the Budget, the CPS is unlikely to provide the long-term certainty and confidence for investors in new low-carbon generation that the government claims. (If it did there would be no need to introduce CfDs.)The annual CPS rate is only set two years in advance – far shorter than the time horizon upon which these decisions are based. For example, a new large wind farm or nuclear power development generally takes well over a decade to build, from the original planning phase through to final construction. This tax could also be removed at any time. This policy clearly fails against our first key principle as it will add to bills, even though it is unlikely to deliver new low-carbon investment.[154]

The CPS will mean existing low carbon generators enjoy windfall profits and it will raise significant extra revenue for the government

The CPS will act as a means of raising revenue for the government. In fact, the government estimates it will bring in £600 million in its first year, rising to £1.2 billion in its third year.[155] It will also provide windfall profits for those generators with existing renewable and nuclear power, as these generators do not have to pay the tax but will benefit from the higher electricity prices that result from its introduction. For example, according to government estimates existing nuclear plants will enjoy around an extra £50 million a year up to 2030.[156] But the government said that it would send the 'wrong signals' to industry and investors should it recoup these windfall gains.

4.1.3 The Capacity Mechanism

There is currently plenty of spare electricity capacity in GB, but electricity margins are expected to tighten over the next decade

The generation mix will become more variable over the next 20 years with more wind power on the system. At the same time, with more low-carbon power, flexible fossil fuel plants such as gas-fired power stations will need to run less often. This will mean the returns for these plants are more uncertain, making them less attractive to build or keep open. Running less often, these generators will rely on higher prices at times of peak demand to remain profitable. But some of these flexible plants will still be needed, for example for when output from renewable capacity is low, there are unplanned nuclear outages,

or overall demand for electricity is very high.

Over the last six years there has been plenty of spare electricity capacity in GB.[157] In 2012 de-rated margins were high, at around 14%, largely because of the recession and a fall in industrial demand.[158] But capacity margins are likely to narrow over the next decade. As chapter 1 set out, around a fifth of generating capacity will close by the end of this decade. This is because oil and some of the oldest coal power plants will shut as European regulations to protect air quality come into force.[159] These plants have opted not to fit the technology that would allow them to keep running and have used up their remaining hours quicker than anticipated as they have been profitable. Eight of the UK's existing nine nuclear power stations are expected to be retired by 2023.[160] A fall in the profitability of burning gas to generate electricity (particularly compared to coal), along with an increase in the amount of spare capacity, have meant a number of gas plants have also been mothballed over the last year.[161] It is not clear whether these gas plants will be brought back online, and if so when.

Ofgem's Electricity Capacity Assessments from October 2012 and June 2013 indicate that the de-rated capacity margin in GB could fall to 4% by 2015/16 (see figure 9).[162] As Ofgem notes, the impact of a de-rated capacity margin of 4% on the electricity system is difficult to predict. To put it in more practical terms this would mean that the likelihood that some households need to be disconnected increases to around 1 in 12 years, from around 1 in 47 years for the coming winter.[163] Despite some of the alarmist media coverage at the time of Ofgem's publications, margins of this kind would not be unprecedented. In fact, it would be similar to the levels of risk seen in some years of the last decade for example the winter of 2005/06, without any problems for consumers' electricity supply.[164] Ofgem's modelling then has margins widening from 2016/17 as demand falls, so that by 2018/19 capacity margins are back up to just below 8% and the risk that some households are disconnected rises to 1 in 112 years.[165]

According to DECC modelling from November 2012, using central demand assumptions, margins are not expected to fall below 10% until after 2020 (see figure 9).[166] Even under DECC's 'stress test' scenario, in winter 2015/16 the electricity margin is expected to be 8.4%.[167] In DECC's modelling it is only after 2022 that margins fall below 5%.[168] The differences between Ofgem and DECC figures are because Ofgem assumes demand will be higher in 2016/17 than today and takes a very conservative approach to calculating how much power will flow into GB over interconnectors at times of peak demand (see box 18) [169]

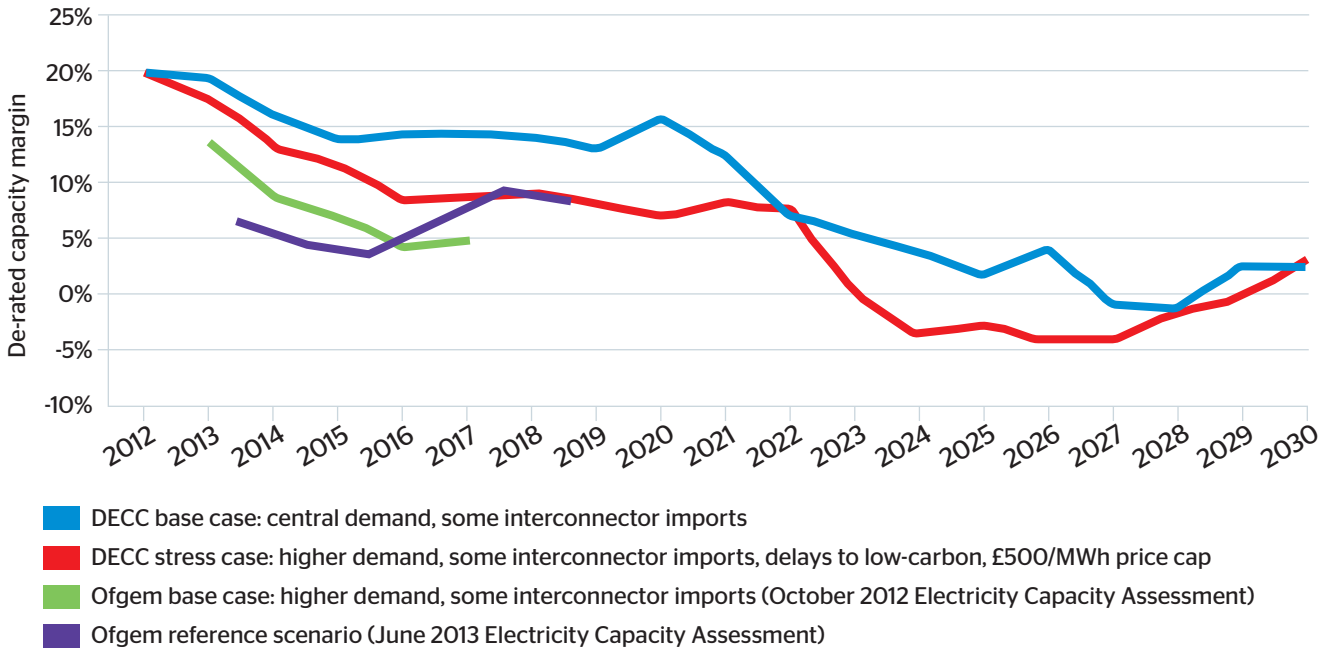
Experience has shown it is notoriously difficult to accurately predict future electricity demand and this is unlikely to change

The differences in these estimates around future margins reflect the difficulties in accurately modelling how tight future margins will be. This is for a range of reasons, including the considerable uncertainty around demand growth, what will happen to the economy, how much electricity will flow into GB over interconnectors at times of peak demand, whether mothballed plants will be brought back into action and the weather.

The government plans to introduce a market-wide capacity mechanism, with the first auction being run in 2014

Currently, the GB electricity market is energy only. In other words, generators only get paid when they produce electricity and are not rewarded simply for being available to generate. The government has been subject to pressure from most fossil fuel generators, calling for a capacity mechanism to reward

Figure 9: DECC and Ofgem modelling of de-rated capacity margins in GB



Box 16 An overview of the new capacity market for GB

In June 2013 the government updated its proposals for the new capacity market. Under the proposals the System Operator will run auctions for a set amount of reliable capacity four years in advance of when it is needed (with the first in 2014), with a further auction one year ahead of delivery (with the first in 2017).[170] Capacity given a capacity agreement will receive a predictable payment for being available, with payment levels being set by competitive auction. This means generators receive revenue both from the capacity market and from selling their electricity on the wholesale market. These capacity providers will face financial penalties if they do not deliver when needed (i.e. when the Systems Operator has warned there will be an expected period of system stress four hours ahead of time).

The capacity auction will be open to new and existing generators. However, those with a CfD, or RO or FIT support will not be eligible, and interconnected (non-GB) capacity will also not be able to participate. (The government is exploring how the latter could be included in later auctions.) Providers of electricity storage and those who can offer firm demand-side response will also be able to participate.[171] The government will run pilot auctions for demand-side response for delivery one year in advance in 2015 and 2016. The length of capacity contracts will vary depending on whether plants are new, refurbished or existing. Existing plants will be eligible for one year contracts. Refurbished plants are expected to get contracts for three years and new plants for a term they choose, up to 10 years or potentially even longer. (A consultation on this is expected in 2013.)[172]

Ministers will decide how much capacity to put up for auction based on forecasts of future peak demand. This will be provided by the System Operator, which will also advise government on how much capacity it should auction for. These decisions will also be informed by the new and enduring reliability standard, which is expected to be announced at the end of the year, following a consultation.

The cost of these payments will be paid for by suppliers, according to their market share at times of peak demand.[173] Penalties paid will be distributed among suppliers, again in line with their market share at times of peak demand. Costs will ultimately be paid for by electricity consumers. (At times of peak system demand household electricity consumption comprises a significant proportion of the total demand – approximately 45%.)[174]

As generators with capacity contracts will receive payments for being available, the capacity mechanism should reduce wholesale prices. (This is because the mechanism should reduce the level of the spikes in prices that occur when demand is high.) But there is uncertainty over the extent to which they will reduce them, particularly before the reliability standard has been set, and before Ofgem has finished reforming balancing arrangements.

availability. Otherwise they say that the business case will not be there to build new flexible generating plants or keep the existing ones available because of the uncertain returns.

In December 2011, the government confirmed it intended to introduce a capacity mechanism as part of its EMR programme to ensure sufficient reliable capacity is available. This will be a major change to how the market currently works. Initially, the government explored the idea of a strategic reserve model, which would have involved the System Operator tendering for a certain amount of capacity. This capacity would then be removed from the market, with these generators receiving payments, and then only be used when there is a supply shortfall. But, despite the strategic reserve coming out as the cheaper option in its modelling, the government dropped this model.[175] Instead, persuaded by lobbying from many generators that the incentives would no longer be there for generators outside the strategic reserve to keep investing, so the size of the reserve would need to keep increasing, the government has chosen to introduce a complex market-wide capacity market (see box 16).

In November 2012 the government provided an update on its plans. It still did not fully commit to introducing a capacity mechanism, but put the powers to do so in the Energy Bill. In June 2013 the government confirmed it will run the first capacity auction in 2014, for the first delivery in the winter of 2018/19, (providing it gets state aid clearance).[176]

Ironically the capacity market looks set to come in around the time Ofgem forecasts suggest the risk to security of supply will have fallen, and the de-rated capacity margin will have risen to just under 8%. In fact, reflecting this, in June 2013 Ofgem and National Grid published an informal consultation asking whether two new balancing services – a Demand Side Balancing Reserve and a Supplemental Balancing Reserve – should be introduced to help National Grid manage the system from as early as 2014/15.[177] The latter would involve a certain amount of capacity being set aside and this reserve being used at times of a supply shortage to avoid emergency actions, such as disconnections. So in principle, it seems similar to the strategic reserve, the approach for the capacity mechanism that the government dropped for the capacity market.

Ironically the capacity market looks set to come in around the time Ofgem forecasts suggest the risk to security of supply will have fallen

Once the government created market uncertainty by making a capacity mechanism a serious possibility, it perpetuated the problem it was trying to tackle

Once the government made the prospect of a capacity mechanism a serious possibility without making a firm decision – as has been the case here in GB over the last few years – the government perpetuated the very problem it was seeking to solve. This is because the government created uncertainty, delaying investment decisions by generators and discouraging them from building new flexible plants.[178] It is also likely to have contributed to generators' decisions to mothball their less profitable gas plants, particularly among those generators that have been keen to see a capacity mechanism introduced. In turn these investment delays and plant closures reduce capacity margins, making the introduction of the mechanism seem more necessary to policymakers and therefore more likely. In this way, it becomes a self-fulfilling prophecy, with many generators lobbying for it to be introduced as soon as possible.

Introducing a capacity mechanism is a major intervention and there is significant uncertainty around how much it will add to consumers' bills

The government has described the capacity market as 'an insurance premium against the risk of blackouts'.[179] But its introduction will represent a significant intervention in the market and will bring with it a number of risks. It is likely to increase costs for consumers. Although a capacity mechanism should reduce wholesale prices, it is unlikely this will offset the cost of capacity payments. In its November 2012 Impact Assessment, DECC estimated the capacity market's net present value would be a cost to society of £1.7 billion between 2024 and 2030.[180] It calculated this would be equivalent to an extra £14 on the average annual domestic electricity bill.[181] Less than two months later in an updated EMR Impact Assessment, DECC estimated the costs would be significantly lower, coming in at £0.6 billion, due to some revised modelling assumptions.[182] Despite this fall in projected costs, the government estimated that the mechanism would add £16 to the average annual consumer bill in years when it is running.[183]

The government says the mechanism could even reduce bills, depending on how much it reduces wholesale prices and financing costs for investors. This underlines the uncertainty inherent in modelling the costs for consumers. Estimates rely on the government contracting for an appropriate amount of capacity. Yet predicting future demand is notoriously difficult, and governments and the System Operator do not have a good track record on this front. This uncertainty in how much the capacity mechanism will add to bills is central to our concerns around its introduction.

Box 17 What is market coupling?

To promote competitive energy prices, Europe is committed to the creation of an integrated electricity market by harmonising network rules and trading arrangements across all Member States. The model adopted to support market integration is referred to as the "target model" and is to be in place by 2014. The model requires that interconnection capacity be traded at the day-ahead and intra-day stages via a process referred to as "market coupling". This requires liquid power exchanges within individual Member States or price zones, which are then coupled to produce a common generation "stack" in ascending offer price order. The process allocates available interconnector capacity and schedules generation simultaneously to meet total demand, minimising electricity price differentials across the coupled markets. To be effective, the integration of Europe's electricity markets through market coupling will require the availability of adequate levels of interconnector capacity – far more capacity than currently exists.

98% of the electricity supplied in the UK is also generated here

Box 18 The role of interconnection

Slightly over 98% of the electricity supplied in the UK is also generated here.[184] UK interconnector capacity with other electricity markets is relatively low compared to many other European countries, at around 3.8GW.[185] An increase in interconnection should help reduce the overall costs of cutting carbon emissions from the power sector because it allows areas with the most efficient renewable resources to be effectively exploited. Increased interconnection with the rest of Europe should also allow more surplus renewable electricity to be exported, reducing how often renewable electricity needs to be curtailed and therefore the amount paid to generators for having their output constrained.

A further benefit of more interconnector capacity is that it allows more electricity to be imported when electricity generation is scarce. However, it does not guarantee the availability of capacity and there are concerns about the reliability of these imports when they are needed – for example, if electricity scarcity in GB is due to anti-cyclonic, low-wind conditions, which extend across Northern Europe.[186] Such weather events are relatively infrequent, and interconnection on a continental scale should increase overall reliability by exploiting very different renewable technologies such as wind, solar, geothermal and hydro. By allowing energy balancing over a much wider area, greater interconnection across Europe should also reduce the amount of reserve generation capacity needed by individual Member States to manage the impacts of variable output from renewables.[187] The impact on wholesale prices of increased interconnection will vary throughout the year. When UK renewable output is low, importing electricity from elsewhere in Europe will reduce wholesale prices in the UK for consumers. In contrast, when surplus renewable output is exported via increased interconnection capacity, wholesale prices will be higher in the UK than if those exports had not taken place. However, the wider savings described above should more than offset the increased costs from times when wholesale prices increase through exports.[188]

The capacity mechanism will bring new financial risks for consumers and the potential for increased costs

From a cost perspective, there is a problematic link between the capacity market and CfDs. As the capacity market is likely to depress wholesale prices, it reduces the attractiveness of the two-way CfD to consumers. This is because it will be less likely that strike prices will be above market reference prices in the future, and therefore less likely difference payments ever go from generators to consumers. Unlike CfDs, the cost of the capacity market does not fall under the government's cost control mechanism, the LCF cap (see box 13).

The capacity mechanism could also risk reducing the opportunities for consumers to benefit from 'time of use' tariffs in the future. This is because the capacity mechanism is likely to reduce peak electricity prices and therefore the price incentive for domestic consumers to shift their consumption away from times of peak demand and benefit from new smart tariffs. This is important as households are paying £11.6 billion for the rollout of smart meters, and a significant proportion of the expected savings for households from this rollout were predicated on some moving to smart tariffs and changing their consumption patterns. The government has proposed that capacity costs will be levied on suppliers according to their share of demand at peak times, so this may encourage suppliers to develop smart tariffs to reflect this.

The GB electricity market is not isolated and it is expected to become more integrated with other European power markets through the process known as 'market coupling', and an increase in the amount of interconnection (potentially rising to around 10 GW by 2020, see boxes 17 and 18). The introduction of a market-wide capacity mechanism does not seem compatible with this market integration. In fact, the European Commission is opposed to unilateral action by national member states.[189] The risk is that GB consumers could end up paying a capacity payment, which is then expected to reduce the wholesale price in GB. These lower wholesale market prices could mean electricity flows out of GB to other European countries, which would benefit generators here but not GB consumers paying for that capacity. It is not clear how the government could stop this from happening.

Which? recognises that margins will become tighter over the next decade as power stations are expected to close. Likewise as more variable renewable generation comes on the system, returns for fossil fuel generators will be less certain as they will run less often. A number of other European countries, such as France, are looking to introduce a capacity mechanism to address these issues. But for consumers there are clearly serious financial risks and cost uncertainties associated with introducing a capacity market and there are likely to be teething problems. The government will assess whether the capacity market is still needed every five years.[190] But once it is introduced it will be very difficult to go back to an 'energy only' market in GB, not least as it looks like long contracts for capacity (of 10 years or even longer) will be in place for new plants. Yet the market and the need for a capacity mechanism could change significantly over the next few decades. For example, as the government acknowledges, reforms to imbalance arrangements (known as cash out) could send sharper price signals to generators and better reflect the value of preventing power cuts for consumers.[191] Reforms to imbalance arrangements are in train and Ofgem is expected to make its final decisions in early 2014, with changes coming in from 2015.[192] There are also other important uncertainties that will affect how much the capacity mechanism is needed. These include how much consumers shift their demand in response to smart tariffs, how many households move to electric forms of heating and how much electricity will flow over interconnectors at times of peak demand here in GB.

The inclusion of demand reduction in the capacity mechanism could mean domestic consumers end up cross-subsidising efficiency measures in businesses, while having little or no direct benefit

Following its consultation on Electricity Demand Reduction, in May 2013 the government announced it was proposing to amend the Energy Bill so that a financial incentive for permanent electricity demand reduction can be incorporated into the capacity mechanism.[193] How this would operate in practice is still to be worked through, and the government says it is considering a pilot to understand more about the benefits, potential and challenges, which will be funded through taxation.

In the consultation document, the government suggested that a market wide financial incentive was likely to have most impact for promoting efficiency in industrial processes and non-domestic buildings.[194] It also stated that there was a strong argument for excluding homes from any scheme because of the 'extensive support available through the Green Deal and the Energy Company Obligation'. It is peculiar to describe the Green Deal as 'support' given that it is a market based product, akin to a loan, for households.

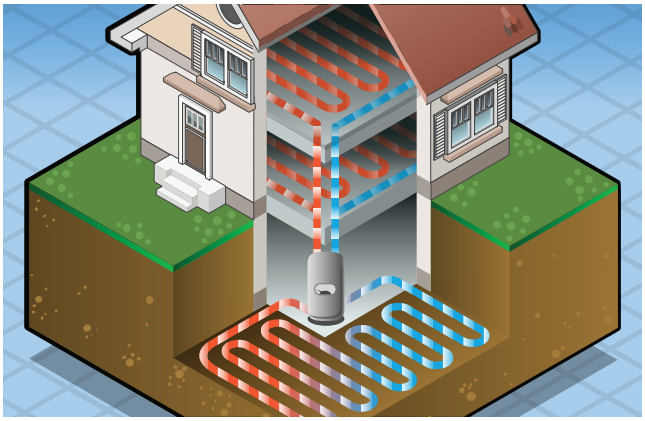
From the information currently available, Which? questions how much domestic consumers could directly benefit from the inclusion of demand reduction in the capacity mechanism, particularly compared to how much they could pay in subsidy. Which? recognises reduced electricity demand should mean less new subsidised low-carbon capacity needs to be built, particularly if this is a reduction in demand at peak times. If this displaces some investment in lowcarbon generation, it should be useful for keeping CfD subsidy costs down for all consumers. But if the majority of those who benefit are industrial or commercial consumers, it will be these customers' whose bills will fall most. This would mean action, for example to improve process efficiency in industry, is subsidised by households. Yet business consumers do not cross subsidise any energy efficiency for households. The new Energy Company Obligation to help fund some thermal energy efficiency for fuel poor households and some homes that are hard to treat is funded solely through household bills. This would clearly not be a fair pass-through of policy costs across different consumer groups.

4.2 New policies to encourage low-carbon heat in homes

4.2.1 The Domestic RHI

Which? recognises that to meet carbon reduction targets households will need to change the way they heat their homes. Many will need to move away from gas heating to low-carbon forms of heat, principally heat pumps, biomass boilers and heat networks. This will be a major challenge as consumers are largely satisfied with their existing gas heating and low carbon forms of heat have higher upfront costs.

Figure 10: Diagram showing house heated by Ground Source Heat Pump



The RHI is finally to be open to households in spring 2014, but the proposed structure will not remove the most significant barrier to renewable heat for homes – the higher upfront costs

In 2011 the government introduced the RHI for businesses to encourage companies to take up renewable forms of heating. This involves financial support through tariff payments for 20 years for those taking up a range of accredited renewable heating technologies, including biomass, solar thermal, heat pumps and bio methane.[195]

Households should also be able to benefit from this subsidy, to help make renewable heat more affordable for those for whom these technologies are appropriate, so Which? supports the government's plans to extend the RHI to homes. The domestic phase of the scheme, originally expected in autumn 2012, has been delayed. It looks like households will finally be able to access the RHI in spring 2014. Following a consultation in winter 2012, the government is deciding on what form the domestic RHI will take and is expected to make a decision in summer 2013. The consultation proposed tariffs for seven years for heat pumps, biomass boilers and solar thermal technology to help households with the higher upfront and running costs.[196] But the proposed structure does not remove what both government and wider research identifies is the most significant barrier to the take-up of renewable heat for homes – the higher upfront cost of purchasing the heating system in the first place.

Which? agrees with the proposal to design the RHI to target homes off the gas grid

The government's consultation proposed that, while the RHI should be open to all, the scheme should be designed to target off-gas-grid homes in its initial phase. This is sensible as these households currently use oil or solid heating fuels, or have electric heating, and generally pay more for their heating than those on mains gas. For reasons of equity, we also agree that the scheme should be open to homes on the gas grid who wish to be early adopters.

But there is a clear risk consumers could be mis-sold the RHI and renewable heating technologies

There is a real danger some consumers could be mis-sold the RHI and the associated renewable heat technologies. Most consumers are unfamiliar with renewable forms of heating.[197] This, coupled with the fact that the suitability of different forms of renewable heat varies significantly between homes,[198] leaves consumers particularly dependent on the quality of advice given by assessors. Public funding for independent advice for consumers was cut in 2012. Which? mystery shopping investigations into solar thermal in 2010 and solar PV in 2011 revealed failings with the quality of advice given.[199] In its field trials, the Energy Saving Trust also identified poor advice and poorly designed heating systems as reasons for the poor performance in some installations.

The government is proposing a level of RHI subsidy that is calculated to compensate consumers for the increase in costs of a renewable heating system compared to the 'currently used conventional heating technology for the "median off-grid home"'.[200] This complex calculation could make it difficult to clearly explain to consumers what the subsidy is expected to cover and risks leaving consumers vulnerable to being oversold the subsidy when making a decision over which system to buy.

The proposed link with the Green Deal risks pushing consumers into a Green Deal assessment or into taking up the Green Deal

The proposed precondition that households take up basic energy efficiency measures to be eligible for the RHI is sensible, given how important thermal efficiency is for a renewable heating system (particularly heat pumps) to function well, and therefore cost effectively. It is reasonable to require as a minimum (easy to treat) loft and cavity wall insulation,[201] and draught-proofing lagging. But solid wall insulation should not be an eligibility requirement for the RHI, given that the cost and disruption can be significant and planning permission is not always permitted. However, the implications of not having solid wall insulation for the efficiency of a renewable heating system – and therefore the increased cost to run it – must be made clear to the consumer.

Even though Green Deal finance is technically not required, many households could be pushed into the Green Deal, particularly as most Green Deal assessors are likely to be commercially tied to Green Deal providers. It is inappropriate to

link the RHI with a market-based product that is expected to charge interest rates in the range of 6 - 9%.[202] Finally, it is unlikely that all, or even most, Green Deal assessors would have sufficient knowledge of different heating systems to provide the advice consumers need to make effective choices.

Field trials in the UK have revealed many heat pumps perform worse than expected

A poorly performing system is often very difficult for consumers to spot and take steps to remedy. In field trials in the UK heat pumps have tended to perform less effectively than expected and worse than in some other European countries.[203] The EST field trials found a wide variation in performance, with only 13% of sites achieving system efficiencies in excess of 3.0, the level considered well-performing, and well below the current 3.5-3.8 standards required in Germany. With poor performance a consumer could end up spending £6,000 to £17,000 for a heat pump,[204] but find that their energy bills are higher than before.[205]

Since the EST field trials, installer standards through the Microgeneration Certification Scheme (MCS) have been revised and these came into effect in September 2011. But interim results from Renewable Heat Premium Payment (RHPP) installations indicate only a 'measurable but modest' improvement in performance compared with 2010 heat pump trials.[206] RHPP results are likely still to be some way off German performance.[207]

The complaints process for renewable heat technologies is not consumer-friendly

Ensuring all energy consumers are protected is the fourth of our key principles, and redress is an important part of this. But the complaints process that is currently in place for consumers with renewable heat technologies is difficult to use. There are two separate complaints systems depending upon the type of issue – one run by the MCS CBs (Microgeneration Certification Scheme Certification Bodies) and another by REAL (Renewable Energy Assurance Limited). Technical complaints should be taken to the MCS, and non-technical (i.e. contractual) issues to REAL. It is often unclear to consumers which route to take, or whether their complaint may fall under both. REAL has argued that this system is too complex and that a streamlined approach is needed.[208]

In field trials in the UK, heat pumps have tended to perform less effectively than expected and worse than in some other European countries

There is no real backstop to provide redress under the current process

REAL subsidises an independent arbitration service (provided by IDRS Ltd) which consumers can use should they still be unsatisfied after completing the complaints process. However, as REAL has itself highlighted, this alone will not be enough to support an effective redress system for all RHI-related complaints, particularly if there is an increasing number of more complicated issues.[209]

If a consumer is unsatisfied with how their installer has dealt with their complaint, they can find out who the relevant MCS CB is and escalate their concern. The MCS CB will review the evidence, may order an inspection and will produce a report. If they decide that there is a valid complaint, they will issue a rectification notice to the installer, non-compliance with which could lead to the installer losing their MCS accreditation.[210] But there is no provision for an independent review service or independent arbitration.

Consumer complaints about renewable heat technologies need consistent treatment

In comparison, consumers who take out the Green Deal have access to the Green Deal Ombudsman and Investigation Service.[211] This helps to make the process more straightforward for consumers, as it is logical for the Green Deal to sit with the energy ombudsman. The fact that Ombudsman Services operate a 'no wrong door' policy is also important so that customers' complaints are passed on to the correct service.[212]

The current scheme also creates a discrepancy between the redress available through the REAL complaints procedure, where consumers have access to an independent arbitration service, and the process when going through the MCS CBs where there is no such independent review service. This results in different levels of protection depending on the category of complaint. This is not fair or transparent for consumers and will not encourage confidence in installing renewables in the home.

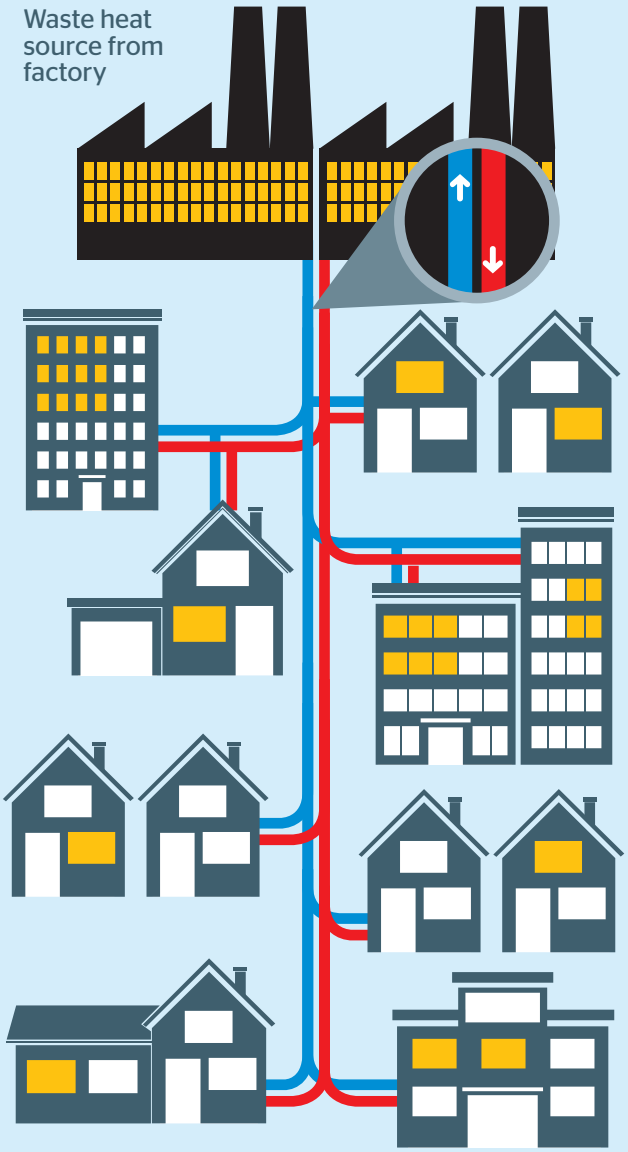
4.2.2 District Heating

To meet carbon reduction targets the number of households on district heating is expected to increase significantly, but this transition will be a challenge

District heating meets just 2% of current UK heat demand, with around 210,000 homes on heat networks.[213] Homes or other buildings with district heating[214] get their heating from a central source, such as a natural gas or biomass boiler, with the heat then being transferred through a network of hot water pipes. District heating is a proven technology, and is already widely used to heat homes in many other countries, including Germany, Sweden and Denmark.

In its 2011 *Carbon Plan* and more recently in the 2013 *The Future of Heating* policy paper,[215] the government has made clear its intention that far more homes should be on heat networks in densely populated urban areas. This is because heat networks are compatible with technologies that help

Figure 11: Illustration of a heat network



reduce carbon emissions, such as combined heat and power (CHP) using a range of fuels (natural gas, biomass, biogas, waste), biomass boilers, heat pumps, fuel cells, and captured waste heat from industrial facilities.[216] The use of district heating with CHP and heat storage also provides opportunities to improve energy demand management. It provides the flexibility to operate alongside more intermittent low-carbon generation such as wind and solar and allows better management of peak electricity capacity requirements (see box 10 the challenge of meeting seasonality in heat demand).

The government has stopped short of setting a specific target for the number of homes that should be on district heating but is developing modelling on heat network potential. The initial results from this suggest that heat networks could serve up to 20% of household heat demand in the UK by 2030, representing a significant increase.[217] But high upfront costs, revenue uncertainty and the challenge of getting households to sign up can deter investment in potential schemes.

DECC has recently published some research on the barriers to heat networks and also commissioned a survey with consumers to understand consumer attitudes towards more efficient heating systems and their willingness to take these up.[218] Of those surveyed, 31% had heard of heat networks and 34% were positive towards them. [219]

Consumers on district heating are unable to switch supplier, and have less protection than those who heat their homes with mains gas and electricity

It is almost impossible for consumers to change the way that their heating is supplied once they are connected to a heat network. Other than moving house, alternative options for heating would be costly, for example the use of electric heaters. It is also possible that in the original contract signed by the tenant or home owner they committed to pay a standing charge throughout their tenancy or ownership of the property. This inability to switch supplier means that consumers have less control and less power than households on mains gas and electric heating to incentivise good standards and price transparency from their supplier. There is also a danger of abuse of market position by companies who have a guaranteed customer base and therefore lack incentives to pass on cost savings to consumers.

Despite this inability to switch supplier, there are no specific consumer protection rules for customers on heat networks beyond general consumer law. This means they have fewer protections than those with gas and electric heating, the provision of which is regulated.

The energy regulator currently has no remit in relation to heat networks

Ofgem, the energy regulator, currently has no duties to look into the regulation of heat, and new legislation would be required for them to do so. Around the time of the *Heat and Energy Saving Strategy* consultation in 2009, Ofgem did begin to look into the options for the regulation of district heating.[220] But DECC now favours a voluntary approach and it does not appear that it intends to legislate for Ofgem to have a role in this area. The recent heat policy paper does recognise that consumer groups have been concerned about the lack of protection for domestic customers, and that potential investors also see this as a barrier. But DECC's policy solution is to leave it to the industry to establish a voluntary customer code of conduct. DECC believes that regulation is 'unnecessary' and would stunt growth in the sector.[221]

Consumers with district heating currently do not have recourse to the Energy Ombudsman

Consumers on mains gas and electricity have access to the Energy Ombudsman for any complaints over their gas and electricity supply. The major energy companies are required to be members of the Energy Ombudsman.[222] But for district heating there is no such requirement for redress. Some consumers with district heating can seek redress through specific ombudsman schemes, but the Energy Ombudsman does not cover heat networks even if the scheme is owned by a company that is a member of the Energy Ombudsman for its other services. At present, access to an ombudsman scheme depends on who owns the network. For example, the Pimlico District Heating Undertaking, which serves 3,356 homes, is run by Westminster City Council and CityWest Homes. After going through the complaints process of CityWest Homes, customers would then have the Housing Ombudsman Service available to them, which could carry out an independent review. But for a consumer on a heat network owned by a private company, the process would depend solely on what procedures that particular company had in place, which may not include access to independent adjudication.

There is no standard practice for pricing heat on heat networks

Some consumers on heat networks get a cost competitive heat supply, but this clearly depends on the particular scheme. There is no single standard for pricing heat from heat networks in the UK. DECC's research with property developers suggested this is a problem for many consumers leading to a lack of trust as well as confusion.[223] Yet the government has gone no further than stating the issue, giving industry discretion over pricing, which is unchecked by competition. Prices appear to vary considerably in other countries, such as Germany, where district heating is more common.[224]

Energy price rises are a major concern and consumers need to be given adequate notice. Which? is aware of a few cases where there has been poor communication of price increases, even where the heat supply agreement states that notification will be given, and it is not clear how widespread a problem this is. This highlights the gap that is left in the absence of consumer protection and regulation, particularly when consumers on such schemes have little choice but to pay their bills and remain with the same supplier.

With no consumer complaints data or research with homes on district heating, it is unclear what problems households are currently experiencing

There appears to be no publicly available research with homes on existing schemes, despite its potential value for identifying the problems currently faced by these households. There is also a lack of consumer complaints data for those on district heating. Again, this is in contrast to households with electric and gas heating: changes in October 2012 to the requirements around complaints reporting for these households mean that the major suppliers must now report their complaints data quarterly under standardised categories.[225]

The voluntary consumer protection scheme being developed is a useful transitional arrangement, but it is unlikely to provide protection for all consumers and will lack the teeth of enforceable regulation

The CHPA (Combined Heat and Power Association), together with industry and other stakeholders, is establishing a voluntary code of conduct through the Independent Heat Customer Protection Scheme (see box 19). The governance and crucial issues such as monitoring to ensure heat suppliers' on-going compliance and enforcement are still being worked through.

This customer Charter should be a step in the right direction, which should encourage a good level of practice and consumer protection for those heat networks it covers. Importantly, it should help establish independent adjudication for households that fall under its scope. The scheme in turn should also help identify the problems that consumers with district heating currently experience.

However, it is not known how many heat suppliers will be willing and able to join the Charter, so potentially many households will remain unprotected. In particular, consumers on heat networks whose heat supplier does not sign up may remain without recourse to independent adjudication.

Many district heating customers on older schemes currently

Box 19 The Independent Heat Customer Protection Scheme

The CHPA is working with its members, DECC, energy companies and consumer groups to establish a voluntary customer protection scheme for consumers on district heating. This protection scheme will set standards on what needs to be included in heat supply agreements, for example around complaints handling, billing procedures and transparency, the division of responsibilities between the supplier and the customer and the obligations of each party, payment and disconnection, breakdown and maintenance. These draw on some existing licence conditions for gas and electricity suppliers and the terms will be set out in a customer Charter, which will be backed up by independent adjudication.

The Charter is expected to be funded through annual membership fees from the heat suppliers that join up, with fees potentially set according to how many customers each supplier has on heat networks that fall under the Charter. The Charter is likely to come into force in April 2014, depending on funding. DECC has yet to confirm whether membership of the Independent Heat Customer Protection Scheme will be an eligibility criteria for the £9 million worth of government funding for new heat networks.[226]

are not individually heat metered. Instead, their costs are estimated and typically added to rent or service charges. Those heat networks without heat meters will not be able to join the new Charter, but the CHPA is exploring whether it will be feasible to develop a tailored version to cover these households. There are challenges with establishing an effective scheme for households that do not have individual heat meters, but these consumers would still benefit from enforceable rules around many of the principles such as price transparency, the complaints process, compensation, and breakdown and maintenance. It is important they are not left behind as new protections are introduced.

Even for those households that are covered by the Charter, at this stage it is unclear what effective sanctions could be introduced to underpin the scheme, given that it is voluntary. Previous voluntary or self-regulatory codes of practice have often failed to deliver for energy consumers. For example, Energy UK – the trade association for energy suppliers and generators – runs the code of practice for billing gas and electricity customers. While the companies all have had successful audits for their billing practices, consumers still find their bills difficult to understand. Until regulations were brought in, bills failed to provide essential information, such as the name of the tariff. Doorstep selling similarly fell under the jurisdiction of a voluntary code of practice. Despite the code, nearly 50% of consumers who bought on the doorstep were mis-sold tariffs.

Ultimately a voluntary self-regulatory approach leaves consumers with less protection if they move from mains gas or electric heating onto district heating. The new Charter should be seen as a useful transitional arrangement, as the introduction of consumer protection regulation is explored, rather than a long-term solution.

Conclusions

The challenge of drastically cutting CO_2 emissions from energy has major implications for domestic energy consumers' wallets, how they heat their homes and the protections they enjoy

The UK faces the massive challenge of renewing its ageing power stations, and at the same time slashing the CO_2 emitted through generating electricity. To meet these challenges, the government estimates around £75 billion worth of investment will be needed in new low-carbon electricity generation by 2020 alone. Subsidies are needed to encourage the private sector to make these huge investments.

But these subsidies will mean higher costs for consumers, at least over the next decade or so, as they are paid through electricity bills. In fact, DECC data suggests they will add around £118 to the average annual domestic electricity bill by 2020, up from around £53 today, and this is assuming average household electricity consumption falls significantly by 2020. These subsidy costs will be much higher for consumers with electric heating, as they use significantly more electricity. Our analysis based on DECC data suggests the average cost of policies for these electrically heated households will be a substantial £317 a year by 2020. Already around 28% of these households are fuel-poor, and clearly there is a risk that these costs could push significantly more electrically heated households into fuel poverty. It is impossible to say definitively how much policy costs will increase the average household bill in the future, and this becomes even more difficult after 2020. This is because there are so many uncertainties. For example, questions remain around the future carbon price, what average household electricity consumption will be, at what level the various subsidies will be set and therefore the attractiveness of these to low-carbon investors. This of course influences how much investment is made under the various schemes and therefore how much subsidy is paid out.

To achieve carbon reduction targets, many households will also have to move from gas for their heating to low-carbon alternatives, principally heat pumps and heat networks. Yet gas heating is popular among households and these low-carbon forms of heat have higher upfront investment costs. There are also new risks for consumers. Households are generally unfamiliar with renewable heat, so there is a greater risk of being mis-sold these technologies. Heat pump field trials have revealed that the performance of heat pumps in homes is mixed, with some performing significantly worse than expected. Meanwhile, moving to a heat network will mean households lose their ability to switch supplier and they will not have the same level of consumer protection as those with gas or electric heating.

So the carbon reduction challenge has major implications for energy consumers, in terms of their wallets, how their homes are heated and what protections they enjoy.

Five key principles should underpin policies to promote low-carbon energy

To ensure consumers' interests are protected during this challenging transition, five principles should underpin policies to promote low-carbon energy. These principles also stand as tests for what constitutes good policy:

1 Policies should deliver low-carbon energy at an acceptable cost to the consumer

2 Policy costs and subsidy levels should be clear and transparent

3 There should be a fair pass-through of subsidy costs to consumers, with targeted help for the most vulnerable households as policy costs increase and no risk of suppliers profiting from their role

4 As households move to low-carbon heat, all should remain protected and have heating that is suitable for their home

5 Consumer buy-in for policies is important and government should promote this with clear and consistent messaging

Existing policies to promote low-carbon electricity have performed poorly against the five key tests

There is no perfect subsidy scheme for promoting low-carbon electricity. But the government could have done more to ensure existing policies delivered against these five key tests. The RO and FIT have both been unnecessarily expensive. For example, the RO buyout fund has increased costs for consumers and made the scheme needlessly complicated. The government has also not used the RO to gather as much data as it could from generators to help it set future subsidy levels at the best prices for consumers.

FIT subsidy levels were initially too high and did not come down quickly enough to reflect falls in panel costs and higher than expected uptake, so consumers have a legacy of higher than expected costs to pay. Support within the scheme has not been sufficiently focused on the most cost-effective forms of low-carbon electricity, with most of the FIT subsidy going to solar PV.

There has also been little transparency over how RO and FIT costs are recovered from consumers, with it left to suppliers' discretion how they pass these through to consumers. So it is not clear whether costs are being paid for fairly by different groups of consumers.

A failure by government to focus on these principles looks set to continue as it develops new policies to promote low carbon electricity and heat

The government continues to place insufficient focus on the five key principles as it develops new policies under EMR and to promote low-carbon heat.

Principle 1: policies should deliver low carbon energy at an acceptable cost to the consumer

The government has repeatedly said affordability is one of the key objectives driving its electricity policy. In fact, affordability is a driver of reforms to replace the RO with CfDs. In theory, CfDs should be a cheaper way of providing subsidy to encourage investment in low-carbon electricity. But it is clear that the government could do more to help ensure costs are kept down. Once CfDs have been signed, there will be little, if anything, the government can do if it has set subsidy levels too high. It is crucial the government does all it can now to ensure strike prices are set at appropriate levels, yet the remit of the government's small new panel of technical experts for CfDs does not extend to advising on strike prices.

The current plans for how suppliers will recover the CfD levy also risk increasing costs for consumers, both directly and indirectly through their potential to undermine retail competition. The government is proposing that each supplier will forecast for itself how much its variable CfD payment will be each month, in turn translating this into an increase or decrease in tariff prices to cover the cost. This complex calculation will be a challenge for all suppliers, and particularly independent or new suppliers because they only have small trading teams. This risks undermining the limited competition that exists in the retail market. This system is also likely to lead to an over-recovery of levy costs from consumers, i.e. putting up bills more than necessary, as suppliers are likely to recover costs at the top end of their forecasts so they are sure they have enough to meet their payments to the central counterparty.

Despite the government's claims to have affordability at the heart of its electricity policy, a lack of focus on achieving this goes beyond CfDs. In April 2013 the government introduced a new tax on electricity – CPS. Even though it is unlikely to lead to new investment in low-carbon electricity, the CPS will push up electricity prices for households. The impact on the average household's electricity bill in the year 2015/16 will be an increase of at least £29, and could be as much as £68. Meanwhile, existing low-carbon generators will benefit from a significant windfall from the resulting increase in electricity prices. This new tax will also bring in around £600 million of new revenue this year for the government, rising to £1.2 billion annually by the third year of the tax. The government has introduced rebates to help electricity intensive businesses manage these increased costs, but there is no equivalent help for vulnerable households.

As part of EMR the government will also introduce a capacity mechanism, which it argues will provide an insurance policy against future blackouts. From the consumer perspective, it is an insurance policy that comes with a potentially expensive premium. There is significant uncertainty around how much the new capacity market will add to bills and the government's proposals risk locking consumers into long-term payments for 10 years or potentially longer, even if the mechanism is removed. There are also a number of other financial risks. For example, the capacity market's introduction will mean the two-way CfD subsidy is less likely to pay back to consumers, as wholesale prices should be depressed because of the capacity payments going to generators.

It is also not clear that the government is thinking sufficiently about the collective challenge and cost of decarbonising electricity and heat for consumers. A clear strategy and set of targets for heat is important, as the government needs to plan policies for promoting low carbon electricity and heat in tandem. After all, any increase in the amount of electricity needed for heating, for example to power heat pumps, increases peak electricity demand. This in turn affects the amount of electricity capacity (and network reinforcement) that needs to be built, and therefore the cost to electricity consumers. But even following publication of the government's heat strategy in 2012, and its recent heat policy paper in 2013, the government is still only in the initial phases of developing policies and clear targets for heat. The government hopes many households will move away from gas to electric heating. Yet these consumers will actually increase their subsidy costs as their electricity use will increase and all subsidies are paid for through electricity bills.

Principle 2: policy costs and subsidy levels should be clear and transparent

Low carbon generators receive subsidies because governments have decided to promote these forms of energy to meet carbon reduction and renewable energy targets. These subsidies effectively amount to public spending so the overall cost of each policy (and how those costs are recovered from consumers) should be subject to the same levels of oversight and scrutiny as spending which comes directly from taxation.

The government could do much more to ensure there is transparency in how subsidy levels are set. The process for

agreeing strike prices for those CfDs that are negotiated lacks transparency. There is no effective scrutiny of this process. Subsidy levels and other key contract terms will only be announced by the government when the deal is done with generators, and it is still not clear what will be covered under key contract terms.

The government has also said suppliers will be left to determine how they pass through the CfD levy costs to their consumers. There are no plans for companies to have to report how they translate their CfD levy costs into price rises for consumers. So, as with the RO and FIT, there will be little transparency about how much consumers are charged or how suppliers recover the cost of subsidy policies from different groups of consumers. This is despite an overwhelming majority of consumers – 81% – believing that energy suppliers should clearly report how they pass through the cost of subsidies to their customers.

Principle 3: there should be a fair pass-through of subsidy costs to consumers, with targeted help for the most vulnerable households as costs increase and no risk of suppliers profiting from their role

The government could do far more to ensure there is fairness in how CfD costs are passed through to consumers. There are no plans by government to oblige suppliers to pass on levy costs in line with consumers' electricity consumption. Likewise, under current proposals, suppliers will not be obliged to give monies raised from generators when market reference prices are higher than CfD strike prices to their customers. This is despite the government repeatedly arguing that the two-way nature of CfD support is one of the key advantages of the scheme for consumers. The government argues that competitive pressure in the retail market will ensure consumers are given the monies they are owed. Yet it is well-recognised that competitive pressure from consumers is insufficient to keep prices in check, as our recent report *The Imbalance of Power The Retail Market* demonstrated. Suppliers should not be able to profit from their role in passing through policy costs to consumers.

The government is also proposing that domestic consumers (along with other business consumers), pay for the cost of exempting electricity intensive businesses from a significant proportion of their share of CfD subsidy costs. This will of course push up CfD subsidy costs for households, including the fuel poor. Likewise, as noted above, although electricity intensive businesses are being given rebates to help with the cost of the CPS, similar help has not been given to vulnerable households.

It is not clear that the government is thinking sufficiently about the collective cost of decarbonising electricity and heat for consumers

Principle 4: as households move to low-carbon heat, all should remain protected and have heating that is suitable for their home

The focus should not just be on getting households to move to low-carbon forms of heating, whether renewable heat or onto a heat network. It must also be to ensure they have heating that is appropriate for their home, and that they remain protected when they have moved. But there is a real risk that many could be mis-sold the RHI and the associated renewable heating technologies. This is because most consumers are unfamiliar with renewable heat and the suitability of these technologies varies between homes. The calculation underpinning the proposed RHI subsidy is also incredibly complex, increasing both the risk of mis-selling and consumer confusion around how much support is worth. The complaints process for renewable heating technologies is also confusing for consumers.

Despite the government's ambition to have many more homes on district heating to reduce carbon emissions, it is not taking responsibility for the lack of any specific consumer protections in this area. This will mean that households moving onto a heat network have fewer protections than when they had gas or electric heating, even though they will no longer have the ability to switch to a new supplier if they are unhappy with their service or want to reduce costs.

There is a lack of complaints data for consumers on existing schemes. Likewise, there is a notable absence of research to understand the satisfaction levels among households on heat networks and any problems that they face with their heating. So it is not even clear what the key problems currently are. The voluntary customer protection scheme being developed is a useful transitional arrangement, which should help establish and promote good practice for those schemes that sign up to it. But it is unlikely to provide protection for all district heating customers. Given the Charter will be voluntary and is likely to have limited funds, there will also be significant challenges establishing adequate monitoring of compliance and robust sanctions.

Principle 5: consumer buy-in for policies is important and government should promote this with clear and consistent messaging and information

Given consumers are paying for the subsidies to promote low-carbon energy, and many will also need to change how they heat their homes if carbon reduction targets are to be met, consumer acceptance and buy-in is clearly very important. In fact, when it comes to changing how homes are heated, without consumer buy-in, failure looks inevitable. Consumer confidence that they will not be mis-sold renewable forms of heating and that they will be effectively protected on heat networks, will clearly be important for consumer acceptance of lower carbon forms of heat.

Headline messaging from the government around the impact of policies on household bills conflates the cost of policies to promote low-carbon energy with potential savings from energy efficiency. This is disingenuous and misleading. Energy efficiency policies would cut household bills irrespective of any policies to promote low-carbon electricity. Moreover, while everyone feels the costs of subsidies, only those who are able to take up energy efficiency policies can benefit from savings. Such high-level messages around savings are treated with suspicion by many consumers, particularly given wider media coverage, which often exaggerates the policy costs of subsidising renewable energy. If consumers are confused or distrustful of why policies have been pursued, or doubt that costs are reasonable or fairly distributed, there is a real risk that there will be a consumer backlash as costs rise. A majority of consumers currently do feel confused by the messages they hear about moving to low-carbon energy. They also doubt the government's ability to keep the cost of its low-carbon energy policies under control, with only 18% currently feeling confident the government is able to do this effectively.[227] The government must do more to ensure it communicates clearly and honestly with consumers.

More widely, consumers' trust of energy companies and the energy sector will be the lens through which many view increasing policy costs over the next decade. Currently there is a widespread lack of trust among consumers, with only 22% saying they trust energy companies to act in their best interests.[228] Wider reforms to the retail markets, beginning with tariff simplification, along with reforms to the wholesale energy markets to increase transparency and promote competition, are needed to convince consumers that the market is working in their interests. If wider reforms are not introduced, there is a very real threat that consumers will react against these significant additional policy costs.

Recommendations

This report has put forward five principles that should underpin all policies to promote low carbon electricity and heat in order to ensure that there is proper scrutiny, consumers' interests are protected and real value is delivered

Subsidies should deliver investment a) at an acceptable cost to consumers, b) transparently, and c) with costs passed through to households fairly. Consumer protections should be in place, so no household moving to low carbon forms of heat has fewer protections than they had on mains gas or with electric heating. The government should work hard to ensure consumers understand why carbon emissions from energy need to be cut, and the impact of this on bills and how homes are heated.

Existing government policies have failed against these tests in key respects and the policies currently being developed also risk falling short, to the detriment of consumers. The recommendations below will together help ensure these principles are met.

Recommendation 1

the cost of policies to promote low-carbon electricity should be subject to the same levels of scrutiny as spending that comes directly from taxation

New mechanisms are needed to ensure subsidies to promote low-carbon electricity are subject to the same levels of oversight and scrutiny as spending from taxation

Government policies to subsidise low-carbon energy that are paid for through energy bills effectively amount to government spending, so they should be subject to the same levels of oversight and scrutiny as spending that comes directly from

taxation. New mechanisms should be developed to ensure this is the case. The National Audit Office should be tasked with reviewing all energy policy costs on an annual basis.

There should be a simple graphic on consumers' annual energy statements, showing the cost of each policy

To promote transparency and accountability, energy companies should be required to provide a simple graphic, such as a pie chart, on annual energy statements, showing the cost of each policy. This policy cost information should be tailored to household consumption.

Recommendation 2

the government must ensure the processes for setting strike prices and allocating CfDs deliver value for money and transparency for consumers

A new Panel of Experts is needed to help ensure CfD strike prices are set appropriately

The government's small Panel of Technical Experts has only a narrow remit. To ensure that CfD support levels are appropriate, the government should establish a new panel of experts, which should advise government on the appropriateness of all strike prices. This input should extend to all negotiated contracts, including those agreed under the FID enabling process. Its membership should include the regulator, given it is the regulator's duty to ensure consumers' interests are protected.

The government must provide transparency on the contract terms agreed for all investment instruments and CfDs

To ensure the government is accountable and remains disciplined as it negotiates CfDs, transparency on all the contract terms agreed is essential for investment instruments and CfDs. For example, underwriting of any construction risk by consumers or taxpayers must be made explicit, with an explanation of why this is the case, as soon as the contract is signed. Generators may argue this could breach their commercial confidentiality, but consumers and taxpayers should know what their subsidy covers.

All generators with a CfD should be required to provide information on their construction costs to help make sure the government is in the best possible position to set future strike prices

All generators with a CfD should be required to provide information on their projected and actual construction costs to government. Which? recognises this is likely to meet with opposition from generators on the grounds of commercial confidentiality, but the data could be anonymised once collected. This information would help government develop a more robust evidence base for determining future subsidy levels.

If competition between different low carbon technologies for CfDs is not feasible, the government should acknowledge it now and focus on other ways of making sure strike prices deliver the best value possible for consumers

The government must be more explicit on when and how it will introduce competition between different forms of low-carbon electricity for CfDs. Introducing competition for CfDs would undoubtedly create some significant challenges. If technology-neutral competition for CfDs is not practical the government should acknowledge it now, and focus on other ways of making sure strike prices deliver the best value possible for consumers.

The government must set out how the Levy Control Framework will constrain CfD costs for consumers

The government must set out how the Levy Control Framework (LCF) will effectively constrain CfD costs for consumers. Given subsidy levels will be contingent on volatile wholesale prices and CfD strike prices cannot be renegotiated with generators, it is not clear to us how the LCF offers any protection in practice for consumers, despite the government's claims that it will.

Recommendation 3

the government must ensure that costs recovered from consumers under the CfD supplier obligation are fair and transparent

The central counterparty, not suppliers, should be responsible for calculating the CfD levy

The central counterparty should be responsible for forecasting the levy and then telling suppliers how much they need to collect, in the form of a monthly fixed payment per kilowatt-hour each year. This will make the recovery of costs more manageable for suppliers, particularly small independent suppliers, so should ensure competition in the retail market is not undermined by the introduction of CfDs. Importantly, this would also mean it is not left to the discretion of suppliers whether they give CfD money raised from generators to consumers when strike prices are below market reference prices. Reconciliation would be needed at the end of each year to account for differences between forecast and actual subsidy levels.

Suppliers should be obliged to recover the CfD levy according to consumers' electricity consumption

Suppliers should be obliged to pass on the centrally set CfD levy according to their consumers' electricity consumption. All suppliers should be required to report to the regulator what proportion of each tariff is the CfD levy.

Recommendation 4

domestic consumers should not subsidise the cost of policies to promote low-carbon electricity or electricity efficiency for business consumers

Domestic consumers should not subsidise the cost of decarbonising electricity for energy intensive companies

Which? is not in principle opposed to targeted help with the cost of policies to promote low-carbon power for vulnerable electricity intensive sectors of industry. But, as any exemption from these costs effectively amounts to industrial policy, if the government considers it necessary to provide exemptions, the funding should come from taxation. It should not be paid for by households, including the fuel poor, through energy bills.

If domestic energy consumers are paying for electricity demand reduction through the capacity mechanism, they must be able to benefit directly

A financial incentive for electricity demand reduction through the capacity mechanism should not be paid for by domestic consumers, if few or no households can directly benefit. Business consumers do not pay towards the cost of policies to promote energy efficiency in homes. These costs must also fall within the levy control framework.

Recommendation 5

fuel-poor households with electric heating should receive help to manage the increasing impact of policy on bills

Fuel-poor households with electric heating should receive targeted help to manage the increasing impact on bills of policy

As costs increase, fuel-poor households with electric heating should receive help to manage the rising impact on bills of policy costs. This could take the form of targeted policy to improve the thermal efficiency of their homes or grants if their home does not reach minimum energy efficiency standards. This should come from taxation, like the targeted financial support energy intensive businesses enjoy towards the cost of the Carbon Price Support (CPS).

Recommendation 6

the Carbon Price Support should be scrapped

The Carbon Price Support should be scrapped

Policies that add costs for consumers need to deliver real investments and long-term CO_2 reductions. The CPS is unlikely to achieve either aim. The government should drop this unnecessary and costly policy.

Recommendation 7

the government must minimise the risks for consumers associated with introducing a capacity mechanism

The government should proceed with caution, so maximum contract length should be for three years

The government should proceed with caution as it introduces the capacity mechanism, as this significant intervention in the market is a move into uncharted waters. The maximum length of any contract should be three years. It is not appropriate that generators with new plants can choose the length of their contract, and that this payment stream can be for up to 10 years. This would lock consumers into paying a certain price for that capacity long into the future, even if the decision is taken to go back to an energy-only market.

The cost of the capacity mechanism must be spread fairly across all consumers

The cost of the capacity mechanism must be spread fairly across all consumers. There must be no exemptions, as all consumers should benefit from lower wholesale prices.

Recommendation 8

Reforms to the retail and wholesale market to promote transparency and competition are needed to increase consumer confidence that the energy system is working in their interests and that subsidies for low-carbon generators are justified

To promote consumer acceptance of policy to promote low-carbon energy, wider market reforms are needed to increase consumers' confidence that the energy system is working in their interests

Consumers' increasing distrust of energy companies and the energy sector will be the lens through which many view increasing policy costs. Reforms to the retail and wholesale market to promote transparency and competition are vital if consumers are to be convinced that subsidies for low-carbon generators are justified.

The government should clarify how it will decide whether it will use its new backstop powers to promote liquidity

Reliable wholesale markets are necessary for each reference market against which CfDs are struck. The government should provide clarity on how it will decide if it needs to use its new backstop powers to promote liquidity. This should include the government and Ofgem developing a set of standards for wholesale price indexes to provide confidence that a minimum standard of robustness and representativeness is met.

Recommendation 9

the domestic Renewable Heat Incentive to promote renewable heat should be structured as part grant, to offset higher upfront costs, and part on-going tariff to help with additional running costs

The domestic Renewable Heat Incentive (RHI) to promote renewable heat should be structured as part grant to offset higher upfront costs and part on-going tariff to help with additional running costs

Structuring the tariff in this way helps remove the most significant barrier to the take-up of renewable heat, the higher upfront cost of purchasing the heating system.[229] This should make renewable heat more accessible for households without capital. Likewise, it should also be more appropriate for the private rented sector and it could be structured so that a landlord receives the support towards the upfront cost, while the tenant (if the bill payer) directly receives support towards the on-going running costs. A significant proportion of private rented homes are without gas heating, and therefore in the group where the government rightly wishes to focus RHI support.

Although this tariff structure could result in larger payments during the first few years, it would reduce the overall cost of the RHI to the government as it would no longer need to pay the 7.5% compensation for finance that it proposes to include in the tariff.[230]

Recommendation 10

government must ensure advice around the RHI is clear and consistent to avoid households being mis-sold the RHI subsidy

Advice should come from a qualified heating engineer, and those selling renewable heat must make it clear to households that the RHI subsidy is not expected to cover the full difference in cost of a renewable form of heating compared to a gas heating system

Advice should come from a qualified heating engineer and be clear and consistent. Assessors and those selling renewable heat must make it clear to households considering replacing gas heating that the RHI subsidy is not expected to cover the full difference in upfront and running costs of choosing a renewable form of heating over a new gas boiler or gas heating system. Likewise, it must be explained to prospective buyers of solar thermal that even with the RHI subsidy the technology is unlikely to pay for itself. The accreditation bodies should carry out regular and rigorous mystery shopping to ensure the agreed sales and marketing standards are being met.

Households should not be pushed into a Green Deal assessment or into taking out the Green Deal for the RHI

To meet the energy efficiency requirement for the RHI, consumers should not be forced to have a Green Deal assessment. An up-to-date EPC demonstrating that all lower-cost energy efficiency measures are in place (such as loft insulation), should be sufficient to meet the eligibility criteria. Consumers who wish to take out the Green Deal can do so, but the choice should be theirs. Any protections available to people taking out the Green Deal should be open to all.

Recommendation 11

government and industry must demonstrate that more rigorous monitoring is improving installation quality and heat pump performance, and this needs to be underpinned by a more consumer friendly route to redress when problems do arise

Government and industry must demonstrate that changes to the Microgeneration Certification Scheme (MCS) have improved the quality of renewable heat installations in practice.

In its recent policy paper on heat, government stated that MCS will increase the number of inspections it carries out to ensure compliance with the scheme rules.[231] Government and industry must also demonstrate that changes to the MCS have improved the quality of renewable heat installations in practice. Robust enforcement of these tighter standards by the MCS and the certification bodies is also vital.

Government and industry must ensure that access to redress for customers with renewable heat technologies is consumer friendly

Consumers with renewable heat technologies under the RHI should have access to a clear route to redress and installers should be accountable for their selling techniques and installation. There should be a one-stop-shop for consumer complaints. The current process is confusing for consumers as it is not clear when the customer will be covered by REAL, the MCS Certification Board or both. There should be a single ombudsman scheme to help enforce this.

Recommendation 12

Ofgem should be given the powers to explore and consult on whether regulation is needed to ensure households on heat networks are protected

All consumers should have recourse to the Energy Ombudsman (EO), including those with district heating

All consumers should have recourse to the EO, including those with district heating, regardless of whether their heat supplier is signed up to the new Independent Heat Customer Protection Charter.

Research with consumers on district heating should be carried out to understand their satisfaction levels and what problems they are currently facing

There is no publicly available research into current household experiences of district heating. Consumer research with people who are already on existing networks should be carried out to identify what key problems they currently face. This would also help provide an evidence base for establishing whether consumer protection regulations are necessary.

Heat suppliers should collect and publish consumer complaints data

Heat suppliers should routinely collect and then make publicly available data summarising the complaints from their consumers. This will help identify problems consumers are currently experiencing. It will also help assess the effectiveness of the new voluntary consumer protection Charter. Data collected by the EO can also feed into this process.

Recommendations

Ofgem should be given the power to explore and then consult on the introduction of consumer protection regulations for heat networks

Building on the District Heating Customer Protection Scheme and new consumer research and complaints data, Ofgem should explore and consult on the options for consumer protection regulation for homes on district heating. This should include new and existing networks, and those which are owned by local authorities and privately. Any regulations should then be introduced as appropriate, and these should be standardised across schemes as far as possible. In order for consumer protection rules to function properly there must be effective enforcement and robust sanctions in place.

Government and Ofgem should explore how companies can be incentivised to reflect cost savings in consumers' bills

The price of heating a home on district heating is likely to be the primary concern for household customers.[232] In the absence of retail competition, the government should work with Ofgem to develop a strategy which incentivises companies to pass on cost savings to their consumers on heat networks so that they are paying a fair price to heat their homes. Ofgem should also explore whether there is a need for price controls and if so how they could work.

To promote transparency and accountability, energy companies should be required to provide a simple pie chart on annual energy statement

References

[1] DECC, *Renewable Heat Incentive: Consultation on Proposals for a Domestic Scheme*, 2012: 17. Also see IPPR, *Warmth and a Changing Climate: how the government should encourage households to use renewable heat?* 2011:18-20, and Delta Energy and Environment, *2050 pathways for domestic heat: final report*. September 2012: 64

[2] DECC, *Renewable Heat Incentive: Consultation on Proposals for a Domestic Scheme*, 2012: 65

[3] DECC, *The future of heating: meeting the challenge*, 2013: 91

[4] Energy prices are a top financial concern for consumers. Which?, *Consumer Insight Monthly Tracker*, February 2013.

[5] Around 8 GW of existing coal generation will have to close by the end of 2015 as a result of the Large Combustion Plant Directive (LCPD), see DECC A*nnex C: Capacity Mechanism Design and Implementation Update*. November, 2012:8. The LCPD covers emissions from sulphur dioxide, nitrogen oxides and dust from large combustion plants. All generating plants built after 1987 must comply. Those that began operating before 1987 can choose to fit flue gas desulphurisation technology or they are restricted in their running hours after 2007 and must close by the end of 2015.

[6] Of the existing nuclear fleet only Sizewell B has a scheduled decommissioning date after 2023, and is expected to continue to run until 2035. EDF Energy email and http://www.bbc.co.uk/news/ukwales-north-west-wales-20150796 http://www.magnoxsites.co.uk/about-us/electricity-generation

[7] This means the old fossil fuel plants will need to be replaced by renewable or nuclear capacity, or if new coal or gas power stations they will need to have carbon capture and storage technology.

[8] DECC, *EMR: Policy Overview*, November 2012:7 http://www.decc.gov.uk/assets/decc/11/meetingenergy-demand/energy-markets/7090-electricity-market-reform-policy-overview-.pdf Significant. investment in the transmission and distribution networks is also needed alongside this.

[9] See Chapter 2 for more information on this. This assumes average annual household consumption falls to 3030 kWh by 2020, from 3800kWh in 2013, in line with government estimates, (policy costs for the average household would be higher if consumption does not fall). This figure takes into account subsidy costs associated with investment already made under the Renewables Obligation and Feed-in Tariff.

[10] Ofgem, *Electricity and Gas Supply Market Indicators*, July 2013http://www.ofgem.gov.uk/Markets/RetMkts/rmr/smr/Pages/indicators.aspx

[11] The domestic sector uses around 35% (112TWh) of the electricity consumed in the UK, DECC, *Digest of United Kingdom Energy Statistics*, 2012: 117

[12] In the UK for every GWh of electricity, 443 tonnes of carbon dioxide are emitted, this is known as the 'carbon intensity' of the power sector, DECC, *Digest of United Kingdom Energy Statistics*, 2012:124

[13] See, for example, Committee on Climate Change, *The Renewable Energy Review*, 2011:12

[14] HM Government, *The Carbon Plan: Delivering Our Carbon Future*, December 2011: 3

[15] This was slightly down on the previous year, when this figure stood at 45% (223 MtCO2), largely reflecting milder weather. Heat and electricity were responsible for 39% of total Green House Gas (GHG) emissions in 2010 (229 MtCO2e) and 36% (197 MtCO2) of GHG emissions in 2011. Domestic energy use accounted for around 23% of greenhouse gas emissions in 2010. Around 27% of total greenhouse gas emissions in 2010 came from the residential sector and around 24% of greenhouse gas emissions in 2011. (DECC, *Statistical Release, 2011 UK Greenhouse Gas emissions, provisional figures* and DECC *Statistical Release, 2012 UK Greenhouse Gas emissions, final figures by fuel type and end-user*, 29 March 2012)

[16] Around 99% of total UK CO_2 emissions from UK households result from household energy use and around 97% of total UK greenhouse gas emissions from UK households result from household energy use.

[17] http://ec.europa.eu/clima/policies/package/index_en.htm

[18] 12th Euro Observer report, *The State of Renewable Energies in Europe*, 2012

[19] DECC, *Planning Our Electric Future: a White Paper for Secure, Affordable and Low-Carbon Electricity*, July 2011: 30

[20] DECC, *Renewable Heat Incentive: Consultation on Proposals for Domestic Scheme*, September 2012:11

[21] DECC, *Digest of United Kingdom Energy Statistics*, 2011: 121, chart 5.2.

[22] See, for example, HM Government, *The Carbon Plan: Delivering Our Carbon Future*, December 2011: 70-2. But the government has stopped short of setting a specific decarbonisation target, despite calls from the Committee on Climate Change to do so. http://www.theccc.org.uk/publication/letterthe-need-for-a-carbon-intensity-target-in-the-power-sector/

[23] Generating electricity from coal creates more than twice the emissions of electricity produced from gas (909/ tCO2MWh, compared to 398/tCO2MWh).

[24] Cooper, I. and Palmer, J. (for DECC), *Great Britain's housing energy fact file 2011*, 11D/866, 2011:29

[25] See for example The Royal Academy of engineers *Heat: Degrees of Comfort?: Options for Heating Homes and a Low-Carbon Economy*, 2012: 47

[26] Committee on Climate Change *The Renewable Energy Review*, 2011:122.

[27] Figure for 2012 provisional. DECC, *Statistical Release: 2012 UK Greenhouse Gas Emissions, Provisional Figures* and DECC, *2012 UK Greenhouse Gas Emissions, Final Figures by Fuel Type and End- User*, March 2013:6 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/193414/280313_ghg_national_statistics_release_2012_provisional.pdf

[28] Data taken from NS/DECC, *Energy Consumption in the UK 2010*: table 3.7

[29] BRE, *Energy Use in Homes 2007: A series of reports on domestic energy use in England: Space and Water Heating*

References

[30] The Energy Saving Trust and TNS Research International, *Evaluation Report – The Boiler Scrappage Scheme in England*, February 2011:5

[31] EST, Ground source heat pumps, http://www.energysavingtrust.org.uk/Generate-your-ownenergy/Ground-source-heat-pumps

[32] An exception to this is the injection of biogas into the existing gas grid.

[33] DECC, *EMR: Policy Overview*, 2012:7 http://www.decc.gov.uk/assets/decc/11/meetingenergy-demand/energy-markets/7090-electricity-market-reform-policy-overview-.pdf, Ofgem, Updated Household Energy Bills Explained Fact sheet 98, January 2013 http://www.ofgem.gov.uk/Media/FactSheets/Documents1/household-bills.pdf

[34] It is worth noting that the cost to consumers of the distribution and transmission system is subject to price controls.

[35] The 'levelized cost' is useful for giving an indication of the overall cost and competiveness of different forms of electricity. It does this by translating the combined cost of building and operating a plant over its life into a per megawatt hour figure.

[36] DECC, *Electricity Generation Costs*, October 2012; Modelling by Mott MacDonald in 2010 suggested new nuclear had a levelised cost of just below £100/MWh. Mott MacDonald, *UK Electricity Generation Costs Update,* 2010: 68 http://www.decc.gov.uk/assets/decc/statistics/projections/71-uk-electricity-generation-costs-update.pdf

[37] See for example Mott MacDonald, *UK Electricity Generation Costs Update*, 2010 http://www.decc.gov.uk/assets/decc/statistics/projections/71-uk-electricity-generation-costs-update64.pdf; KPMG, *New Nuclear – an economic perspective,* June 2011; Committee on Climate Change, *Renewable Energy Review – Executive Summary,* 2011, p.22-23; Citigroup, May 2012.

[38] ICEPT *Working Paper, Cost estimates for nuclear power in the UK,* August 2012.

[39] This is known as the 'load factor'.

[40] This wide range reflects the current cost differences between round two and three offshore wind developments. DECC, *Electricity Generation Costs,* October 2012: 10

[41] The Crown Estate *Offshore Wind Cost Reduction: Pathways Study*, 2012: vii. (This figure is notably lower than the £157-186/MWh modelled by Mott MacDonald in its 2010 update.) DECC, *Electricity Generation Costs,* October 2012

[42] The Crown Estate *Offshore Wind Cost Reduction: Pathways Study,* 2012

[43] The Crown Estate *Offshore Wind Cost Reduction: Pathways Study,* 2012

[44] Committee on Climate Change, *The Renewable Energy Review,* 2011

[45] Mott MacDonald, *UK Electricity Generation Costs Update,* 2010: 65

[46] See for example the ICE-Endex OCM Dashboard, which gave a System Average Price (SAP) 63.74 p/Thm on 14 July 2013. http://www.iceendex.com/market-results/spot-markets/ocm/dashboard/

[47] Data taken from DECC, *Electricity Generation Costs*, October 2012:10

[48] Data taken from DECC, *Electricity Generation Costs,* October 2012:10 and 13

[49] As revenue from the carbon price is not guaranteed, banks are not willing to lend on the back of it as the investment returns are not secure.

[50] Over the lifetime of a gas plant, most of the costs are through the on-going purchase of gas to fuel it, rather than upfront construction costs as is the case with low carbon plants.

[51] Ofgem E-Serve, *Feed in Tariff: Annual Report 2011-2012*¸ December 2012: 5; 15

[52] Ofgem E-Serve, *Feed in Tariff: Annual Report 2011-2012*¸ December 2012:20

[53] Populus online survey for Which?, involving 2,109 UK adults, 31st of May-2 June 2013

[54] The supply of heat does not fall within the EU ETS.

[55] In July 2012 the Government published the response to its consultation on the Renewables Obligation Banding Review, indicating the new support levels for 2013 to 2017.

[56] Gov.UK, Calculating Renewable Obligation Certificates, https://www.gov.uk/calculatingrenewable-obligation-certificates-rocs (updated 1 April 2013).

[57] http://ec.europa.eu/clima/policies/ets/index_en.htm

[58] This is the EUA closing price for December 2013 delivery. http://www.pointcarbon.com/news/marketdata/euets/forward/eua/

[59] The domestic RHI is to be funded through general taxation.

[60] For example, £850 for an ASHP, for homes without mains gas heating only. With the delay in the RHI's introduction, in March 2013 the government extended the RHPP until the end of March 2014.

[61] Figures provided by the National Grid.

[62] The same can also be said of surface transport, particularly if it is to be electrified.

[63] DECC, *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills*, March 2013: 78 DECC assumes average annual electricity consumption of 3800khw. This is higher than Ofgem, which bases its figures on the annual average dual fuel household electricity consumption and bill. Ofgem's latest estimate of the average household dual fuel bill from July 2013 (of £1420) reflects the most up-to-date tariff price data so has been used on page 10 of this report, rather than the average bill underpinning the data tables published by DECC in March 2013 looking at policy costs.

[64] In January 2013 Ofgem estimated the EU ETS was then adding between £9 and £16 to wholesale power prices, and the RO and FIT a further £21 and £6 to the average annual household electricity bill. See Ofgem, *Updated Household Energy Bills Explained Fact sheet 98*, January 2013 http://www.ofgem.gov.uk/Media/FactSheets/Documents1/household-bills.pdf Ofgem's figures are based on an average annual consumption of 3300 kWh for electricity.

[65] Populus, on behalf of Which?, online survey of 2109 UK adults between 31 May to 2 June 2013

[66] With the domestic phase of the RHI delayed, DECC introduced a Renewable Heat Premium Payment (RHPP) to provide one-off small grants to householders to help with the upfront cost of solar thermal, air-source heat pumps (ASHP), ground-source heat pumps (GSHP) and biomass boilers. (For example, £850 for an ASHP, for homes without mains gas heating only.) To participate, consumers must agree to provide data on their system use and performance.

[67] The September 2012 Impact Assessment for the domestic RHI suggested that it would cost around a total of £2.6 billion throughout the period 2013 to 2020.

[68] The stacked bar chart for 2013 is based on data from DECC *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills 2012* (March 2013): 78, table D1; data for the stacked bar chart for 2020 is derived from table E on page 80 of the same report. The analysis uses DECC's estimate of average household consumption of 3030kWh of electricity in 2020, which is a lower level of consumption than today through energy efficiency savings.

[69] Data for these bar chart is derived from DECC, *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills 2012* (March 2013): 80 table E. The analysis uses DECC's estimate of average household consumption for electrically heated homes today (8639kWh) and in 2020 (8070kWh.)

[70] In time a reliably high carbon price should help remove the need for any subsidy.

[71] This estimate is for the annual electricity bill for the average dual fuel household. Committee on Climate Change *Energy Prices and Bills-Impacts of Meeting Carbon Budgets*, December 2012: 6 The CCC modelling is based on nuclear receiving support of £89 per megawatt hour.

[72] DECC assumes the average electricity bill will be £670 in 2020.

[73] This includes the VAT associated with these policy costs. These figures are based on calculations using DECC data and assumptions of average household consumption of 3030kWh of electricity in 2020, which is a lower level of consumption than today through energy efficiency savings. Figures derived from DECC data in *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills,* March 2013: 80 table E.

[74] Figure derived from DECC, *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills* 2012 (March 2013): 80 table E. Low carbon generation with low or zero running cost are at the bottom or close to the bottom of the merit order and are therefore used to produce electricity before higher running cost plants. So the impact of having more low carbon generation as part of the mix tends to reduce the average marginal electricity price, which in turn sets electricity prices.

[75] This number is the sum of the RO, EU ETS, CPF, FIT and EMR costs. Relative to the DECC figures we assume that household EU ETS and CPS costs scale up in proportion to the increased units (25.4%). For the RO, FIT and EMR costs we assume that the aggregate costs of these policies are constant and hence the household share of these costs would rise in proportion to the increased share of domestic consumption in total electricity consumption. The proportionate rise in these costs (16.8%) is calculated using DECC demand projections.

[76] We have assumed the merit order effect is the same as for consumption of 3030kWh (i.e. £16) as we do not have access to the models that underpin DECC data in table E.

[77] 2.3million homes in Britain (9.3%) are heated by electricity. Consumer Focus, *Off-gas consumers: information on households without mains gas heating*, September 2011 4.

[78] Figures derived from DECC data in *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills,* March 2013: 80.

[79] Consumer Focus, *Off-gas consumers: information on households without mains gas heating*, September 2011: 4.

[80] Consumer Futures, *The hardest hit: going beyond the mean – A report by CSE on the impact of energy policy on consumers' bills*. May 2013: 24

[81] Again figures derived from DECC data in *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills*, March 2013: 80 table E.

[82] It could become politically untenable for the government to keep on the current trajectory for the carbon price up to 2030 if EU ETS prices remain low because of the how much it would add to UK bills. See section 4

[83] Once contracts have been agreed it will be clear how much the generator will receive for electricity if they sell it, and therefore the cost to consumers of the low-carbon electricity with a CfD. What will not be clear is what proportion of that cost will be in subsidy and what proportion will be the market price.

[84] Figures in table derived from Consumer Focus, *Off-gas consumers: information on households without mains gas heating,* September 2011: 4.

[85] HM Government, *The Carbon Plan: delivering our low carbon future,* December 2011.

[86] HMT, *Autumn Statement*, 2012: 88, table B.3

[87] Populus, on behalf of Which?, online survey of 2109 UK adults between 31 of May to 2 June 2013

[88] In 2011 households in the lowest income decile spent the largest proportion of their total average weekly expenditure on housing, fuel and power (23 per cent). This compares to just 8% for those in the highest income decile. (ONS, *Family Spending 2012 Edition: Overview,* December 2012: 4)

[89] However this 9% figure is below the target level set under the RO, with suppliers continuing to make significant use of the buyout clause. In 2010-11 71% of the total renewable obligation was met by purchasing rocs, rather than through the buyout clause, (Ofgem, *Renewables Obligation Annual Report 2010-2011,* 2012: 14.) http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/Documents1/Renewables%20Obligation%20Annual%20Report%202010-11.pdf

[90] In the final 10 years of the scheme, i.e. from 2027, government will fix the value of ROCs.

[91] See for example Ecofys *Financing Renewable Energy in European Energy Market*, 2011:27;

[92] Or these developers are forced to sign long-term power purchase agreements to satisfy lending conditions, and these typically come with a significant price discount. In either case subsidy needs to be high enough to compensate.

[93] Governments are often receptive to energy intensive companies when they argue they will become uncompetitive because of the cost of policy to promote decarbonisation and low carbon energy in the EU, and fear industry will move to countries with lower policy costs on energy.

[94] The average day ahead price in 2008 stood at £71.45. Data from Platts.

[95] If they took the decision to invest before 2010 when the policy was announced by the coalition government.

[96] This is minus the cost of administration by Ofgem.

[97] The bigger the shortfall in ROCs (compared to the size of the obligation) the larger the buyout fund to be recycled among those submitting ROCs.

References

[98] Ofgem email to Which?, 15 March 2013

[99] Ofgem e-serve, *Information Note: The renewables obligation buy-out fund 2011-12*, October 2012

[100] Under the LCF £196 million was set aside for feed-in tariffs for the year 2012/13, but from figures on the amount of PV installed by the end of July 2012, the estimated cost to consumers would be £440 million for PV alone in 2012/13. DECC, *Government Response to Consultation on Feed-in Tariffs Comprehensive Review Phase 2A: Solar PV Tariffs* and DECC *Cost Control - Impact Assessment,* May 2012,

[101] DECC, *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills,* March 2013: 78

[102] DECC, *Estimated Impacts of Energy and Climate Change Policies on Energy Prices and Bills*, March 2013: 78

[103]These cuts came into effect in March 2012.

[104] Ofgem E-Serve, *Feed in Tariff: Annual Report 2011-2012*¸ December 2012:4- 5. As of March 31, 2012, there was a total installed capacity of 1.1 GW under the scheme.

[105] Average day ahead electricity price for 2011 and 2012 (£46.22) + average ROC price between April 2011 and March 2012 (£46.60). Generators with a power purchase agreement will not receive the full power price (as those giving PPAs take on some of the risk ie. around offtake and balancing) so in effect their combined income per MWh will be lower.

[106] Ofgem E-Serve, *Feed in Tariff: Annual Report 2011-2012*¸ December 2012: 5; solar PV was the technology which enjoyed the highest level of subsidy under the scheme until the tariff cuts kicked in. Ofgem E-Serve, Feed in Tariff: Annual Report 2011-2012: 42-43.

[107] See for example, https://www.gov.uk/government/news/policies-are-putting-a-cushion-betweenenergy-prices-and-household-bills-davey

[108] Populus, on behalf of Which?, online survey of 2109 UK adults between 31 of May and 2 June 2013

[109] Populus, on behalf of Which?, online survey of 2109 UK adults between 31 of May and 2 June 2013

[110] Populus, on behalf of Which?, online survey of 2109 UK adults between 31 of May and 2 June 2013

[111] Populus, on behalf of Which?, online survey of 2109 UK adults between 31 of May and 2 June 2013

[112] The Emissions Performance Standard acts as a regulatory backstop as it sets the maximum amount of CO_2 any new fossil fuel plan can produce until 2044 at 450g per kWh. This effectively rules out the building of new coal power stations if they do not have carbon capture and storage. DECC *Annex D: Electricity Market Reform - Update on the Emissions Performance Standard;* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48375/5350-emrannex-d--update-on-the-emissions-performance-s.pdf HM government, *Energy Bill* (as amended at Commons stage), February 2013: 43 http://www.publications.parliament.uk/pa/bills/cbill/2012-2013/0135/2013135.pdf

[113] However, with a CfD generators are still exposed to imbalance risk and basis risk.

[114] With a Premium Feed-in Tariff low carbon generators receive a fixed payment on top of the money they earn selling their electricity on the market.

[115] In modelling carried out for the Government by Redpoint, the CfD option came out £2.5 billion cheaper than a Premium Feed-in tariff to deliver the same level of investment, DECC, *Planning Our Electric Future,* 2011, 37.

[116] The government is proposing to publish strike prices for renewables for five years in the delivery plan. DECC, *Annex A: Feed in Tariff with Contracts for Difference: Operational Framework,* November 2012: 12

[117] HM Government, *Control Framework for DECC Levy Funded Spending,* March 2011

[118] The Warm Home Discount (WHD) Scheme is a 4 year programme introduced in April 2011 run by the government and energy suppliers to provide rebates on the electricity bills of households that need it most in England, Scotland, and Wales.

[119] The ONS is responsible for defining whether policies are counted as tax and public spending.

[120] DECC, *Control Framework for DECC Levy Funded Spending: Questions and Answers*, December 2011

[121] How governments treat emissions trading from a public expenditure and tax perspective is agreed internationally.

[122] This is in real 2012 prices. The LCF budget for 2014/15 will be £3.3 billion. DECC, *Annual Energy Statement 2012*, November 2012, 15 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65633/7086-annualenergy-statement-2012.pdf DECC Electricity Market Reform: Delivering UK Investment, June 2013, Appendix A.

[123] The panel only has four members, and the government expects it will be in place until the end of 2013. HM Government, *Electricity Market Reform Panel of Technical Experts - Terms of Reference,* February 2013 'https://www.gov.uk/government/policy-advisory-groups/141

[124] A more long-standing, ad hoc advisory body is expected to be in place by 2014. Government has indicated it intends its remit will remain broadly the same.

[125] http://www.independent.co.uk/news/uk/home-news/taxpayer-billions-could-be-secretly-funnelledto-edf-to-underwrite-cost-of-proposed-power-station-at-hinkley-point-8473810.html

[126] See, for example, http://www.bbc.co.uk/news/world-europe-18862422 July 16, 2012

[127] In October, it submitted the final application for Hinkley Point C. EDF Energy has a similar application in place for Sizewell C. (Centrica had a 20% stake in the project carrying out predevelopment work, and the option of a 20% stake in each of the new power station's two nuclear reactors, but has recently pulled out.) In October 2012 the Japanese company Hitachi purchased Horizon Nuclear Power from EON and RWE nPower which means it has the right to build new nuclear plants at the existing nuclear sites Wylfa and Oldbury. http://www.bbc.co.uk/news/business-20134735 30 October 2012

[128] HM government, *Energy Bill* (as amended at Commons stage), February 2013: 106 http://www.publications.parliament.uk/pa/bills/cbill/2012-2013/0135/2013135.pdf

[129] HM government, *Energy Bill* (as amended at Commons stage), February 2013: 106 http://www.publications.parliament.uk/pa/bills/cbill/2012-2013/0135/2013135.pdf

[130] Once contracts have been agreed it will be clear how much the generator will receive for electricity if they sell it, and therefore the cost of the low-carbon share of generation, but not what proportion of that will be in subsidy.

[131] Populus, on behalf of Which?, online survey of 2109 UK adults between 31st of May and 2 June 2013

[132] DECC, *Annex A: Feed in Tariff with Contracts for Difference: Operational Framework,* November 2012:

[133] DECC, Annex *A: Feed in Tariff with Contracts for Difference: Operational Framework*, November 2012: 55

[134] Ofgem, *Wholesale power and market liquidity: final proposals for 'secure and promote' licence condition,* June 2013 and Which?, *The Imbalance of Power: Wholesale costs and Retail Prices,* July 2013

[135] Ofgem, *Wholesale power and market liquidity: final proposals for 'secure and promote' licence condition*, June 2013

[136] DECC, *Electricity Market Reform: Delivering UK Investment,* June 2013: 15

[137] Ofgem, *Wholesale power and market liquidity: final proposals for 'secure and promote' licence condition*, June 2013

[138] For example, around 28 days after the billing period DECC, *Annex A: Feed in Tariff with Contracts for Difference: Operational Framework,* November 2012: 77

[139] To cover the size of their next CfD levy payment

[140] Which?, *The Imbalance of Power: The Retail Market,* December 2012

[141] Which?, *The Imbalance of Power: The Retail Market*, December 2012

[142] DECC, *Annex A: Feed in Tariff with Contracts for Difference: Operational Framework*, November 2012: 6

[143] BIS, *Electricity Market Reform: Eligibility for an Exemption from the Costs of Contract for Difference,* July 2013:29. The illustrative example, which relates to the government's preferred approach, suggests the 80% exemption would push up EMR costs in 2020 from £10/MWh hour to £11/MWh for non-exempt groups. DECC assumes electrically heated households will on average consume 8073 annually.

[144] Government/ HMRC, *Carbon price floor: support and certainty for low-carbon investment*, December 2010 http://62.164.176.164/d/consult_carbon_price_support_condoc.pdf

[145] To the extent that the CPS increases wholesale electricity prices, it will help reduce the level of subsidy for those generators with CfDs as payments depend on the difference between strike prices and market reference prices. But this offset does not of course apply to those generators with the RO subsidy.

[146] Government/ HMRC, *Carbon Price Floor Impact Assessment*, 2010: 20.

[147] HM Government, *Budget 2011* http://www.hmrc.gov.uk/budget2011/tiin6111.pdf HM Government, Budget 2013 http://cdn.hm-Government.gov.uk/budget2013_complete.pdf

[148] For example in April 2012 the EUA price stood at around 7€/tCO2 for December 2012 delivery, the annual point of EU ETS permit settlement. In June 2013 EUAs were trading at 4€/tCO2. See http://www.pointcarbon.com/

[149] Using the carbon intensity of electricity in 2011 as a proxy

[150] CPS rate for 2015-16 (£18.08) * total emissions from UK power stations in 2011 (146 million tonnes) / 35% (Households consume 35% of electricity sold). The data on which this calculation is made comes from DUKES.

[151] This wide range is because the impact on the wholesale price is dependent on the generation mix and the extent to which it is coal or gas that sets the price for electricity during the year. The lower estimate would see gas setting the price all year. (CPS rate for 2015-16 (£18.08) * typical electricity domestic consumption for an average household (3800) * gas emission factor (on power sold) (392). The upper estimate would see coal setting the price all year (CPS rate for 2015-16 * typical domestic consumption * coal emission factor (on power sold) (912). The data on which this calculation is made comes from DUKES. We estimate the impact on the average consumer's electricity bill in 2014/15 will be a rise of between £15.35 and £36.17 (In 2014/15 the CPS rate will be £9.55/tCO2).

[152] In line with DECC's current estimates for 2013, we have used an average annual consumption of 8,639kwh for electrically-heated households. The carbon price support does not apply to gas, and therefore does not affect gas bills or the cost of gas heating.

[153] Gov.uk, *Overview of the compensation scheme for energy-intensive industries,* https://www.gov.uk/energy-intensive-industries-compensation-for-carbon-leakage

[154] The CPS should reduce the level of subsidy required to support low carbon generation with CfDs as it will raise the wholesale electricity price. However, this is an unnecessarily complicated approach.

[155] HM Government, *Press Release - definition of environmental taxes,* 16 July 2012 http://www.hm-Government.gov.uk/press_60_12.htm

[156] http://www.theyworkforyou.com/wrans/?id=2011-05-09a.52152.h&s=justine+greening+carbon+price+floor+50#g52152.r0

[157] DECC, *Impact Assessment: Electricity Market Reform-Capacity Market,* November 2012: 18

[158] Ofgem, *Electricity Capacity Assessment: Ofgem Report to Government,* October 2012:6. Derated capacity margins indicate how much excess generating capacity is expected to be available at times when demand is highest (taking into account factors such as intermittency and maintenance). Electricity systems with the same forecasted de-rated margins do not necessarily have the same likelihood that the lights will go out for some households, because this will depend on the electricity mix.

[159] Around 8 GW of existing coal generation will have to close by the end of 2015 as a result of the Large Combustion Plant Directive, see DECC *Annex C: Capacity Mechanism Design and Implementation Update.* November, 2012:8

[160] Of the existing nuclear fleet only Sizewell B has a scheduled decommissioning date after 2023, and is expected to continue to run until 2035. EDF email and http://www.bbc.co.uk/news/uk-wales-northwest-wales-20150796 http://www.magnoxsites.co.uk/about-us/electricity-generation

[161] The amount of electricity generated from gas has fallen significantly as a result. According to new figures from DECC, gas generation fell by 27.5% in 2012, largely due to high gas prices. At the same time, the amount of electricity from coal increased by 9%. This means 39.5% of electricity generated came from coal, making it the largest single source of UK electricity in 2012.

[162] This modelling by Ofgem assumes there is no reform to cash-out and that there is no capacity mechanism. Ofgem, *Electricity Capacity Assessment: Ofgem Report to Government,* October 2012:6; Ofgem, *Electricity Capacity Report 2013,* June 2013. The June 2013 Assessment highlighted how more plants had been closed or mothballed over the previous six months than had been expected in 2012, and suggested margins could fall faster over the next few years than anticipated, while still reaching 4% by 2015/16. Figure 9 uses data from Ofgem, *Electricity Capacity Assessment Report,* June 2013: 14 and DECC *Annex C: Capacity Market-Design and Implementation Update,* November 2012

[163] Ofgem, *Electricity Capacity Assessment: Ofgem Report to Government,* October 2012: 17

[164] DECC, *Impact Assessment: Electricity Market Reform-Capacity Market,* November 27, 2012: 15. The Systems Operator can take a number of mitigation actions, such as voltage control, before it needs to ask Distribution Network Operators to start disconnecting their customers.

[165] Ofgem, *Electricity Capacity Assessment Report*, June 2013: 14

[166] DECC, *Impact Assessment: Electricity Market Reform-Capacity Market,* November 27, 2012: 17-18

[167] DECC, *Impact Assessment: Electricity Market Reform-Capacity Market,* November 27, 2012: 18

References

[168] DECC *Annex C: Capacity Market-Design and Implementation Update,* November 2012: 12. Ofgem modelling goes up to 2017.

[169] DECC *Annex C: Capacity Market-Design and Implementation Update,* November 2012: 13

[170] This will be based on an annual demand curve set out in advance, which will allow a trade off between the level of system reliability and the cost to consumers. This will set out a desired level of capacity and a maximum auction price. The auction will be Pay-As-Clear, where all capacity providers successful in the auction, receive the same auction clearing price for their capacity, regardless of what price they bid in, based on the marginal bidder.

[171] This encompasses a range of 'actions' taken by consumers in response to conditions in the electricity system and pricing signals. These actions can include moving electricity use away from times of peak demand and network constraint, or shifting demand to times of excess electricity supply.

[172] DECC, *Electricity Market Reform: Capacity Market-Detailed Design Proposals,* June 2013: 45

[173] DECC, *Electricity Market Reform: Capacity Market-Detailed Design Proposals,* June 2013: 35

[174] Platchov and Pollitt, 'The Economics of Energy and Electricity Demand', in *The Future of Electricity Demand,* Jamasb and Pollitt ed., 2011

[175] DECC, I*mpact Assessment: Electricity Market Reform-Capacity Market*, November 27 2012: 21

[176] DECC, *Electricity Market Reform: Capacity Market-Detailed Design Proposals,* June 2013: 45

[177] Ofgem, *Consultation on the Potential Requirement for New Balancing Services by National Grid Electricity Transmission Plc (NGET) to support an uncertain mid -decade electricity security of supply outlook,* June 2013

[178] The government has said that any capacity built from May 2012 onwards will be treated as new capacity in any auction.

[179] DECC *Annex C: Capacity Market-Design and Implementation Update,* November 2012

[180] DECC *Annex C: Capacity Market-Design and Implementation Update,* November 2012

[181] These government estimates are based on average household electricity consumption of 4.5 MWh annually, which is higher than the average annual consumption assumed by Ofgem and also in other DECC modelling. DECC, *Impact Assessment: Electricity Market Reform-Capacity Market*, November 27, 2012: 30

[182] DECC, *Impact Assessment-Electricity Market Reform-Ensuring Electricity Security of Supply and Promoting Investment in Low Carbon Generation* (January 2013 update.), January 14, 2013: 7

[183] DECC, *Impact Assessment-Electricity Market Reform-Ensuring Electricity Security of Supply and Promoting Investment in Low Carbon Generation* (January 2013 update.), January 14, 2013: 59

[184] DECC, *Digest of United Kingdom Energy Statistics,* 2011: 117

[185] Ofgem, *Electricity Capacity Assessment Report 2013,* June 2013: 13

[186] See Poyry, *The challenges of intermittency in North West European power markets; the impacts when wind and solar development reach their target levels.* http://www.poyry.com/sites/default/files/143.pdf

[187] See, for example, European Climate Foundation *A roadmap 2050: a practical guide to a prosperous, low carbon Europe: technical analysis*, 2010, http://www.roadmap2050.eu/attachments/files/PowerPerspectives2030_FullReport.pdf

[188] DECC *Electricity System: Assessment of Future Challenges-Summary,* August 2012: 5

[189] European Commission, *Consultation Paper: on Generation Adequacy, Capacity Mechanisms and the Internal Market Electricity* November 2012

[190] DECC, *Electricity Market Reform: Capacity Market-Detailed Design Proposals,* June 2013: 36

[191] DECC *Annex C: Capacity Market-Design and Implementation Update,* November 2012: 9

[192] DECC, *Electricity Market Reform: Capacity Market-Detailed Design Proposals,* June 2013: 34

[193] DECC, *Consultation on Options to Reduce Electricity Demand-Government Response,* May 2013:7

[194] DECC *Electricity Demand Reduction: Consultation on Options to Encourage Permanent Reductions in Electricity Use* November 2012: 46

[195] It is a condition of the RHI that the installer of the renewable heat technology is accredited by an MCS Certification Body.

[196] Although payments last for seven years, they are designed to meet the difference in upfront and running costs for 20 years.

[197] See for example, Delta Energy and Environment, *2050 pathways for domestic heat: final report,* September 2012, 65

[198] For example, for a well-insulated home not on the gas grid and with some outside space, a heat pump could be a suitable option. Similarly, replacing an electric heating system in an average three bedroom semi-detached home with an air-source heat pump installation could save £380 a year on energy bills. Yet a consumer replacing gas central heating with an air source heat pump could see their bills actually rise by £100 a year - a negative return on an investment of between £6,000 and £10,000. EST website, http://www.energysavingtrust.org.uk/Generating-energy/Choosing-a-renewable-technology/Air-source-heat-pumps#costs

[199] Which? Magazine *Mysteries of the Solar System,* May 2010

[200] DECC, *Impact Assessment: Renewable Heat Incentive-Domestic* September 2012: 6

[201] Under the proposals 'hard to treat' loft or cavity wall insulation, which can be considerably more expensive, would be required as it would appear as a Green Deal tick on all Green Deal assessments.

[202] DECC, *Green Deal and ECO Impact Assessment,* June 2012.

[203] Energy Saving Trust, *Getting Warmer: a Field Trial of Heat Pumps,* September 2010

[204] Energy Saving Trust webpages http://www.energysavingtrust.org.uk/Generating-energy/Choosinga-renewable-technology/Ground-source-heat-pumps

[205] The EST estimates that an Air Source Heat Pump performing at 2.2 could cost an additional £100 per year to run than a gas heating system. Energy Saving Trust webpages http://www.energysavingtrust.org.uk/Generating-energy/Choosing-a-renewable-technology/Airsource-heat-pumps#costs

[206] DECC, *Renewable Heat Incentive: Consultation on Proposals for a Domestic Scheme*, 2012:68

[207] DECC, *Renewable Heat Incentive: Consultation on Proposals for a Domestic Scheme*, 2012:68

[208] REAL Consumer Code's response to DECC's consultation on a domestic RHI scheme, December 2012

[209] REAL Consumer Code's response to DECC's consultation on a domestic RHI scheme, December 2012

[210] http://www.energysavingtrust.org.uk/Generating-energy/Finding-an-installer/Making-a-complaint

[211] Although technically separate to the Energy Ombudsman it is in practice part of the same organisation. The original intention was to use the EO but this would have required primary legislation. Therefore a separate body was set up.

[212] The 'no wrong door' policy means that consumers' complaints are transferred through to the correct department or team to deal with the complaint, rather than being turned away and told to follow a different process. This creates a more simple, joined-up process.

[213] DECC, T*he Future of Heating: meeting the challenge*, March 2013:39. There are around 200 heat networks in the UK which service about 210,000 homes and 1700 commercial and public buildings.

[214] District heating is also known as a heat network.

[215] DECC, *The Future of Heating: meeting the challenge*, March 2013

[216] A heat network is a piece of infrastructure rather than a low carbon technology.

[217] These are provisional results from the heat network model that DECC is developing. Evidence Annex to DECC's heat policy paper, *The Future of Heating: meeting the challenge,* (March 2013) discusses a number of estimates for the amount of future heat demand that could be served by district heating. The 2009 Poyry report and the UKDEA Policy Paper (2012) have predicted that if barriers were removed and the right incentives were in place, networks could supply around 14 per cent of UK heat demand by 2030.

[218] DECC, *The future of heating: meeting the challenge – Evidence Annex,* March 2013

[219] Ipsos Mori and EST for DECC, *Research Report: Homeowners' willingness to take up more efficient heating systems,* March 2013:8; 60.

[220] *The Heat and Energy Saving Strategy consultation* (2009) proposed setting up a Heat Markets Forum, which would consider different regulatory options for district heating to ensure consumer protection. Responses were mixed in their views over whether there should be a voluntary or mandatory approach and some did suggest that Ofgem's remit be extended to heat, particularly district heating. Even some of the energy industry responses were supportive of regulation, for example one respondent stated that 'If customers are locked into receiving heat from a particular plant…this will require either a collective ownership model…or some form of regulation to protect consumers which would proxy a competitive framework.' (summary of responses to consultation, August 2009).

[221] DECC, *The future of heating: meeting the challenge*, March 2013:58

[222] The Consumers, Estate Agents and Redress Act 2007 established the Energy Ombudsman and allowed the Secretary of State to make it a requirement of regulated providers that they belong to a redress scheme approved by the relevant regulator.

[223] DECC, T*he future of heating: meeting the challenge – Evidence Annex,* March 2013

[224] Email correspondence with VZBV (Germany's equivalent of Consumer Futures in the UK), January 2013.

[225] This data must be easily accessible to consumers, which is defined as being no more than two clicks away from the supplier's website homepage. http://www.ofgem.gov.uk/Sustainability/Cp/Cr/Pages/Supplierdataoncustomercomplaints.aspx

[226] DECC, *The future of heating: meeting the challenge*, March 2013

[227] Populus online survey for Which?, involving 2,109 UK adults, 31st of May-2 June 2013

[228] Which? *Monthly Consumer Insight Tracker,* May 2013

[229] DECC, *Renewable Heat Incentive: Consultation on Proposals for a Domestic Scheme,* 2012: 17. Also see IPPR, *Warmth and a Changing Climate: how the government should encourage households to use renewable heat?* 2011:18-20, and Delta Energy and Environment, *2050 pathways for domestic heat: final report*¸ September 2012:64

[230] DECC, *Renewable Heat Incentive: Consultation on Proposals for a Domestic Scheme,* 2012:65

[231] DECC, *The future of heating: meeting the challenge*, March 2013:91

[232] Energy prices are a top financial concern for consumers. Which?, *Consumer Insight Monthly Tracker,* February 2013

Reforms to the retail and wholesale market to promote transparency and competition are needed to increase consumer confidence that the energy system is working in their interests and that subsidies for low-carbon generators are justified