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Future Energy Efficiency Policy

This POSTnote outlines the benefits and costs of future improvements in energy efficiency across various UK sectors. It then describes the barriers to energy efficiency measures, outlines options for future energy efficiency policy and summarises analyses of the effectiveness of different policy options.

Overview

- The Government will set out future energy efficiency policies and proposals in its Emissions Reduction Plan in early 2017.[1] Future energy efficiency policy choices will also arise from Brexit.
- Energy efficiency improvements can reduce fuel poverty and greenhouse gas emissions and improve comfort, health, wellbeing, energy security and economic productivity.
- Barriers to improvements include financial constraints, misaligned incentives, hassle, poor return on investment, lack of prominence and low confidence in results.
- Regulatory, economic and behavioural policies could improve UK energy efficiency.
- There is insufficient evidence to identify which types of policy are most effective.

Background

What is energy efficiency?

Improving energy efficiency means using less energy (such as electricity, heat and transport fuel) to produce the same output or service.[2] Examples of measures to improve energy efficiency include: insulating a home so that it needs less heating to reach the same temperature; installing a motor that uses less electricity to perform the same role in a manufacturing plant; and inflating car tyres to the correct pressure to reduce drag when driving and cut fuel use.[3]

Past and current policy

In recent years, the Government has implemented various policies (see policy options section) aimed at encouraging energy efficiency measures, particularly in domestic buildings. EU Directives have also guided substantial parts of UK energy efficiency policy. These policies have helped to drive an 18% fall in energy demand between 2000 and 2014.[4,5] However, since 2015, a number of UK energy efficiency policies have either been scrapped or reduced in scope.[6-8] Looking forward, the Government is seeking to update UK energy efficiency policy.[1]

Potential benefits and costs

Energy efficiency improvements can reduce energy bills, fuel poverty and greenhouse gas emissions (GHG) and improve comfort, health, wellbeing, energy security and economic productivity.[9] To achieve these benefits there is usually an upfront financial cost associated with each energy efficiency measure. Such measures are deemed cost-effective if the benefits (that accrue over time) outweigh the costs. However, it can be difficult to judge real-world performance of energy efficiency measures, so the cost-effectiveness is rarely as good as predicted (see Box 1).

This section outlines the potential benefits of energy efficiency measures in the domestic sector (which accounted for 29% of energy use in 2015), the non-domestic (public and commercial) sectors (14%), the industrial sector (17%) and the transport sector (40%).[10]

Domestic sector:

- For every £1 invested by the Government in domestic energy efficiency, GDP could be increased by £3.20 and tax take by £1.27.[11-13] It has been suggested that this would more effectively stimulate the economy than cutting VAT, reducing fuel duty or investing in capital infrastructure projects such as HS2 and Crossrail.[13,14]
- Overall UK GHG emissions could be reduced by 1% by 2030 by installing lower cost domestic measures, such as loft and cavity wall insulation (see Box 2).[15]
- Average household energy bills could be permanently reduced by £300 per year and 90% of the 2.4 million households in fuel poverty (see Commons Briefing Paper (CBP) 5115 for definition) removed from it.[16-18]

Box 1. Limitations to estimates of energy efficiency benefits.
Energy efficiency measures usually offer real-world energy savings, but often they are lower than predicted.[19,20] Inaccuracies are attributed to four causes: first, poor quality installation; second, incorrect operation; third, components not performing according to their design specification; and fourth, 'rebound effects'.[19] Rebound effects often occur when the potential financial savings from energy efficiency improvements lead consumers to increase activity, thus offsetting some of the energy savings (POSTnote 409).[21-23]

To reduce inaccuracies in estimates, the Energy Research Partnership recommends more stringent quality control in installations and the collection of more extensive, real-world data to allow more effective evaluation and forecasting of the effects of energy efficiency measures in buildings.[19]

Box 2. Domestic energy efficiency measures.
The table below shows the most common domestic measures, the extent of their deployment and cost-effectiveness over their lifetime.[3,24,25] Negative figures represent financial savings resulting from the measures.

Common measures	Homes that have measure installed (as % of homes that could have measure)	Cost of reducing GHG emission (£/tonne CO_2)
Loft insulation[26]	66%	-22 to 123
Cavity wall insulation	69%	-107 to 106
Solid wall insulation	8%	329 to 859
Upgrading to a condensing boiler	60%	-209

- Installation of loft, cavity wall and solid wall insulation could benefit consumer health;[27] reduce the burden of illness due to cold homes, which costs the NHS £1.3bn per year; and help reduce poor educational attainment, which has been linked to cold homes.[28,29]

Non-domestic and industrial sectors:

- Non-domestic energy use could be cut by 14% by improving the efficiency of, for example, air conditioning and lighting, causing annual bill savings of £1.3bn.[30,31]
- The value of commercial buildings could be increased by improving their energy efficiency.[32,33]
- Industrial GHG emissions could be cut by 10% by 2050 by, for example, improving motors and lighting, and through better energy management.[34]
- Electricity use in manufacturing could be reduced by 18% (equivalent to 4% of the UK's annual electricity consumption) leading to annual savings of £1bn.[35]

Transport sector:

- Efficient driving style could save the average driver up to 10% of fuel, equivalent to £96 per year.[36]
- Switching from a petrol car to an electric car could lead to a 43% energy saving.[37]
- GHG emissions from new cars and vans could be cut by 29% from 2015 levels by improved technological efficiency of petrol and diesel vehicles.[38]
- Energy efficiency measures could help to offset the rise in GHG emissions in sectors that are difficult to decarbonise such as aviation and shipping.[39]
- Air pollution (POSTnote 458), such as nitrogen oxides, could be reduced, thus improving health.[40]

Barriers to energy efficiency improvements

Although there is broad consensus that some energy efficiency measures are cost-effective, such measures are often not implemented because of various barriers.[21]

- Misaligned incentives: In the private rented sector, the financial reward for installing energy efficiency measures (through reduced energy bills) usually benefits tenants rather than landlords, which means that there is no direct financial incentive for landlords to install energy efficiency measures in their properties.
- Hassle: The installation of energy efficiency measures can be disruptive, which can put off potential adopters. In the industrial and commercial sectors, disruption also has cost implications.
- Lack of prominence and information: For many households and non-energy intensive businesses, saving energy is not a priority.[41] Householders are generally more interested in the comfort and value of their homes.[42-44] These factors may also mean that consumers do not seek information about opportunities for saving energy and money.
- Poor return on investment: Energy efficiency measures are less attractive to businesses when the payback time is longer than for business growth projects.[45]
- Low consumer confidence: Confidence in energy efficiency measures has been eroded by instances of poor quality installation under Government-supported programmes and discrepancies between proposed and realised performance.[46]
- Difficulty accessing finance: A lack of finance to pay for the up-front cost of measures, which is often high, can be a barrier to their installation.[31]

Policy options

The Government is expected to publish its Emissions Reduction Plan in early 2017. This will outline future energy efficiency policies and proposals to meet its GHG emissions targets for the period 2023-2032. In the coming years, the Government will also need to decide how to take forward EU-derived energy efficiency policies (see Box 3).The following sections outline the main future behavioural, regulatory and economic policy options for supporting the uptake of energy efficiency measures.

Behavioural interventions

These approaches (POSTnote 417) often focus on persuading consumers to take up efficiency measures by providing them with information about their energy use. The Government currently has four behavioural policies, each of which is at least partly required by EU Directives.[47]

- **Energy Performance Certificates (EPC)**, which rate the energy efficiency of a property, must be displayed when a property is for sale or let.[48,49]
- **Energy Labels** must be attached to certain products to indicate their energy efficiency.[50-52]
- **Smart meters** (POSTnote 471), which help people to view their energy use in real time, are being rolled out to all households in Britain by the end of 2020.[53-55]
- **Energy audits** must be completed by large businesses under the Energy Savings Opportunity Scheme.[56]

Box 3. Brexit and existing UK energy efficiency policies.
Several of the current UK energy efficiency policies outlined in this briefing follow EU Directives. It is also likely that a number of EU energy efficiency directives will be updated and transposed into UK law before Brexit, including a commitment to make national energy savings of 1.5% per year from 2021-2030.[57,58] As part of the Brexit negotiations, the UK Government could choose to continue to comply with some energy efficiency directives, possibly as part of a deal to achieve some of the Government's other negotiating objectives, or it could decide to take control of these policies. If the UK chooses the latter approach, it still might be beneficial to maintain most of these policies, but with some modifications.[59,60]

Future policies could also include the following options.

- **Mandated billing feedback**. Consumers could be informed of the average energy use of a comparable customer via their bills.[61]
- **Mandated feedback on driving style and improving driver training**. Devices in vehicles can provide feedback on the efficiency of a driver's style (which can also be tied to insurance premiums) and learners could receive more instruction on efficiency.[62]
- **Mandated disclosure of buildings' energy use levels**. This could affect businesses' reputations and thus encourage energy efficiency.[63]
- **Make investment in efficiency projects easier**. This could be done by creating simpler, standardised project documentation or aggregating smaller efficiency projects to create more investable larger projects.[64,65]
- **Reformed mortgage eligibility tests**. Tests could be adapted to encourage more lending to buyers of more energy efficient (cheaper to run) properties.[66,67]

Regulatory interventions

There are a range of existing minimum energy efficiency standards and targets that drive energy efficiency.

- **Appliance standards** have been set by the EU.[68,69]
- **Cars' and vans' mandatory emissions targets** have been set by the EU (a 40% cut from 2007 levels by 2021 and a 19% cut from 2012 levels by 2020).[70]
- **Private rented sector building energy efficiency standards** have been set by the Government, following an EU Directive.[55,71,72] From April 2018, all new lets will need to have a minimum EPC Band of E.
- **Minimum standards for new buildings and new gas boilers** have been set by the Building Regulations.[73,74] However, the Government cancelled its 'Zero Carbon Homes' policy (CBP 6678) in 2015, which would have required new builds built after 2016 to be highly energy efficient. The cancelled policy would also have largely met EU requirements for domestic buildings in 2020.

Future policies could also include the following options.

- **Tightening of existing standards and targets**. For example, the EU is looking to set standards on new groups of appliances and the Government may consult on tightening the standards for new homes.[75,76]
- **Minimum standards in the owner-occupier sector**. These could (a) prevent the sale of property with low energy performance or (b) require building owners to undertake efficiency measures during renovations.[42,43]
- **Installation standards**. These would encourage higher quality installation of measures to help ensure consumer satisfaction and predicted energy savings. In December 2016, the Government-commissioned Bonfield Review recommended installation standards.[46]
- **Inserting energy efficiency requirements into public sector procurement policies**. Procurement managers often have no interest in buying energy efficient items as they may not pay for energy use or manage it.[63]

Economic interventions

Several types of economic intervention are listed below, some of which may be used by the Government in designing future policy options.

- **Supplier obligations**. These oblige energy suppliers to fit efficiency measures in domestic buildings, with the cost passed on to all consumers. The Government has extended its existing supplier obligation (the Energy Company Obligation, see CBP 6814) to September 2018 with an increased focus on reducing fuel poverty.[77]
- **Loans for energy efficiency measures**. Some loans are currently provided to the public sector, interest free, through the Government-funded organisation, Salix. The Green Investment Bank lends to commercial projects at commercial rates.[78-80]
- **Pay-as-you-save loan schemes**. These offer a loan to the consumer to fit energy efficiency measures. The loan is paid back as savings are made on energy bills.[81] Government funding for a UK version of this, the Green Deal (see CBP 5763), was cancelled in 2015.
- **Taxes or charges on energy or carbon emissions**. By increasing energy prices, these would encourage efficiency. The CRC Energy Efficiency Scheme mandates large, non-energy-intensive organisations to report their energy use and buy equivalent emissions allowances.[82] In 2019 it will be replaced by an increased Climate Change Levy: a tax on energy users in all non-residential sectors.[83]
- **Tax breaks**. The Enhanced Capital Allowances scheme allows businesses to offset the cost of certain energy efficient equipment against tax.[84] Further options include charging lower rates of stamp duty or council tax to those purchasing or living in buildings with more energy-efficient EPC bands or charging less VAT on more energy efficient goods.[85]
- **Grants**. These use Government funds to contribute towards energy efficiency measures. One current version is the Electricity Demand Reduction Pilot, which offers funding to companies to reduce their peak-time electricity use through improved efficiency, although penalties can apply if the reductions are not delivered.[86]
- **Funding or coordinating innovation**. Innovate UK is expected to offer loans as well as grants in future.[87] The Higher Education Bill will change how innovation is funded in the UK by bringing together the seven research councils and Innovate UK into one body: UK Research and Innovation.[88]

Which policies work?

Effectiveness of individual policies

A number of studies have concluded that there is insufficient evidence to identify which policies are most effective.[20,89-91] Where there is evidence of the effectiveness of policies, it has often been measured against different metrics, which makes it difficult to compare results. The following sections summarise the evidence on the effectiveness of policies at reducing energy use, GHG emissions and fuel poverty, as well as evidence about the social acceptability of policies. Evaluation evidence from enacted policies is presented where possible, in preference to predictions of the future effect of untried policies. (There is very little robust analysis available about the widespread economic effects of energy efficiency policies.)

Reducing energy use and GHG emissions

There is evidence about the level of reductions in energy use and GHG emissions from a limited number of policies.

- Minimum energy efficiency standards for domestic buildings and appliances in several European countries have delivered an average reduction in domestic energy use of around 10%.[20]
- Mandatory emissions targets for new cars have driven fuel efficiency improvements, which has driven most of a 20% cut in new cars' CO_2 emissions from 2009-15.[38]
- Smart meters and billing feedback lead to an average reduction of 1-5% in household energy use.[20]
- Supplier obligations have delivered annual energy savings of 1.1% and usually deliver their target.
- Irish grants for homes have led to 20% gas savings.[61]
- The CRC Energy Efficiency Scheme delivered annual emissions reductions of 6-8% from 2010-12.[82]
- Reliefs from council tax and stamp duty have not been tested, but it is estimated that they could save 0.3-0.6% and 1.2-3.3% of annual emissions from domestic buildings.[85,92]

There is also some evidence of the cost (to government or to consumers) of reducing energy use or of reducing GHG emissions through energy efficiency policies.

- From 2008-12, UK supplier obligations cost around 1 pence to save a kilowatt-hour (kWh) of energy (the cost of energy was around 10 pence per kWh). The average cost of reducing a tonne of CO_2 emissions was £13. (The price of a tonne of CO_2 in the EU emissions trading scheme ranged from €5-30 from 2008-12.)[93,94]
- A UK programme that introduced minimum efficiency standards for appliances led to total consumer savings of £28.50 and 0.13 tonnes of CO_2 per £1 spent by Government between 2007 and 2011.[95]
- A range of European energy efficiency projects for buildings and industry have delivered energy savings at median costs of 0.025 and 0.012 €/kWh and payback times of 5 and 2 years, respectively.[96]
- It is estimated that private rented sector standards will deliver benefits of £3.6bn from reduced energy use and £0.6bn from 11.6 million tonnes of CO_2 savings over a 52-year period, costing consumers £2.4bn.[97]

Fuel poverty reduction

Most stakeholders agree on some general points about which policies are most effective at reducing fuel poverty. Grant schemes funded via general taxation may be more effective at tackling fuel poverty than economic interventions that require an up-front financial contribution from households.[18,98,99] Supplier obligations can reduce fuel poverty and are more likely to be successful if they focus on installing lower cost measures in fuel-poor households.[100]

Many stakeholders suggest that locally-administered energy efficiency programmes would be more effective at reducing fuel poverty than centralised schemes. Locally-administered schemes form a large part of energy efficiency projects in Scotland and Wales.[18,101-105] However, some local authorities do not have capacity for such administration.[18,20]

Social acceptability

Certain energy efficiency standards have proven to be controversial. For example, some national newspapers opposed the introduction of EU appliance standards.[106] In another example, a Government proposal to mandate energy efficiency measures when renovating a house was withdrawn in the face of public opposition (CBP 6301).

Lessons learnt about energy efficiency policies

A number of lessons have been learnt through the implementation of energy efficiency policies.

- There is a consensus that a mix of policies works best to deliver energy use and GHG reductions. Specifically, standards, taxes and feedback complement other policies. However, combining overlapping financial incentives can reduce the effectiveness of each intervention.[107]
- Successful economic interventions tend to require considerable public subsidy, according to the consultancy Ricardo AEA.[89] Pay-as-you-save schemes in Germany, Estonia and Japan had more success than the UK's Green Deal partly because government subsidies allowed them to offer lower interest rates.
- Overcoming financial barriers is not always sufficient to encourage consumers to take up efficiency measures.[61]
- For behavioural interventions, repeated feedback is more effective than one-off feedback.[62]
- An unstable policy framework hinders innovations in the installation of energy efficiency measures.[19]

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