IPPR

WHEN THE LEVY BREAKS

ENERGY BILLS, GREEN LEVIES, AND A FAIRER LOW-CARBON TRANSITION

Joss Garman and Jimmy Aldridge

Institute for Public Policy Research

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The views and conclusions expressed in this paper are the authors' own.

Erratum
Page 10: In table 2.1, the 'Amount paid from average dual-fuel bill' for smart meters has been revised from £34 to £4 (18 June 2015).

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SUMMARY

To date there has been insufficient debate about the dramatic rise in charges on energy bills that is set to take place over the next decade to fund progress on low-carbon and social policies. Since political pressure over the cost of bills is very likely to build, this is creating the risk of a sudden, panicked response from politicians that harms efforts to address climate change.

Serious thinking is needed now to find ways to mitigate the costs that are being put on to consumers without reducing the ambition, which is shared by all the major political parties, for substantially reducing levels of carbon pollution.

To pre-empt this debate, this report explores the distributional impacts of the existing green and social levies on different sections of society, and sets out a strong case for overhauling the approach the government takes to financing the low-carbon transition, particularly beyond 2020.

In chapters 2 and 3 we examine who is currently paying in the most through these levies on fuel bills, and who is benefitting from the policies.

- **Lower income groups are paying in a far larger contribution, relative to their income, than more affluent households.** People within the lowest income decile are spending 1.68 per cent of their disposable household income[1] on green and social policies, six times more than those in the highest income decile, who contribute just 0.27 per cent of their income.

If the low-carbon transition is to succeed it must be funded more fairly.

In chapter 4 we consider six ideas for how the UK could maintain its ambitions on clean and efficient energy while reducing the burden that is falling unfairly on the energy bills of households and businesses.

New nuclear generation

The UK has cross-party agreement on the need for a new fleet of nuclear power stations. The Hinkley Point C nuclear power station is the first of 12 that the government wants to build. Our view is that a new nuclear programme at this scale is not feasible due to the costs involved. Nevertheless, if new nuclear power projects are to continue to be supported, beyond the Hinkley Point C project, the government should use different financing arrangements that would provide better value for money for the British public.

- **Public ownership of new nuclear projects could bring substantial savings to families and businesses compared to the current approach because the government is better placed than private firms to bear certain risks.** The government could borrow more to enable this to happen, or projects could be financed through existing capital budgets in place of other major infrastructure schemes.

The cost of building new nuclear capacity could be significantly reduced if the British government owned the new reactors while contracting construction and leasing operation to private firms.

1 Disposable household income is after income tax and national insurance contributions, but before housing costs.

In 2014, National Grid produced scenarios for meeting UK and European legal targets on low-carbon energy and climate change, and estimated that, after Hinkley Point C, 14.2GW of cumulative additional nuclear capacity would be required by 2035.

- **For a nuclear programme on this scale, public ownership during the construction phase could save consumers £1.2–1.8 billion between 2015 and 2035, by socialising policy risks and therefore reducing financing costs. If public ownership was continued during the operational phase but private companies ran each nuclear plant, this could produce additional savings for the consumer of £2.5–3.7 billion over the period.**[2]

These figures show that there is a powerful case for the government to consider public ownership of any new nuclear reactors.

Offshore wind

The public is not getting the best value for money through the government's current approach to the development of offshore wind farms.

- **Most of the regulatory risks for these projects, in terms of planning permission and safety regulations, exist in the early development phase – before construction even begins. In the UK, this is a lengthy and inefficient process that is driving up costs and so unnecessarily raising subsidies. Hundreds of millions of pounds are being spent** developing **offshore wind farms which may never be built. These costs are finding their way through to higher consumer bills.**

In Denmark, by comparison, specific marine areas are strategically identified by the government and mapped out as designated sites for the development of a set volume of large offshore wind farm capacity. The government's Energy Agency takes these sites through the necessary development surveys and impact assessments, and then announces a government tender for an offshore wind turbine project of a specific size at each location, with specific deadlines for their construction. This approach has brought down the cost of procuring offshore wind energy – and Britain could do the same.

- **The UK government should adopt the 'Danish model' of procurement of new offshore wind farms to bring down development costs. This process should be overseen by the Department of Energy and Climate Change (DECC), working alongside National Grid and the Crown Estate**.

While it is difficult to apportion regulatory risk between the development and construction phases, we estimate that public ownership during the early development stage only – followed by private ownership during their construction and operation – could deliver savings of up to £1 billion to billpayers without substantial costs to the government. This would have the effect of substantially reducing the size of the overall funding envelope that would otherwise need to be raised through energy bill levies in the 2020s for climate change goals to be met.

Onshore wind

Onshore wind farms represent the most affordable low-carbon energy source. A study by the Royal Academy of Engineering has suggested that replacing a single onshore wind turbine with an offshore equivalent would cost billpayers an extra £300,000 a year in subsidies.

2 These are illustrative and not exact estimates. They do not take account of the relative efficiency of the public and private sectors in providing utilities, which could be positive or negative.

In spite of this, the government has pledged to 'halt the spread of onshore wind farms' and to 'end any new public subsidy for [onshore wind] and change the law so that local people have the final say on windfarm applications.'

Since the government remains committed to making cuts in carbon from the energy system, ruling out the cheapest deployable technology in favour of more expensive ones like offshore wind will increase costs faced by billpayers.

- **IPPR calculations suggest that if the UK directly substitutes offshore wind in the place of the growth that could otherwise have been expected in onshore wind through to 2030, this will increase the cost to billpayers by up to £3 billion through to 2030.[3] The 2015 Conservative manifesto promised to cut carbon 'as cheaply as possible'. To make good on this promise, the government should permit onshore wind farms to go ahead where there is local support.**

The capacity market

The government's capacity market, which aims to guarantee security of supply, will also help to make costs for consumers higher than they need to be. In 2018, its first year of operation, this scheme will be worth around £1 billion, funded through energy bills.

The government considered an alternative option – a strategic reserve – in 2011, and found that it would cost only £0.3–0.35 billion in pay-outs, compared with £1.5–2.5 billion in pay-outs for a market-wide capacity market. The government opted for the capacity market because its assessment suggested that the market-wide option would reduce wholesale prices, as the additional revenue for operators would mean they required a lower price from the open market. However, this assumes the operation of a competitive energy market in which cost reductions are passed on to billpayers, but it is not clear that this is happening. As a result, the billpayer is funding the more expensive option, and not enjoying the anticipated benefits in terms of offsetting cost reductions.

- **The capacity market should be replaced with a targeted strategic reserve that would reduce costs and provide greater control over the nature of spare capacity.**

Rather than allowing all operators to bid into the market, a strategic reserve is an amount of capacity that would be competitively procured by a central body, such as National Grid, and then held back from the normal market. This capacity would only be drawn upon as a last resort when other capacity is unable to meet demand.

Another way that the capacity market makes bills higher than they should be is that it effectively compensates generators for the carbon-intensive energy that is being penalised through another government policy – the unilateral carbon tax that the chancellor George Osborne introduced during the last parliament. This means the consumer is paying to both penalise and incentivise the operation of these power stations.

- **IPPR analysis shows that the costs of the capacity market would be reduced by £37 million a year between 2017 and 2030 if coal were to be phased out using an emissions performance standard (EPS) and if the carbon floor price was to remain frozen until it is surpassed by the price in the EU emissions trading scheme.**

3 Our calculation here is necessarily only illustrative. It is likely that other, cheaper technologies such as solar would also be used in the place of onshore wind. If this is the case then the cost to billpayers would be less than our upper estimate. It is also possible that more expensive technologies such tidal lagoons will developed, which would increase costs above our estimate.

Energy efficiency

The thermal and electrical efficiency of the UK's housing stock is very poor, which drives up costs for householders and increases fuel poverty. The best way to reduce the costs on household energy bills is to make home improvements to reduce the amount of energy consumed.

The government's existing approach to tackling fuel poverty and delivering energy saving is flawed. Its principal policy, the energy company obligation (ECO), is ineffective at targeting those groups that are most in need of assistance. IPPR has previously set out a framework for improving the delivery of fuel poverty and energy efficiency programmes called Help to Heat (see Platt et al 2013).

- **A Help to Heat strategy would be better targeted towards lower-income households. This would help to rebalance the government's wider programme of low-carbon policies towards the groups who disproportionately fund them. It would mean that levy-funded energy efficiency schemes would be progressive: the beneficiaries would be low-income groups and the greatest costs would fall onto higher-income groups. On this basis, we believe that the current energy efficiency programme should continue to be funded primarily from levies on energy bills.**

Our concern with the alternative – with funding insulation schemes entirely through taxation, as some consumer groups, trade unions and energy companies have advocated – is that if energy efficiency is transferred into current budgets then it would be captured by the wider programme of spending cuts through this parliament, and thus reduced.

We agree, however, that energy efficiency should be seen as an infrastructure priority.

- **There is a very strong case for using capital budgets to invest in energy efficiency as infrastructure.** Studies have shown that this could generate a threefold return in GDP – that is, £3 in return for every £1 invested by government – as well as benefitting millions of householders. ECO runs until April 2017, at which point a new programme will need to be introduced. In our view, the government should take this opportunity to raise the level of ambition on energy efficiency by making use of capital budgets.

A green levy allowance

We believe that these actions, taken together, would reduce the total amount that billpayers need to contribute to achieving the low-carbon transition by more than £7 billion. This saving would allow each consumer to receive some form of levy relief without jeopardising the UK's progress towards climate change targets.

- **The total accumulated saving could be distributed to provide each energy consumer with a green levy allowance: a certain amount of energy that can be used levy-free.** This could help to incentivise energy efficiency, if set at the right level. Importantly, however, it would also recast the levy framework in a progressive manner because, as we set out in chapter 2, more affluent households generally use more energy and a Help to Heat efficiency strategy would effectively support low-income households.

In the years ahead, the levy control framework and other charges on bills are anticipated to rise to previously unseen levels. This will increase political pressure from opponents to limit ambition on clean and efficient energy. To paraphrase Led Zeppelin,[4] if it keeps on rising, the levy's going to break.

The ideas in this report set out a way to ensure that reducing the UK's carbon footprint does not take place on the backs of hard-up consumers, but in a fair and equitable – but also efficient – manner.

4 With due credit to Kansas Joe McCoy and Memphis Minnie.

1. INTRODUCTION

In spite of the recent nosedive in the wholesale price of oil and gas, which brought a pause in the increases that UK billpayers have seen over previous years, controversy over the cost of energy bills is unlikely to have gone away for good.

During the last parliament, MPs voted almost unanimously to financially support clean energy generation paid for through higher levies on energy bills. The chancellor, George Osborne, has stated that, by 2020, £7.6 billion[5] will be raised this way and set aside to support clean energy schemes, mostly through long-term fixed-price government contracts for clean power through a system known as the levy control framework (LCF) (HMT 2013).[6] The intention is that this will enable the UK to meet its binding EU target to generate 15 per cent of total energy from renewables by 2020 by increasing the amount of electricity from these technologies to around 30 per cent by 2020, compared to the current level of 14.9 per cent (Pollitt 2015). Levy control funds can also be used to support the development of new nuclear stations and the commercialisation of carbon capture and storage (CCS) technology.

These levies exist alongside other significant charges that government places on energy billpayers – most significantly the carbon floor price, a tax to make dirtier energy sources more expensive, and the energy company obligation (ECO), a scheme to support energy saving.

Levies on bills are already projected to more than double through this parliament to 2020. Beyond this point, if the government continues with this approach to financing the low-carbon transition, it is expected that the levies for low-carbon generation will have to almost quadruple through to 2030 in order to meet increased costs (CCC 2014). In a typical household energy bill, costing £1,140 in 2013, the government's advisers, the Committee on Climate Change (CCC) calculate that around £45 goes to supporting low-carbon power generation[7] (ibid), as one of a bundle of costs associated with green and social policies. Extending the current financing approach would mean that this amount could rise to £175 by 2030.

While opinion polling shows that public support for tackling climate change remains very strong (DECC 2015), paying for it in this way is likely to be contentious. Indeed, the existing contributions extracted through levies on energy bills have proven to be controversial. That these levies are regressive – being essentially flat consumption taxes which take no account of ability to pay – has prompted consumer groups and critics of action to address climate change to attack 'green policy' as something contrary to the interests of working people.

Ramping up these levies so significantly in coming years would lead to a high risk of a more sustained public backlash, which might be stoked and amplified by influential critics of climate policy in parliament and in the media. This could cause an unravelling of the entire policy framework that underpins the low-carbon transition in this country, and thus undermine both domestic efforts to cut pollution and the UK's international leadership on climate change.

5 In real 2012 prices.

6 There are other costs to be added to bills that are not captured by this figure, such as those relating to the warm homes discount and capacity market.

7 Our figures, presented in chapter 2, are slightly different to those of the CCC, but we agree on the scale of the increase required for support for low-carbon generation out to 2030.

This political problem may partly explain why we currently know no details about the government's plans with regard to the size of the levy control framework beyond 2020. The Conservative party has ruled out adopting a legal target to decarbonise the power sector by 2030, despite pressure from the nuclear and renewables industries and advice from both the House of Commons Energy and Climate Change select committee and the CCC (see Coates 2012). The prime minister David Cameron blocked the introduction of a new binding 2030 renewable energy target at the EU level on the grounds that it was 'inflexible and unnecessary'. Meanwhile, the energy secretary has announced that subsidies for onshore wind generation will be ended altogether. As a consequence of these decisions, there is now a high degree of uncertainty over how much support there is likely to be for any kind of new low-carbon energy generation projects in the UK beyond 2020, and thus over any energy investments in the next decade (see Webster and Hope 2013).

Yet continued growth in clean energy is imperative if carbon pollution is to be reduced to limit climate change, in adherence with our international commitments, and if security of energy supplies is to be maintained. A loss of confidence in the future development of the British low-carbon energy market could have a devastating impact on domestic supply chains, with a consequential loss of jobs and tax revenues. It would also damage progress already made towards reducing the cost of renewable technologies, which would in turn inhibit efforts to address climate change both in the UK and internationally (McNeil et al 2013).

The question of how much financial support the government chooses to provide for the low-carbon transition and where this funding will come from – particularly after 2020 – is therefore likely to feature prominently in the debate over climate and energy policy in the current parliament. Through this report and the original analysis that informs it, we seek to contribute to that debate.

In chapter 2 we explore the all costs that fall onto an average household energy bill and present a distributional analysis of the energy and social levies. This highlights the differing contribution that households in different income deciles are making towards the low-carbon transition.

Chapter 3 identifies who is benefitting from the government's energy and social policies. We look at the two largest levies in particular: support for low-carbon generation and energy efficiency programmes.

Chapter 4 outlines six options for reducing the costs of the low-carbon transition while maintaining ambition, and for protecting lower-income groups from having to make a disproportionate contribution.

2.
WHO IS PAYING FOR THE GOVERNMENT'S ENERGY AND SOCIAL POLICIES?

In this chapter we first investigate all of the costs that make up a household energy bill before drilling down into the costs that fund government policies.

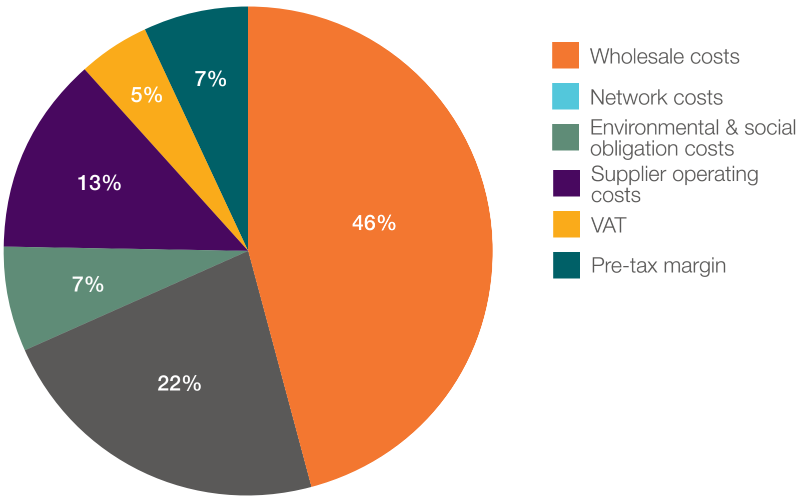
What costs make up an energy bill?

The typical household energy bill is made up of several different cost components:

- **Wholesale costs**: the costs of buying power from a generator or gas from a supplier. These costs have been the principal driver of the increase in energy bills over the past decade.
- **Network costs:** the costs of installing, refurbishing and upgrading the networks of gas pipes and electricity wires.
- **Operating costs:** additional costs faced by suppliers, such as those related to billing systems.
- **Pre-tax profits:** this is the average margin made across the supply businesses of the energy companies.
- **VAT:** set at just 5 per cent for energy.
- **Energy and social policies:** subsidies for supporting low-carbon generation, including renewables and nuclear, energy efficiency programmes and the capacity market. Each of these is explored in more detail below.

The balance of all these costs in an average household bill is shown in figure 2.1.

Figure 2.1
The breakdown of a household energy bill
Cost components of a dual-fuel bill, 2014/15 (estimated)



Source: Ofgem, 'Understanding energy bills' (Ofgem 2015a)

As this breakdown shows, the biggest contributor to energy bills is the wholesale costs. As well as making up the largest part of an average bill, these costs are responsible for 73 per cent of the *increase* in energy bills that occurred between 2004 and 2013 (CCC 2014).

By comparison, at just 7 per cent of the average bill, energy and social policies are a relatively insignificant part – for now. As noted in the previous chapter, some of these costs – contributions to low-carbon power generation – are projected to more than double through this parliament to 2020, and to almost quadruple through to 2030. We argue that this increase, as a proportion of the total household bill, would disproportionately affect lower-income billpayers, and will therefore face increased scrutiny.

We calculate that, in 2013, £143 was added to the average dual-fuel energy bill[8] to pay for government energy policies; this total amount is broken down by policy in table 2.1.

Table 2.1
Cost components of a typical dual-fuel bill, 2013

Policy	Amount paid from average dual-fuel bill	Percentage of policy costs on bills	Included in LCF?
Warm homes discount	£15	11 per cent	Yes
Carbon price	£15	10 per cent	No
Direct support for low-carbon generation	£41	28 per cent	Yes
Intermittency*	£5	3 per cent	
Energy efficiency	£63	44 per cent	No
Smart meters	£4	3 per cent	No
Total	**£143**		

Source: IPPR calculations based on policy costs from the Committee on Climate Change (CCC 2014) and consumption data from the Living Costs and Food survey (ONS 2014)
*Intermittency costs are the costs associated with integrating renewable technologies into the electricity system.

In this breakdown, 'low-carbon power' includes the renewables obligation (RO) and the feed-in tariff (FiT).[9] These two policies and the warm home discount[10] (WHD) are paid for by energy suppliers, who then pass the costs on to consumers. In reality it is down to the supplier how they recoup these costs, but we assume here that it is a fixed percentage on all bills. This levy-funded expenditure is limited by the LCF, which caps the cost of levy-funded schemes.

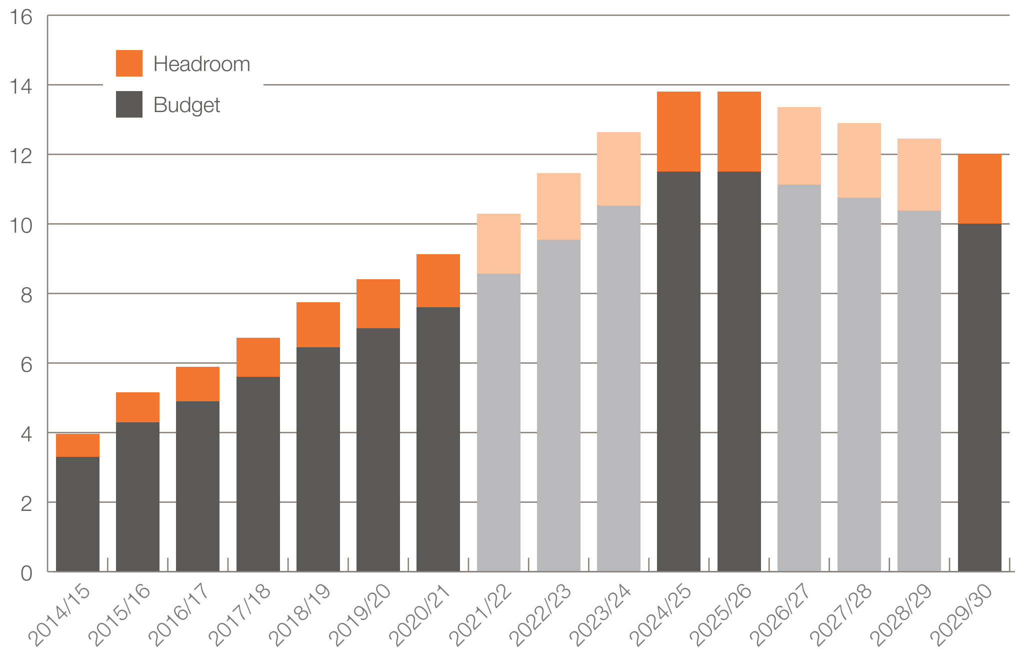
Another policy that is included in the LCF but is assumed here to have a zero net cost is the capacity market.[11] This was expected to pay out £1.5–2.5 billion each year in subsidies, but the Department of Energy and Climate Change [DECC] assumes that the additional revenue for energy companies will mean that they sell their power at a lower price. Our view is that a lack of liquidity in the energy market means that energy companies will *not* pass through the savings and therefore that these costs will actually fall onto bills (we return to this in the next chapter).

8 A dual-fuel bill is where a customer receives their gas and electricity from the same energy supplier.
9 The renewables obligation is the main support mechanism for renewable electricity projects in the UK. The feed-in tariff is a support mechanism specifically for renewable generation under 5MW.
10 The warm home discount scheme requires domestic energy suppliers to provide approximately £1.13 billion of direct and indirect support arrangements to fuel-poor customers over four years. It came into operation in April 2011 and is due to expire in 2016.
11 The capacity market guarantees security of energy supply by providing payments to energy companies, on top of their electricity revenues, to ensure that they deliver energy or reduce demand when needed.

Nonetheless, our modelling as presented below is based on CCC calculations, which assume the capacity market has no net cost, and this policy is excluded from the breakdown in table 2.1.

In 2014, the total budget for levy-funded programmes was £3.3 billion. This is set to rise to £7.6 billion by 2020/21. Beyond this, the CCC has suggested that delivering the levels of low-carbon capacity required to meet carbon budgets will mean further increases through the 2020s, with the LCF budget peaking at £11.5 billion in 2025 and then £10 billion in 2030. This increase is shown in figure 2.2.

Figure 2.2
Expected rises in the levy control framework budget, 2014/15–2029/30 (£bn)



Source: Figures through to 2020/2021 have been set by DECC (DECC 2013a). Figures for 2024/25, 2025/26 and 2029/30 are CCC estimates (CCC 2013). Figures for other years are IPPR calculations.

The rationale for using levies to pay for policies

There are a number of reasons why energy policies are funded through energy bills.

- Several current and previous policies have been delivered through supplier obligations, where suppliers have to deliver their share of a policy programme or face a penalty. Supply companies have then passed the costs of delivering the programmes through to their customers. In theory, a competitive market will ensure that costs are kept low as suppliers compete to win customers.
- Until recently, this kind of levy-funded spending enabled governments to deliver policy without the scrutiny that is applied to government spending, especially at a time when most departmental budgets are being cut. As a relatively small portion of a total energy bill, the costs of government programmes went relatively unnoticed until increased public concern over the actions and profits of big six energy companies worked to heighten the scrutiny given to all aspects of household bills.
- This ability to distance the costs of the programmes from government's other spending meant that policies were insulated from political interference and therefore seen by industry as carrying less regulatory risk.

The costs of the other schemes in table 2.1 – those relating to the carbon price, intermittency, energy efficiency, and smart meters – are met by energy companies and then passed through to bills but are not classified as levies by government (who rely on judgments by the Office for National Statistics (ONS) on what constitutes a levy) and therefore are not counted within the LCF. However, it is the total impact of government policy costs that we consider in this chapter.

The CCC estimates that average energy bills will actually fall from £1,140 in 2013 to £1,100 in 2020,[12] but that the share of the bill that is accounted for by levies will increase from 7 per cent to 15 per cent over this period. It is then estimated that bills will increase to £1,305 in 2030 with levies representing 18 per cent of the total (CCC 2014).

The impact that the expected increase in levy-funded spending has on bills depends to a degree on changes in the other costs that make up the bill. Projections of future wholesale costs are particularly uncertain due to the volatility of the gas price, which typically sets the wholesale price of power.[13] If wholesale costs are low then the relative impact of increasing levies is greater, although the total bill will be less onerous. If wholesale costs are high then the relative impact of the levies is lower but bills will be higher, and therefore more closely scrutinised by billpayers. There are risks either way to the public – and hence political – perception of green and social levies.

Clearly it is important to minimise the costs of the low-carbon transition so that bills are kept as low as possible for all households. It is also important that the costs of the government's policies do not fall disproportionately on particular groups. In the following section we set out our analysis of the distributional impacts of levy-funded spending and explain why the costs are falling where they are.

Who pays? A distributional analysis

Using the Living Costs and Food survey (ONS 2014), we have estimated the energy consumption and expenditure of UK households by income decile.[14] Using calculations from the CCC report *Energy prices and bills* (CCC 2014), we have then been able to establish the total levy contribution from each decile in 2013 – the last year for which all the relevant data is available.

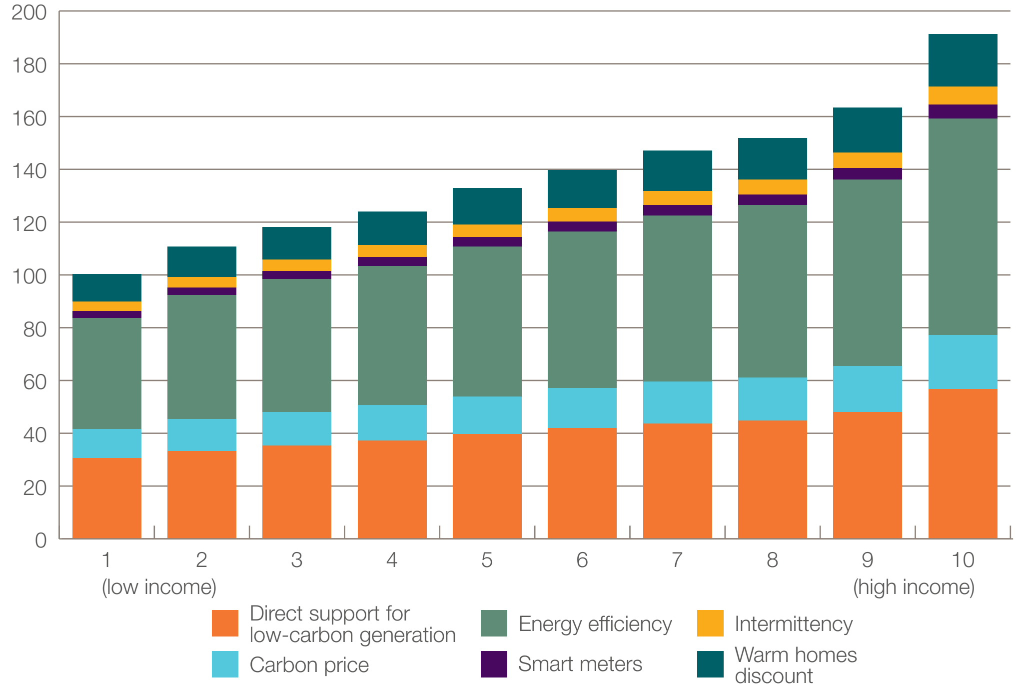
This chart shows that higher income groups are making a larger contribution towards the costs of government energy policies, and that there is a consistent increase up through the deciles. However, as figure 2.4 shows, the level of energy consumption also increases for successively higher income deciles, and at a faster rate.

12 All costs in this paragraph are in real 2012 prices.

13 Theoretically, an energy market will rank power stations in order of increasing variable cost and select the cheapest available station until demand is met. The price required by the most expensive station (known as the 'marginal plant') is the price that all generators receive. For the vast majority of the time, the marginal plant in the UK is combined cycle gas turbine (CCGT).

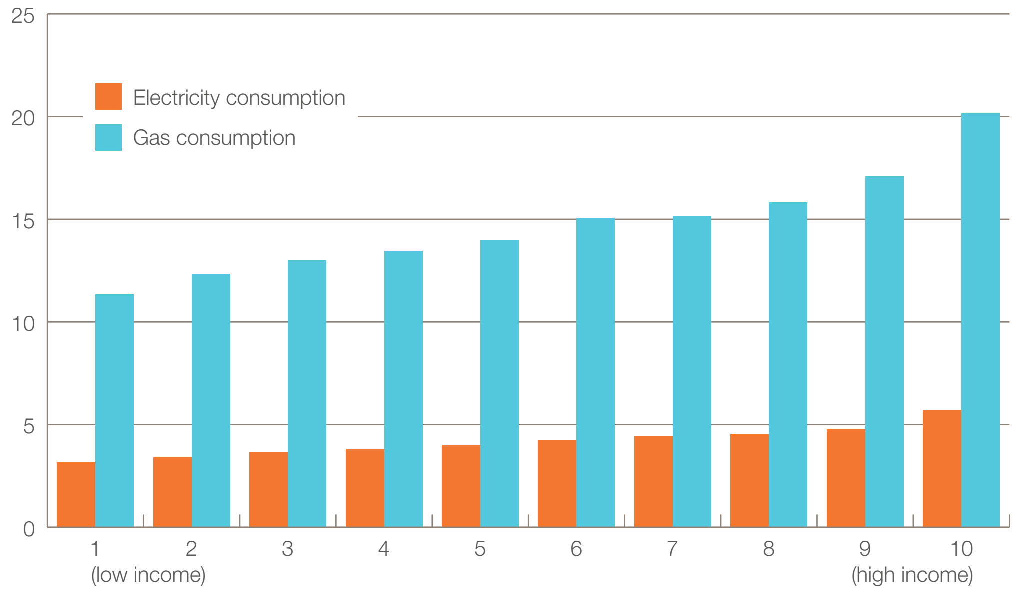
14 We estimated the electricity and gas consumption of households in our sample by taking reported weekly household energy expenditure from 2007 to 2012 and dividing these figures by the relevant regional and yearly average price of electricity and gas. We converted these weekly estimates of energy consumption to an equivalent yearly figure. This data was weighted in order to represent the true level of domestic energy consumption in the UK in 2013. In order to have a comparable measure of income, we uprated everyone's reported weekly household disposable income (income after tax) to July 2013 levels.

Figure 2.3
Which households are paying more towards the cost of energy policies?
Annual household expenditure on individual energy policies for all dual-fuel household bills, by income decile, 2013 (£)



Source: IPPR calculations using ONS 2014

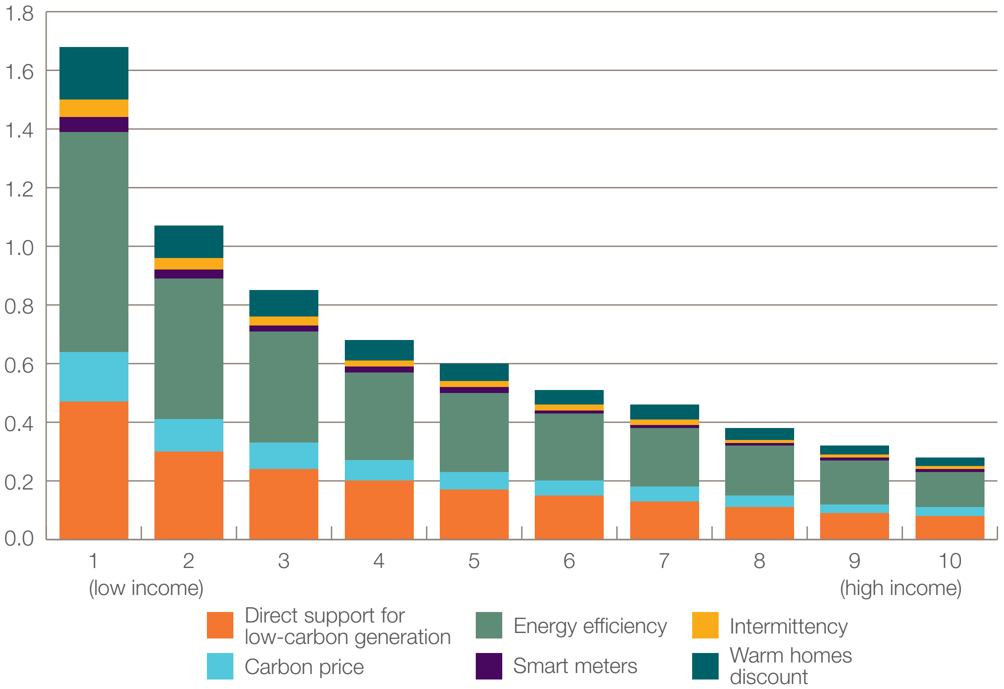
Figure 2.4
Which households are using more energy?
Household consumption of gas and electricity energy, by income decile, 2013 (MW)



Source: IPPR calculations using ONS 2014

In figure 2.5, therefore, we show the contribution that households in each income decile make as a proportion of income. It is clear from this graph that lower-income groups are paying a much larger amount, relative to their income.

Figure 2.5
Which households are paying more towards the costs of energy policies as a share of household income?
Annual household expenditure on individual energy policies for all dual-fuel household bills, by income decile, 2013 (% of income)



Source: IPPR calculations using ONS 2014

People within the lowest income decile – that is, the poorest 10 per cent of households – are spending 1.7 per cent of their income on energy policies. This is six times greater than those in the highest income decile, who contribute just 0.3 per cent of their income. The greatest jump between deciles is between the lowest income decile and the second lowest, who contribute 1.1 per cent of their income, a difference of 0.6 per cent, or almost one-third less.

It is not surprising that lower-income groups spend a larger proportion of their income on energy bills, and therefore on energy levies. However, the trend is exaggerated because many low-income consumers actually pay a higher rate for their energy, because they are often excluded from the lowest available energy tariffs. There is a lower level of internet access among these groups, which can prevent them from signing up for an online tariff, which is often the lowest price deal on the market, or from using online price comparison and switching sites and services (see Platt et al 2014).

Another factor is the prevalence of prepay energy meters in lower-income households. It is estimated that 10.8 million people in the UK – or 16 per cent of the population – use prepay meters to access energy. Although these are often valued by customers for the control that they offer, they add an average of £80 to an annual energy bill. Low-income households are overrepresented within this group, and are therefore often paying the most expensive tariff on the market (Vyas 2014).

Another group of consumers being overcharged by energy companies is those who have not switched supplier since the energy markets were opened up to competition in the 1990s (see Platt et al 2014). Ofgem recently found that 62 per cent of customers could not recall ever having switched supplier (Ofgem 2014). Lower-income households are overrepresented among this group as well: 68 per cent of those in social group E say they have never switched electricity supplier, compared with 51 per cent of social group AB, while these numbers are 64 per cent and 56 per cent respectively for gas (Ipsos MORI 2013).

IPPR analysis, conducted in 2013, revealed that:

- the gas bills of customers who had not switched supplier since the market was opened to competition were on average £76 per year higher than those of customers who had switched
- the electricity bills of customers who had not switched were on average £27 per year higher than those of customers who had switched (Platt et al 2014).

Because the cost of government policies are usually applied as a percentage of bills, these price differentials have a disproportionate impact on lower-income households.

The net effect of these regressive factors would be ameliorated if the government's policies were benefitting those same low-income groups – the following chapter investigates whether this is actually happening.

3.
WHO IS BENEFITTING FROM THE GOVERNMENT'S ENERGY AND SOCIAL POLICIES?

In this chapter we look at who is benefitting from the two largest levies: direct support for low-carbon power and energy efficiency measures. As set out in table 2.1, these two policies make up almost three-quarters – 38 per cent and 33 per cent, respectively – of policy costs in an average household dual-fuel bill.

Who benefits from support for low-carbon power?

There are currently two support mechanisms for renewable deployment. The feed-in tariff (FiT) subsidises small-scale technologies (under 5MW), while the renewables obligation (RO) supports larger-scale technologies. From 2017, the RO will be superseded by the contracts-for-difference (CFD) framework. This could also subsidise new nuclear power stations and carbon capture and storage (CCS) projects.

The renewables obligation

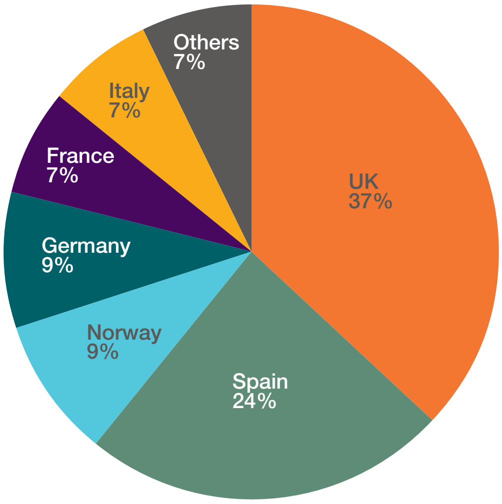
In 2013/14, the aggregate generating capacity supported under the RO was 2.8GW. The majority of this – 1.8GW – was in wind power, of which around 1GW was offshore and 0.8GW was onshore (Ofgem 2015b).

Figure 3.1 shows where the owners of the UK's onshore wind capacity were domiciled (for 2011/12). Although the data is out of date, our view is that the same broad percentages remain. There are more UK companies than any other nationality, but together they represent only a little over one-third of total onshore wind capacity. This means that 63 per cent of the subsidies that were levied from energy bills to support onshore wind were paid to foreign-owned companies, making it more likely that foreign shareholders were the ones that gained. It is not necessarily a bad thing that foreign-owned companies have such a large stake in the UK's onshore wind sector – they bring much-needed capital investment and expertise developed on the back of progress in other markets. But in a context where the costs of renewable technologies are likely to become increasingly controversial in the UK as levies increase, it may be harder to justify the status quo to billpayers if more of the industrial and financial benefits of these developments are not captured in the UK.

This situation is even more pronounced for offshore wind. As figure 3.2 shows, only 12.3 per cent of UK offshore capacity was owned by UK companies in 2011/12, behind Germany, Denmark and Sweden. Scandinavian companies accounted for nearly half (49.4 per cent) of total capacity.

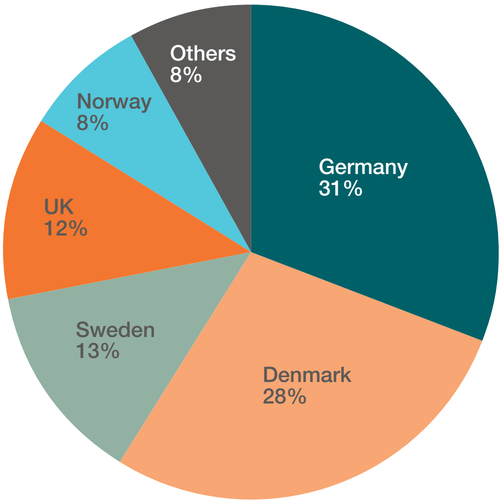
The same analysis highlights one further trend in the ownership of the UK's low-carbon infrastructure: the majority is owned by state-backed foreign companies. Overall, just one-fifth of the UK's total generating capacity (including non-low-carbon) was owned by these companies; however, this rises sharply to 50.4 per cent of offshore wind capacity and 68 per cent of nuclear capacity (Rutledge 2012). That is, more than half of the subsidies that UK billpayers contributed through levies primarily benefitted companies owned by foreign governments.

Figure 3.1
Who owns our onshore wind capacity?
Base country for owners of UK onshore wind capacity, by nation, 2011/12 (% of capacity)



Source: Rutledge 2012

Figure 3.2
Who owns our offshore wind capacity?
Base country for owners of UK offshore wind capacity, by nation, 2011/12 (% of capacity)



Source: Rutledge 2012

Another issue for the wind sector in particular is that only a very limited part of the supply chain is UK-based. Estimates of the UK content for capital expenditure in recent wind farm developments have varied from 10 per cent for London Array Offshore wind farm to 20 per cent for Thanet Offshore wind farm, 48 per cent for E.ON's Scroby Sands development and 50 per cent for Vattenfall's Ormonde project (McNeil et al 2013).

Although the RO has resulted in the deployment of a large amount of renewable capacity that would have otherwise not been developed, we argue that levels of UK ownership and supply-chain content will need to increase if the economic benefits of the renewables sectors in terms of jobs and growth are to be realised, and if public and political commitment and support for the transition is to be maintained. The greater the stake that UK businesses have in the low-carbon transition, the greater the proportion of benefits that can be expected to stay within the UK economy, close to the billpayers who are funding the programme.

The feed-in tariff

The RO, and the CfD regime that will replace it, are designed for large-scale technologies. These are typically owned by large companies and so, to a degree, the benefits of the scheme will always exist at a distance from billpayers. An alternative route by which UK billpayers might directly benefit from the low-carbon transition is through investment in smaller-scale technologies that are supported under the FiT.

The FiT was introduced in April 2010 across Great Britain. The scheme was originally intended 'to encourage deployment of additional small-scale low-carbon electricity generation, particularly by individuals, householders, organisations, businesses and communities who have not traditionally engaged in the electricity market' (DECC 2010: 6).

By the end of March 2015, 599,199 installations had been delivered under the FiT, 92 per cent of which were solar PV installations producing less than four kilowatts. The majority of these are on domestic properties and are individually owned. This diversity of ownership is unprecedented in the UK and in just five years has helped to increase levels of public support for the low-carbon transition (DECC 2015).

However, the FiT has been criticised for being regressively funded and for disproportionately benefitting people in those higher-income groups who can afford the upfront capital required to install solar PV (see for example Monbiot 2010). Although a number of market innovations have allowed residents to benefit from free electricity without owning the panels themselves (such as 'free solar' or 'rent-a roof' schemes and large installation programmes run by social housing providers or local authorities), the FiT has predominantly delivered for those residents with sufficient resources to invest in the scheme.

DECC estimates that the cost of the FiT made up just 0.06 per cent of the average 2014 dual-fuel household bill. But, while the scheme is paid for by all billpayers, it benefits only those who have invested in an installation. Due to the higher rates that low-income groups often pay for energy (as noted in the previous chapter), and the reduced likelihood that they gain directly from schemes like the FiT, it is these groups that are paying disproportionately for all energy programmes, relative to the benefit received in return.

Who benefits from energy efficiency measures?

There are a number of different policies aimed at delivering energy efficiency measures and tackling fuel poverty.

The Coalition government's flagship scheme was the Green Deal. This aims to provide loans to cover the upfront costs of installing efficiency measures.

There are also several programmes that attempt to tackle fuel poverty through income support. Together, the warm homes discount, cold weather payments, and winter fuel payments made up 83 per cent of the government's £3.2 billion of spending on fuel poverty in 2014/15 (Energy Bill Revolution 2013).

The rest is delivered through the energy company obligation (ECO), a key part of the government's approach to tackling fuel poverty.[15] This scheme obliges the largest energy suppliers – those with more than 250,000 customers – to install energy efficiency measures. In 2014, ECO cost £859 million, which companies pass on in bills.

This is of relevance to our own distributional analysis because all fuel-poor households come from the bottom four income decile groups, the same groups that are paying the most towards energy and social policies as a proportion of their income. In 2012, 41 per cent of all households in the lowest income decile were fuel-poor (DECC 2014a). If ECO is successful in tackling fuel poverty (because it reduces fuel costs for those on low incomes) then it will go some way to ameliorating the regressive nature of the current approach to paying for the low carbon transition.

However, the approach taken within ECO to target low-income and vulnerable groups is based on proxies related to who receives particular types of benefit, or who lives in certain deprived areas – and both are poor proxies for fuel poverty, which is a measure of both low income *and* high fuel costs. As we explain in chapter 4, identifying those in fuel poverty requires an on-the-spot, in-house assessment of the property and of the occupant's income. In 2013, IPPR calculated that, as a result of ECO's poor targeting:

- only 47 per cent of fuel-poor households were benefitting from ECO's provisions for low-income households
- 80 per cent of the funds spent every year (£433 million of £540 million) were spent on households that were not fuel poor (Platt et al 2013).

In the next chapter, we outline how energy efficiency policy can be redesigned to address these flaws, so that it works principally in the interests of genuinely low-income and fuel-poor households. It also outlines five other options for reducing the costs associated with the low-carbon transition and for protecting low-income groups from making a disproportionate contribution.

15 Fuel poverty is defined as households whose energy costs are above the median level and whose income after energy costs is below the official poverty line. This definition is measured with the 'low income, high costs' indicator.

4. REDUCING THE BURDEN ON BILLPAYERS

Rather than relying upon a funding model that requires unnecessarily high costs piled onto household and business energy bills, in this chapter we consider policy changes that could reduce the absolute cost – but not the ambition – of mitigating climate change and developing a low-carbon energy system. We also propose a way in which levies could be raised from bills in a fairer manner.

This is not intended to be an exhaustive list of ideas: we have focussed on six options that we believe could go a significant way towards creating a fairer transition to a cleaner and more efficient energy system.

1. Introduce a public ownership option for new nuclear capacity

The UK's experience in securing financial backing for two new nuclear reactors at the Hinkley Point C site, together with the likely ownership structure of that support and the impact of government decisions on future household energy bills, suggest that an alternative approach to funding new nuclear developments is sorely required.

The saga of Hinkley Point C

The UK has cross-party agreement on the need for a new fleet of nuclear power stations. In 2013, the energy secretary Ed Davey and business secretary Vince Cable published a nuclear strategy intended to pave the way for the construction of 12 new nuclear reactors at five different sites around Britain (HM Government 2013a).

The first of the new nuclear power stations to proceed is the 3.2GW project at Hinkley Point C in Somerset. According to EU regulators, the proposed new power station is set to cost a total of at least £24.5 billion (Gosden 2014) which, it is thought, will make it the most expensive power station ever built anywhere in the world (Liberum Capital 2013).

The consortium behind the proposed plant is led by the state-backed French utility EDF, which, it is widely expected, will hold a 40–50 per cent stake. Areva, another French state-backed company, owns the EPR reactor technology that is supposed to be used at Hinkley, and is likely to own a 10 per cent stake – although reportedly Areva could soon become a part of EDF (Probert 2014, Landauro and Masidlover 2015, De Clercq 2015). The UK prime minister and chancellor have signalled their backing for Chinese involvement in the project (PMO 2014), and it has been suggested Chinese state companies CNNC and CGN could take a 30–40 per cent stake. And there have been newspaper reports that additional finance may be secured from Saudi Arabia, Kuwait or Qatar (Butler 2015a, Critchlow 2014, Pickard and Parker 2013).

To ensure this consortium has confidence that it will make significant profits on its investment, a public subsidy of £92.50 per megawatt-hour (MWh) of power generated over a 35-year period has been promised. This is approximately twice the current market price of electricity. In addition, EDF has been offered £10 billion of taxpayer support through Treasury guarantees (Wintour and Inman 2013).

According to European regulators, this could all amount to a total subsidy of £17.62 billion (EC 2013), which will be raised primarily through levies on energy bills during the 2020s. The European Commission's assessment did not include other public support measures the government has put in place for all nuclear stations – for example, action to limit the liabilities that would be incurred by a plant's owners in the event of a major accident (Parr 2014), and complicated support mechanisms for the management of radioactive waste (Jackson Consulting 2011).

Analysis from Liberum Capital concluded that the government's proposed financial arrangements for Hinkley Point C could reward shareholders with returns of 20–35 per cent on their investments, with dividends totalling £80 billion over the lifetime of their government contract (Utility Week 2013). Carbon Connect, a cross-party group of policy experts in parliament, has suggested that returns on the project are likely to be in the region of 15 per cent, similar to the returns seen on private finance initiative (PFI) contracts, which have typically generated returns of 12–15 per cent (Leveque and Robertson 2014, Carbon Connect 2014). However, EDF insists that returns are more likely to be around 10 per cent (ibid Carbon Connect).

Nonetheless, even with planning permission, site licences, reactor design approval, and this extraordinary level of subsidy – guaranteed in law and backed by cross-party parliamentary support – it has not, so far, been possible to secure a final investment decision in order to commence construction. The power station was supposed to be generating power by 2017, but it now looks unlikely to be on the grid until the 2020s, if at all.

The risks of major energy investments

Both the high level of public subsidy and the uncertainty around whether the consortium will actually commit are a product of the same problem: significant risk from a variety of sources.

There are risks of **hold-ups in the planning system and in regulatory approva**l of the reactor design. Indeed, the existing process is already behind schedule, in part due to an investigation by French authorities into the safety of the EPR reactor design (Lichfield 2015).[16]

There is a risk, as the bank UBS recently identified, that a significant **technology breakthrough** in the energy sector leaves projects such as this commercially unattractive, unable to compete with cheaper low-carbon technologies (Vidal 2014).

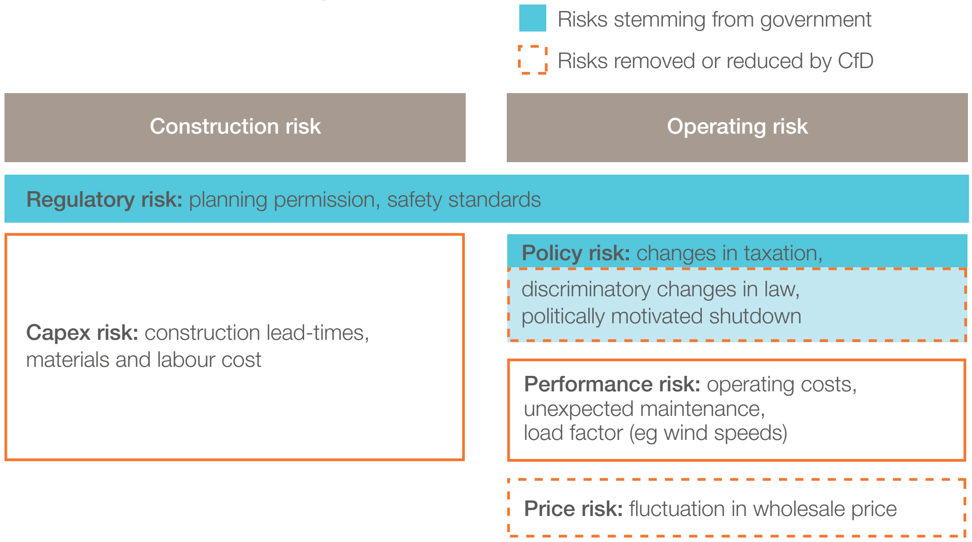
There are technical risks that **construction and maintenance costs** will overrun – perhaps the fuel will be more costly than anticipated or the building timetable will slip. Other nuclear projects under construction at Olkiluoto in Finland and at Flamaville in France have both fallen years behind schedule (Butler 2015b, Jolly and Reed 2015). Pierre Noël of Cambridge University's Electricity Policy Research Group has described the record for building plants on time and within budget as 'between horrendous and terrible' (ibid Jolly and Reed).

A substantial share of the risks associated with new nuclear stem directly from **uncertainty over future government policy.** Changes in policy and regulation pose a high risk to investors in nuclear power, whose returns are heavily dependent on subsidies and favourable regulatory environments, and span over a period that far outlasts political cycles. There is the risk of a significant change in energy policy, as we saw in Germany (Dempsey 2011), Switzerland (WNA 2015) and Japan following the Fukushima disaster. Germany's abrupt decision to shut down all nuclear plants caused RWE's share price to halve in just three weeks. In France, safety upgrades ordered by the nuclear regulator in 2011 are expected to cost EDF £7.5 billion over six years (Burke et al 2012). UK investors will also remember the windfall tax of

16 We acknowledge that there is also significant debate over whether EPR technology is the most cost-effective reactor technology, or whether it would be better to draw on other available nuclear technologies when building new nuclear power stations in the UK.

1997, which punished the newly privatised utilities sector with taxes amounting to several billion pounds. Although CfDs now provide investors with some protection against discriminatory changes in law and politically motivated shutdowns (Decc 2013d), significant policy and regulatory risks remain.

Figure 4.1
Risk factors that impact upon the cost of building new power stations
Including where factors are based on government policy or addressed by the contracts-for-difference programme



Source: Frontier Economics, briefing to IPPR, May 2015

All of these risks translate into a higher cost of capital. In order to make a project like this sufficiently profitable to attract the major private investment required, in spite of these risks, there is a need for ever more generous subsidies – not just through contracts-for-difference but also through Treasury loan guarantees. These in turn pile high costs onto the public, as has been demonstrated with the process for progressing Hinkley Point C.

The array of different public subsidies set to be paid to state-backed foreign utilities in order to enable Hinkley Point C to be built has made the project controversial among even the most ardent supporters of nuclear power. Indeed, there have been political calls for a probe by the National Audit Office (Pickard 2014).

After Hinkley Point C: introducing a public option

The government may consider it is too late to alter the arrangements for the Hinkley Point C project, since adopting a new approach at this point would be damaging to investor confidence in the British energy sector as a whole. However, there is no reason that the government should not change the financing approach it considers other nuclear projects over the next decade.

If new nuclear power projects are to continue to be supported, beyond Hinkley Point C, the government should use different financing arrangements that would provide better value for money for the British public and, by effectively socialising the policy risks of development, would increase the likelihood of success in reaching the point of construction.

To reduce the cost of capital, risks should be borne by the party that is better informed about and better able to mitigate such risks. Costs would fall if policy and regulatory risks were transferred to the government, while capital investment and performance risks remained within the private sector. This could be achieved by the British government owning any new reactors while outsourcing their construction and operation to private firms. Indeed, the International Energy Agency has reported that: 'Nearly all new nuclear construction in recent years has taken place in price-regulated markets or in markets where government-owned entities build, own and operate the plants' (IEA 2015).

One benefit of this approach is that the government is likely to have better information on its own policies than private firms, so is less likely to misprice policy and regulatory risks. Public ownership could also provide the government with a disincentive to introduce destabilising changes in nuclear policy, which would further reduce these risks and drive down the cost of capital.

In 2014, National Grid produced scenarios for meeting legally binding targets on low-carbon energy and climate change, and estimated that, beyond Hinkley Point C, a further 14.2GW of cumulative additional nuclear capacity would be required by 2035 (National Grid 2014).[17]

Original modelling by Frontier Economics for IPPR suggests that public ownership during the construction phase, followed by selling the completed asset to the private sector, could lower the cost of capital by a 0.2–0.4 per cent, which would save consumers £1.2–1.8 billion (in 2012 prices) between 2015 and 2035. If public ownership were to continue through the operational phase, but a private company was contracted to run each individual plant, costs could be lowered by a further 0.8–1.2 per cent through to 2035, producing additional savings for the consumer of £2.5–3.7 billion over this period. Since this is money that would otherwise be taken from households and businesses through their energy bills, this amounts to projected savings of £35–57 per household over the next 20 years (in 2012 prices).

These are illustrative figures and not exact estimates, but they show the magnitude of potential savings. They are based on the existing literature on regulatory and policy risk premiums and the extensive experience of Frontier Economics of speaking to energy investors.[18]

The estimated savings assume that a change in ownership has no effect on efficiency. If government ownership were to increase capital expenditure per MW by more than 2 per cent, any potential savings would be offset. However, the academic literature and empirical evidence is not conclusive in this area: it suggests government ownership of a project can either increase or decrease efficiency. This is especially the case for nuclear power, which is heavily dependent on state subsidies. The Hinkley Point C contract specifies that the British government will receive 30–60 per cent of any profit above the expected return on equity, as well as 50–75 per cent of any construction gains (based on predefined thresholds). This has the effect of substantially reducing the incentive for private operators to reduce costs.

The main question is whether the public sector would be able to harness the necessary skills and expertise to manage large energy infrastructure projects efficiently. If this is achieved, we do not see that government ownership of nuclear projects would be less efficient than the current arrangement.

17 This 'Gone Green' scenario is in line with spending limits imposed by LCF up to 2020. It assumes the renewable energy target for 2020 and carbon budgets are met as well as an 80 per cent reduction in greenhouse gas emissions by 2050, in line with the Climate Change Act 2008.

18 According to Frontier Economics, non-nuclear generation investors may typically factor a policy risk premium of around 1 per cent into their weighted average cost of capital (WACC) calculations; one would expect the policy risk premium on nuclear investors to be at least 1 per cent. Further, to reflect the severity of regulatory and policy risk outlined above, their combined risk premia should be similar to the capex risk premium. Frontier has previously estimated the construction risk premium to be 1–2 per cent, based on a range of construction project types.

In our view the size of the potential savings demonstrate that there is a strong argument that a greater public role in any new nuclear projects could bring substantial savings to families and businesses.

While it is not the subject of this report, it is worth noting that British ownership of new nuclear power stations would also allay security concerns raised in response to the prospect of the Chinese and Middle Eastern governments owning a stake in UK nuclear infrastructure (see Macalister 2012).

Table 4.1
Projected savings for new nuclear development, 2015–2035
Real 2012 prices

		2020	2025	2035	Discounted total, 2015–2035
Total savings (£bn)	Full public ownership	0.1	0.3–0.4	0.7–1.1	3.7–5.5
	Public construction	0	0.1	0.2–0.4	1.2–1.8
Average household savings (£)	Full public ownership	1	3–4	8–12	38–57
	Public construction	0	1	3–4	13–19

Source: Frontier Economics, briefing to IPPR, May 2015

Would public ownership be affordable?

The new Conservative government has said that it will run a surplus on its overall budget from 2018/19, although we will not know the details until its first budget is announced in early July. It is likely that the bulk of the cuts needed to achieve this aim will fall on welfare spending and current government spending. But in the March 2015 budget, which was based on a similar path for overall borrowing, public sector net investment spending was set to fall from 1.6 per cent of GDP in 2015/16 to 1.4 per cent in 2018/19. Gross spending, in cash terms, increases from £68.3 billion to £73.6 billion – or by almost 8 per cent.

This spending envelope could therefore enable investment in new nuclear stations alongside other major infrastructure projects, such as the HS2 high-speed railway. The government already has a stake in other significant infrastructure projects, such as Crossrail and London Underground upgrades, and has previously invested in other similarly large-scale infrastructure, such as the Eurotunnel, London 2012 Olympic and Paralympic Games facilities,[19] and the East Coast mainline (see Helm 2013).

We recognise that budgets are tight and that there are many calls for expenditure. A fleet of new nuclear stations on the scale proposed in the government's nuclear strategy, paid for this way, is unlikely to be feasible, since it would cost around £60.5 billion.[20] In April the chancellor said he did not want the government to step in and build a single new nuclear plant because of the squeeze it would place on other infrastructure spending, such as road building: 'If we were to build [Hinkley Point C] just as a government project, then it would squeeze out vital investment on roads like the A303 or the A358 or the electrification of the Great Western mainline' (Cork 2015).

19 The London 2012 Olympic and Paralympic Games is an example of how large-scale government investment can be economically productive. It cost the taxpayer £8.77 billion but the economic benefits of the games have been large and continue to be felt. The four-year target of £11 billion in economic benefits was achieved in 11 months and the second annual legacy report, published last year, concluded that the benefits to the UK economy have reached £14.2 billion and are still rising (HM Government 2014).

20 Frontier Economics, briefing to IPPR, May 2015.

Our view, by contrast, is that there is a strong case for long-term borrowing for major capital projects, including in low-carbon energy generation (see Dolphin 2014). Right now, the real (after-inflation) cost of borrowing for the government is zero, so it makes sense to borrow more for this kind of productive investment with the potential to raise economic output. Furthermore, as IPPR has argued previously, there is no reason why the current generation of energy consumers should pay for the benefits associated with preventing the worst consequences of climate change, since these will mostly accrue to future generations. Borrowing can and should enable future generations to contribute towards their protection from climate change risks (Lockwood 2013). Furthermore, public ownership of new nuclear power stations would transfer profits arising from their operation from businesses to taxpayers. This would relieve budgetary pressures in the long run.

2. Adopt the Danish model to cut the cost of offshore wind projects

Unlike new nuclear projects, new offshore wind projects are being actively built in the UK. Over the past five years, on average, a turbine went up in UK waters every 48 hours (Freeman 2014). Britain now has more installed offshore wind capacity than the rest of the world combined (GWEC 2015: 55). Already 3.7GW of offshore wind capacity is in operation, and a further 1.8GW is in construction – which will bring the total number of turbines to around 1,500. In 2014, Siemens announced it would open a new factory at Green Port Hull on Humber, with the creation of 1,000 jobs, in order to meet the projected new demand (Siemens 2014).

The UK is regarded as the most attractive place in the world to invest in this technology – often referred to as 'the Saudi Arabia of offshore wind' – and between 2010 and 2013, £7.7 billion was invested in UK offshore wind projects (PwC 2014). Up to 2020, PwC expects £12 billion in new offshore wind investment (ibid), and the Green Investment Bank says it expects more than 10GW of capacity to be built by the same date – or around 1,000 more turbines (UKTI 2014).

While this growth is extremely encouraging, the public are not getting the best value for money because of the government's drawn-out approach to planning. In our view, this should change.

The costs and risks of offshore wind developments

We have argued previously that support to offshore wind should remain in place so long as cost reductions are achieved(McNeil et al 2013). As we set out in chapter 2, billpayers currently contribute to offshore wind projects through the RO subsidy scheme, which will be superseded by the new CfD in 2017. This scheme will see offshore wind farm owners paid subsidies through 15-year fixed, index-linked contracts. The government expects these to be worth £155 per MWh of electricity generated until 2017/18, at which point the rate is expected to be lowered to £140. Some major offshore wind companies have suggested they would need far less support if they had greater certainty over whether or not there will be demand for their power in the 2020s (HM Government 2013b). DONG, for example, foresee that they could bring projects online for £86 by 2020 (Gosden 2013).

A number of factors determine what this subsidy level needs to be in order that these projects are viable (McNeil et al 2013), but an important one is the cost of the development and consent stage. Before licensing and planning approval can be offered there must be coastal and seabed surveys, and surveys of the likely impact of a development on the landscape, the natural environment, and other users of the sea in the proposed area, such as the fishing and oil and gas industries (DECC 2013b). This process has spawned an industry of companies who specialise in helping offshore wind developments to get over the various hurdles along the way to a final investment decision and construction. Nevertheless, the Offshore Wind Cost Reduction Task Force has highlighted problems with this part of the process:

‘Delays and uncertainty increase cost, extend development timelines and impact investor confidence … consenting remains a major concern for the offshore wind industry’ (OWCRTF 2012).

This stage can take many years and require substantial sums of money. Trade association Renewable UK estimates that the average project in the last round of offshore wind developments took more than six years to receive planning consent, and that projects in the new ‘Round 3’ programme projects will take up to five years to be approved (Freeman 2014). ‘The full offshore wind farm development process, from award of lease to full operation beyond Round 2, is now expected to take around 10 years, if not longer.’ One particular problem identified by the industry is that different government agencies involved in the consent process have been cut back, and lack the resources and the skilled workforce required to speed up approvals (ibid).

The Crown Estate, which owns most of the seabed around the UK and licenses it for offshore wind developments, estimates that about 4 per cent of the capital costs of an offshore wind project arise during this process (Crown Estate 2010). For a 500MW offshore wind farm, it says, developers must usually spend around £60 million in the preliminary development and consent phase, and this figure is thought to be higher still for very large projects: around £100 million for a 1GW project.[21]

Despite the high cost, this expenditure does not guarantee that developers will receive planning permission or licences, or be awarded the CfD required to make their project economically viable – these investments might end up as sunk costs. IPPR understands there are currently around eight approved offshore wind projects, totalling 6.35GW of capacity, seeking a CfD.[22] There are another three projects in development, totalling 5.3GW of capacity, without consents or a subsidy contract.

And even if a project is approved, new conditions may be attached – for example, to change layouts or mitigate one impact or another – all of which add further delays and costs.

This array of risks in the development of an offshore wind project – the possibility of delays, the refusal of licences, planning approvals, or subsidies – all increase costs. These ultimately find their way through to consumers and mean that the amount contributed by households and businesses through the LCF component of their bills is higher than it would otherwise need to be.

To try to reduce the level of these risks, and to accelerate the consent process, the Crown Estate was asked by DECC to define offshore zones where wind projects could expect a good chance of being granted consent, and to provide significant background data. This follows a strategic environmental assessment conducted by DECC. However, the process still places most of the onus – and therefore the risks – on the developers, who must do most of the preliminary work before seeking consent and finding out if they will have access to licences and government subsidies.

The argument for this arrangement is that private-sector competition is the best way to drive innovation and efficiencies and to find the best sites at the lowest cost. But in practice, the public are paying through energy bills for costs associated with offshore wind farms that may never be built. Out of recognition of the problems that are arising, the government and the wind industry taskforce is now encouraging more collaboration between developers to try to share knowledge, avoid duplication of efforts, and better manage risk (see OWCRTF 2012).

21 Nick Medic of Renewable UK, in conversation with the authors, 27 May 2015.
22 Nick Medic of Renewable UK, in conversation with the authors, 27 May 2015.

The Danish model: a lower-cost alternative

The Danish model offers an alternative and almost certainly lower-cost approach. Earlier this year the Danish government announced it had developed the cheapest offshore wind farm in Europe to date (Murray 2015). The Danish energy minister, Rasmus Helveg Petersen, said: 'We have developed an efficient procurement model which the whole of Europe can take inspiration from.'

In Denmark, specific areas at sea are strategically identified by the government and mapped out as designated sites for the development of a proscribed volume of large offshore wind farm capacity. The government's Energy Agency carries out the necessary development surveys and impact assessments for these sites, and announces a government tender for each specific area (DEA 2015). Companies are essentially bidding for a package that includes a subsidy contract, all the necessary regulatory approvals and licences, and a grid connection back to shore via a sea cable.[23] The price of the package depends on the nature of the project, so the Energy Agency invites developers to submit a bid price at which they would be willing to produce electricity. In this way, a number of risks have been removed from the process, and construction can begin soon after the tender is awarded. The model also creates greater predictability for suppliers, so that they too can lower costs, and for investors, making capital easier to access.

This approach removes the risk that exists in the UK where one government agency or another might object to a developer's planning permission or licence after their costs have already been sunk. In Denmark, it is the government that is inviting companies to bid to build the offshore wind farm at the particular site in question, and the government has engaged all interested parties – including other government agencies, such as defence, fisheries and nature protection bodies – in determining which sites it wants to see developed.

Since the government has assessed how many wind farms it wants to subsidise before it opens an auction and invites bids, this approach should also remove the risk that hundreds of millions of pounds of development costs are sunk. Cross-party support for any plan would strengthen confidence in this approach and further help to minimise risk and therefore costs; this could be achieved by putting the sites designated for development into legislation.

This approach is transferable. In 2013, the Netherlands decided to adopt the Danish model.[24] By 2023, the Dutch will tender for the construction of 4,450MW in offshore wind power, assuming the cost of the technology will fall by a further 40 per cent. This decision is underpinned by an 'Energy Agreement for Sustainable Growth' that was approved with cross-party backing in the Dutch parliament, and which has the support of employers, trade unions and environmental groups.

We believe if the UK were to adopt this more strategic approach it would have the effect of bringing down the level of subsidy that developers think is required to build offshore wind farms. While it would put some additional costs onto government, there is nothing that prevents such costs being recouped during the auction process.

If this were to happen, there would need to be special arrangements for those projects that have already been through development and consent but that have not yet received a CfD. Developers will have collectively spent hundreds of millions of pounds developing these proposals over the past few years, so any change to the policy approach for offshore wind farms would likely be challenged by them if it applied retrospectively. The new model we are advocating should therefore be adopted for future projects only. After all, the National Grid's scenario (see

23 The developer must pay for a sea-cable grid connection in the case of smaller wind farms that are less than four kilometres from shore, but access to the grid is assured.

24 Nick Medic of Renewable UK, in conversation with the authors, 27 May 2015.

note 16) assumes that there would need to be continued growth in offshore wind deployment for carbon targets to be met.

Alongside this kind of government-led tendering process, there is no reason that ministers could not leave open the option for the private market to identify other offshore wind sites on its own initiative, and to develop them more cost-efficiently and thus for a reduced public subsidy. This is allowed in Denmark but, to date, only one large offshore wind park has been brought forward through this private-led route, and no others are expected. While this 'open door' approach has been used in Denmark for smaller projects that are closer to the shore, even these will in future be tendered in the same way as the bigger, further-offshore projects.

A more radical option would be for the British government to take on the ownership of some offshore wind farms. These could be built and later sold into the private sector or kept in public hands and leased to private firms. The cost implications of this are explored in appendix A. However, since many offshore wind farms are being built we do not believe there is any market failure that would justify the government taking on such a role.

3. Lift the moratorium on onshore wind farms

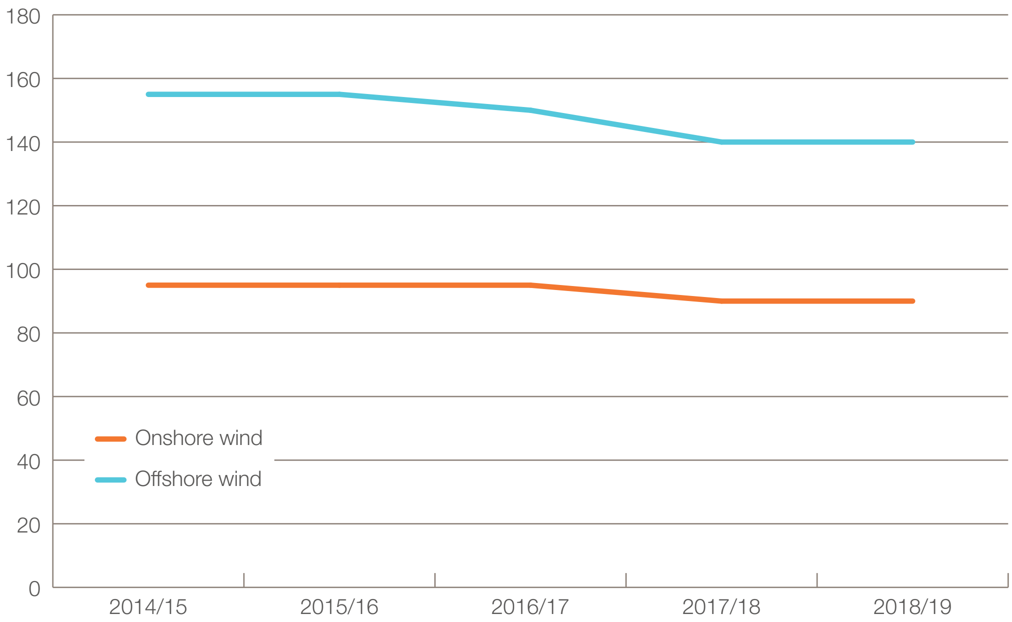
Onshore wind farms make a substantial contribution to British energy security. In 2014, the UK benefitted from 8.2GW of installed onshore wind power capacity from around 5,000 turbines which provided around 17TW hours per year of electricity – enough to meet the demand of around 4 million homes (Renewable UK 2015).

The CCC has estimated that Britain has a 'practical resource' of onshore wind that could allow this figure to rise to around 83TW hours per year of power (CCC 2011). They reached this figure based on a judgment regarding 'the level that would be acceptable to society'; they excluded national parks, areas of outstanding natural beauty, sites of special scientific interest, and greenbelt land; and they applied a 'proximity constraint' to account for public tolerance for wind farms near settlements. Another study by Arup for DECC concluded the UK could generate up to 60TW hours per year from onshore wind by 2030 (Bassi et al 2012), while National Grid's 'Gone Green' scenario – in which the UK hits targets on climate change and clean energy – foresees 36GW of onshore wind capacity in 2030 (National Grid 2014). In both cases, future generation is anticipated to be around four times greater than it is at present.

However, the Conservative party's 2015 general election manifesto promised to 'halt the spread of onshore wind farms' and said the party would 'end any new public subsidy for [onshore wind] and change the law so that local people have the final say on windfarm applications' (Conservative Party 2015). Since then, new energy and climate change secretary Amber Rudd has signalled that the government will follow through on these promises and take action so that the subsidies that would have previously been available for onshore wind farms will be removed. Reports suggest that 3,000 wind turbines that have already received planning consent could have no access to subsidies, while another 3,000 that are in planning but have yet to receive consents or subsidies could essentially be shelved (Gosden 2015).

Since onshore wind technology is the cheapest low-carbon power source available in the UK, ruling out any growth in this sector will have the effect of increasing the cost of achieving legally binding targets on climate change and clean energy. To illustrate, a study by the Royal Academy of Engineering last year suggested that replacing a single onshore wind turbine with offshore wind power would cost billpayers an extra £300,000 a year in subsidies (RAE 2014).

Figure 4.2
Onshore wind capacity is much cheaper than offshore capacity
Prices under contracts-for-difference, 2014/15–2018/19 (£/MWh, 2012 prices)



Source: DECC, *Investing in renewable technologies – CfD contract terms and strike prices* **(DECC 2013c)**

IPPR calculations suggest that if the UK were to directly substitute offshore wind in the place of the growth that could otherwise have been expected in onshore wind through to 2030, based on Arup's figures for DECC, this would cost consumers approximately an extra half a billion pounds through to 2030.[25] However, if this is revised further to take into account the quantity of new onshore wind assumed by the National Grid's target-meeting scenario – a further 27.8GW by 2030 – then we estimate that the onshore wind moratorium could raise the cost for consumers of meeting climate targets by around £3 billion through to 2030.[26] This estimate is in line with analysis by Scottish Power, an energy company with a commercial interest in onshore wind in the UK, which found that prematurely ending support for this industry – as the government proposes to do – will end up costing consumers a total of an extra £2–3 billion (Gosden 2015). Considering the implications of replacing 12GW of onshore wind with offshore farms instead, the CCC previously put the cost at around £900 million per year in 2030 (CCC 2015).

Alongside the Conservative manifesto pledge to stop onshore wind growth was another pledge to 'meet our climate change commitments, cutting carbon emissions as cheaply as possible, to save you money'. It is clear that making good on this promise will require that the government lift its moratorium on onshore wind, and we recommend for billpayers' sake that it does.

25 This is calculated as follows: strike price for offshore wind in 2019 (140) minus strike price for onshore wind (90) x 43 (the Tw/h practical onshore wind resource that is blocked to 2030, based on subtracting the current figure from Arup's projected total resource to 2030) x 0.25 (load factor for onshore wind).

26 This calculation is necessarily only illustrative. It is likely that other, cheaper technologies such as solar would also be used in the place of onshore wind. If this is the case then the cost to billpayers would be less than our upper estimate. It is also possible that more expensive technologies such as tidal lagoons will be developed, which would increase costs above our estimate.

4. Replace the capacity market with a strategic reserve

As part of the electricity market reform (EMR) package, the Coalition government introduced the capacity market. This guarantees the security of energy supply by providing payments to energy companies, on top of their electricity revenues, to ensure that they deliver energy or reduce demand when needed (DECC 2014b).

The capacity market is a response to two main concerns that have emerged in recent years. First, operators of fossil-fuel power stations have indicated that their expected future revenues from the electricity market may be insufficient to bring forward enough investment to replace old power stations that are reaching the end of their lives. Second, there is a concern that some power stations, particularly older gas plants, are not currently profitable and may close prematurely. This threat to security of supply was felt to be great enough to design and introduce a new mechanism to ensure that sufficient capacity is available in advance.

The capacity market is an annual auction: the required capacity is set in advance by the government, and operators bid to receive a contract to provide that capacity, over one-, three- or 15-year terms. Following consultation, the government decided to introduce a capacity market across the energy market because it 'offers the surest way to ensure security of supply against a range of scenarios' (DECC 2011). This means that any provider of capacity can bid for contracts (apart from providers of low-carbon capacity, who are rewarded through other mechanisms such as feed-in tariffs and contracts for difference).

In 2018, the first year of capacity market payments, £956 million will be awarded to successful operators. The costs are recovered from energy bills and it is therefore important that the mechanism is as cost-efficient as possible.

However, there are two principal inefficiencies that we recommend should be addressed. First, the capacity market is effectively compensating the carbon-intensive generation that is being penalised through another government policy, the unilateral carbon price that the chancellor introduced during the last parliament. The consumer is therefore paying to both penalise and incentivise this generation at the same time. Policies delivering security of supply must be aligned with policies supporting decarbonisation – they are currently increasing costs to billpayers unnecessarily.

Second, the capacity market itself is designed in such a way that it is an inefficient way of guaranteeing security of supply. As IPPR has previously argued, a targeted strategic reserve would reduce costs and provide greater control over the nature of spare capacity (Platt et al 2014). Rather than allowing all capacity to bid into the market, a strategic reserve is an amount of capacity that would be competitively procured by a central body, such as National Grid, and then held back from the normal market. This capacity would only be drawn upon as a last resort when other capacity is unable to meet demand.

The government considered this option in an impact assessment in 2011, and found that a market-wide capacity market would cost £1.5–2.5 billion each year, against only £0.3–0.35 billion for the strategic reserve. However, the government's assessment suggested that the market-wide option would reduce wholesale prices because the additional revenue for operators would mean they required a lower price from the open market.

This conclusion, of course, presupposes a competitive market in which cost reductions are passed through to consumers. The energy market is currently being reviewed by the Competition and Markets Authority, as it has 'reasonable grounds for suspecting that features of the energy market were preventing, restricting or distorting competition' (CMA 2014). Until this issue is resolved there is a danger that the additional revenues that operators receive via the capacity market will not result in lower bills for consumers.

In the end, the government decided to introduce a market-wide mechanism because their analysis suggested that a strategic reserve, despite its far lower cost, would not address the issue that operators were not receiving sufficient revenues from a market that includes an increasing proportion of low-carbon generation. There are a multitude of market dynamics that affect the total costs of the mechanism and the impact that it has on the price of power and consumer bills, and it is beyond the scope of this paper to assess all of these. Nonetheless, our view is that without a competitive market, the high costs of the government's chosen policy approach will not be counteracted by a lower price of power and therefore the costs of the mechanism are unnecessarily high.

We recommend that the capacity market should be replaced with a targeted strategic reserve that makes annual assessments of security of supply and procures capacity accordingly via a competitive process.

There are two further policy changes which are related to the capacity market and security of supply. IPPR has previously argued that the UK's unilateral carbon price is an expensive and inefficient means of reducing emissions from carbon-intensive generation such as coal power stations (Aldridge and Straw 2015). Current policy will see the carbon price paid in the UK rise to £78 in 2030, up from approximately £23 today. We recommend, first, that the carbon price is held steady at £23 until the price in the EU emissions trading scheme rises above that level; and second, that targeted pollution controls are placed on the UK's ageing coal power stations. Together, these changes would phase out coal generation by 2025 and save consumers £985 million between 2017 and 2030.

5. Replace the current energy efficiency policy with a 'Help to Heat' strategy

The simplest way to reduce the costs on household energy bills is to reduce the amount of energy that is consumed. The thermal and electrical efficiency of the UK's housing stock is very poor. This drives up costs for householders and increases fuel poverty. As we set out in chapter 2, the government's existing approach to tackling fuel poverty and delivering energy efficiency is flawed. Its principal policy, ECO, is ineffective at targetting the groups that are most in need of assistance.

Determining whether a household is fuel-poor requires information about their income and energy costs, which can only be measured accurately through an in-house assessment. IPPR has previously set out a framework for improving the delivery of fuel poverty and energy efficiency programmes called Help to Heat (Platt et al 2013). This approach involves local organisations providing free energy efficiency and fuel poverty assessments to households, which would enable fuel-poor households to be accurately identified. These households would then receive subsidised energy efficiency improvements, and those found not to be fuel-poor would be encouraged to make efficiency improvements using a low-cost Green Deal loan. The scheme would target low-income areas initially, and so the beneficiaries of the free assessments during this early stage would predominantly be low-income households.

Our view is that if Help to Heat is taken forward, low-income deciles would benefit more than they currently do. This would go some way towards rebalancing the benefits of the government's wider programme of low-carbon policies towards the groups that disproportionately fund them. It would also mean that levy-funded energy efficiency schemes would be progressive: the beneficiaries would be low-income groups and the greatest costs would fall onto higher-income groups.

We believe that the current energy efficiency programme should continue to be funded from levies on energy bills. We recognise that this puts us at odds with some consumer groups, political parties, energy companies and trade unions who have argued for insulation schemes to be funded entirely through taxation. Our concern with such an approach is that if energy efficiency is transferred into current budgets then it would be captured by the wider programme of spending cuts through this parliament, and funding for it thus reduced.

We agree, however, that there is a very strong case for using capital budgets to invest in energy efficiency as infrastructure. Studies have shown that this could generate a threefold return on government investments in GDP terms, as well as benefitting millions of householders (Washan et al 2014). ECO runs until April 2017, at which point a new programme will need to be introduced. In our view the government should take this opportunity to raise the level of support given to home insulation by making use of capital budgets.

6: Offer every consumer a green levy allowance

As is outlined in chapter 2, low-income groups are, in general, paying a higher rate for their energy. The ongoing inquiry into the energy market by the Competition and Markets Authority, and the way in which the government responds to the findings, provides some opportunity to address this. However, it is unlikely that such proposals will be able to fully deal with the problem of people on a low income paying too much for their energy. Nor will the inquiry be able to address the fact that levy-funded spending for clean power generation is overwhelmingly supporting programmes that will not benefit these groups.

In addition to a Help to Heat programme, one option for better protecting low-income groups would be to allow all households a certain level of levy relief – a green levy allowance, or an amount of energy consumption which is levy-free. This would mean that households consuming less energy would be making either a lower or no contribution towards energy and social policies. As our analysis shows, lower income deciles generally consume less, and therefore this sort of approach would benefit these groups the most.

Because there would be a jump in the price of power above a certain level of consumption, at the point levies start being added, this could incentivise action to improve energy efficiency, by penalising high levels of energy consumption. However, it may also have the opposite effect, whereby consumers feel the reduced cost means they can use more energy. This could be controlled by setting the allowance at a low level. We do not suggest here what the scale of the allowance should be.

A levy-free allowance has been used elsewhere – for example, to protect consumers from the regulatory energy tax in the Netherlands (see IEA 2014). This tax was placed on the gas and electricity use of all Dutch households and about 95 per cent of companies. However, all consumers were given an allowance of $800m^3$ per year for gas and 800kWh for electricity. The levy-free allowance reduced the amount of tax individuals and businesses had to pay without reducing the incentive created by the tax (MHSPE 2004). A similar allowance also exists in Ireland, where water charges have recently been introduced. All households with children are entitled to a free allowance of 21,000 litres of water per child to cover normal water and wastewater needs (Citizens Information 2015).

It should, however, be noted that there are also many low-income households that consume a lot of energy because they live in poor-quality properties. These groups would see less benefit from the proposed levy-free allowance, so it is important to target such users through energy efficiency measures as well.

A levy-free allowance would reduce the revenue that is raised through energy bills unless levies increase for consumers using more than the allowed level. However, the other proposals we set out above would reduce the total revenue required for low-carbon programmes. Our recommendation is that the reduction in revenue caused by introducing a levy-free allowance should be set at such a level that it matches the costs savings gained through our other proposals. We estimate this to be just over £7 billion over the period to 2035. This would have a positive knock-on impact on consumer costs and, we believe, ensure that even the biggest consumers would, at worst, face energy bills that are broadly similar to those they will pay under the current policy framework.

5.
CONCLUSIONS

In this paper we have shown that the costs of the government's low-carbon programme are falling disproportionately on low-income groups. As the amount of levy-funded spending for this programme increases in the coming decades, this will have a damaging impact on these groups, and attract controversy, which could threaten existing commitments to decarbonisation. In order to maintain support for the low-carbon transition, costs must be kept as low as possible and funding must be raised in a way that protects vulnerable groups.

We have presented a number of policy ideas that could reduce the burden on billpayers. If the ideas we have outlined were to be adopted, we believe that consumers would need to contribute billions less in the 2020s. Each consumer could be offered levy relief without jeopardising climate targets, and this could be delivered in such a way that it helps to incentivise energy efficiency. Importantly it could also recast levy-funding in a progressive manner.

We recommend six changes to the policy framework:

1. Introduce a public ownership option for new nuclear capacity
2. Adopt the Danish model of procurement to cut the cost of offshore wind projects
3. Lift the moratorium on onshore wind farms
4. Replace the capacity market with a strategic reserve
5. Replace the current energy efficiency policy with a 'Help to Heat' strategy
6. Offer every consumer a green levy allowance.

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ANNEX A: PUBLIC OWNERSHIP OF OFFSHORE WIND

According to modelling work by Frontier Economics for IPPR, as with new nuclear (in chapter 4), public ownership of offshore wind schemes could substantially lower the cost of projects by reducing the associated level of risk. As with new nuclear projects, the technology risks would remain, but the risk premiums associated with changes in policy or regulation could be reduced.

We do not believe that there is a market failure that would justify the government taking on these costs and risks. However, for reference, we set out some analysis below which shows what the impacts of public ownership of offshore wind schemes would be.

Based on assumptions drawn from the existing literature and Frontier Economics' experience of speaking to investors in similar energy projects, illustrative figures from their modelling suggests public ownership during the construction phase of an offshore wind park could reduce the costs of capital by 0.1–0.2 per cent. Continued public ownership during the operation of the wind farm could reduce these costs by 0.4–0.6 per cent.

In National Grid's 'Going Green' scenario for achieving clean energy and carbon targets, they envisage 30.3GW of cumulative additional offshore wind capacity by 2035 (National Grid 2014). With an offshore wind programme on this scale, Frontier Economics suggests that full public ownership through construction and operation could generate savings in 2012 prices of £3.4–5.1 billion between 2015 and 2035, which equates to £35–53 per household. Public ownership through the construction phase, followed by privatisation of the assets, could still save £1.1–1.7 billion, or £12–18 per household. (These sums do not take account of the profits that should accrue from the operation of these schemes to the taxpayer.)

The Green Investment Bank, established by the Coalition government and capitalised with £3.8 billion of public money, has already invested £1 billion in seven offshore wind projects in the UK. By investing alongside private investors during the construction phase, the bank shares in the construction risk and the associated returns. This capital is later recycled into other projects (GIB 2015). The bank only invests on commercial terms despite being a government-backed institution, and it does not outright own any one particular project.

Table A1
Projected savings for new offshore wind development, 2015–2035
Real 2012 prices

		2020	2025	2035	Discounted total, 2015–2035
Total savings (£bn)	Full public ownership	0.2	0.3–0.5	0.4–0.6	3.4–5.1
	Public construction	0.1	0.1–0.2	0.1–0.2	1.1–1.7
Average household savings (£)	Full public ownership	2	3–5	4–6	35–53
	Public construction	1	1–2	1–2	12–18

Source: Frontier Economics, briefing to IPPR, May 2015