Mapping Policies for Improved Efficiency & Reductions in Final Demand: All Sectors (Excluding Transport)

Thomas Steward

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Abstract:

This paper maps the broad range of different policies which currently exist in the UK to support demand reduction or improve energy efficiency. The paper is not intended to be exhaustive in its detail of each policy, but give a broad overview of the policy landscape. It is designed to provide a comprehensive map of all major policy areas aimed at reducing consumption or improving efficiency across the economy.

Keywords: demand, energy efficiency, demand-side, demand-reduction

Contact: T.Steward@exeter.ac.uk

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1. Introduction

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Policies are divided by the sector of the economy they target, and only live and currently planned policies are examined (for in depth analysis of the history of energy efficiency policies, see Mallaburn and Eyre, 2013 and DECC, 2014c). Wherever possible, the projected total final consumption savings in 2020 from each policy are given, taken from the National Energy Efficiency Action Plan (DECC, 2014h). Although making use of only one document leads to some gaps in the figures, it helps to ensure that all figures are comparable. These figures are derived from both historic data and projections.

The policies mapped within this paper are both a constituent part of, and a product of, the governance in the energy sector. The majority are introduced at the national level, however some of these are the result of EU policies such as those stemming from the EU Energy Efficiency Directive. Product policy is also largely a consequence of European-level policy. Policies are dynamic, and as is demonstrated in the case of the Energy Company Obligation, subject to change stemming from various pressures.

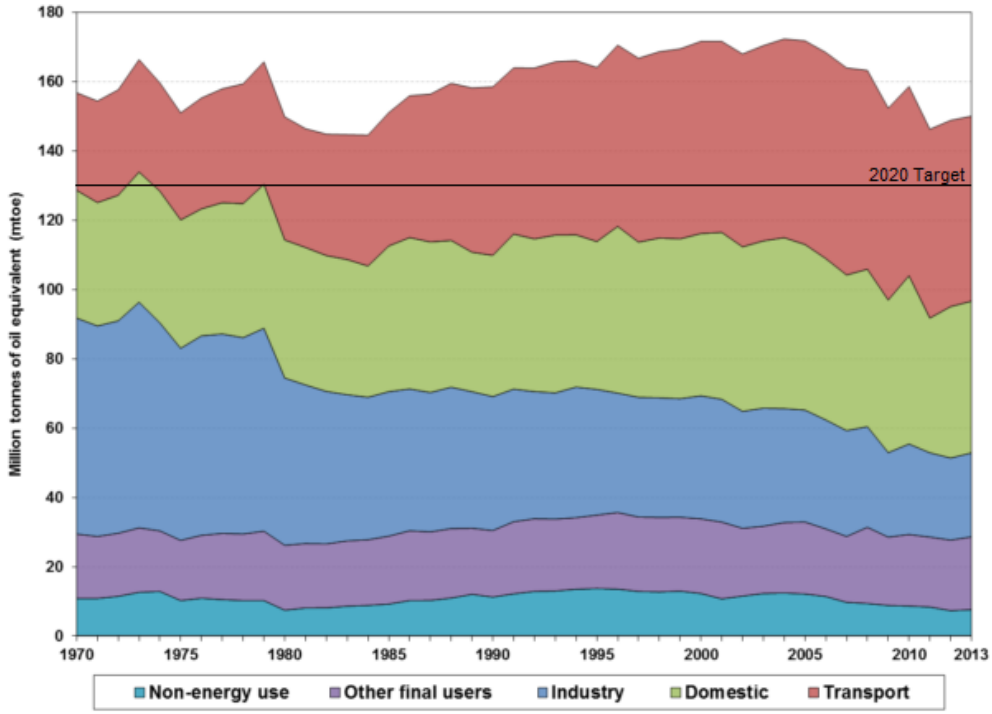

Figure 1 - Final Energy demand by Sector (DECC, 2014d)

Figure 1 shows the total final energy demand in the UK from 1970 to 2013. Although the general trend for consumption is downwards, there is considerable potential yet to be realised for demand reduction - particularly in the domestic sector (Boardman, 2012). It should be noted that it is unlikely that all the reduction in consumption over this period can be attributed to improved efficiency, in that much is attributable to the shift from a predominantly industrial, to a much more service-focussed economy in the 1990s (Griffiths and Wall, 2012). Other macro factors have also played a role in the reduction of demand, the most notable of which in recent is the 2008 financial crisis; the effect of which is clearly visible. The UK 2020 target for efficiency economy-wide improvement is also shown.

2. Policy Overview

Table 1 below shows an overview of the policies which are discussed in this paper.

Policy	Explanation
Domestic	
Green Deal	Pay-as-you-save loan scheme
Green Deal Home Improvement Fund	Financial Incentive for installation of approved measures
Green Deal Communities Scheme	Funding for Local Authorities for Energy Efficiency Schemes
Energy Company Obligation (ECO)	Obligation on supply companies to deploy energy efficiency measures
Energy Performance Certificates	Certification scheme for buildings demonstrating energy and carbon efficiency
Minimum Standards - Private Rented Sector	Minimum standard of EPC rating permissible in a rental property
Building Standards	Minimum building standards for new homes.
Product Policy	European-level standards for energy efficiency of range of appliances
Smart Meters	Meters which offer near real-time consumption information to consumers and suppliers
Business & Industry	
Climate Change Levy	Charge levied on energy use in large businesses.
Climate Change Agreements	Voluntary targets for efficiency improvements
Product Policy	European-level regulations on energy efficiency of industrial products
Carbon Reduction Commitment Energy Efficiency Scheme	Requirement for firms not under EUETS to monitor & report energy usage.
Building Standards	Minimum building standards for new commercial properties.
Green Deal	Pay-as-you-save loan scheme for small businesses
Minimum Standards - Private Rented Sector	Minimum standard of EPC rating permissible in a rental property
Energy Saving Opportunities Scheme	All large firms required to undertake energy audits
Enhanced Capital Allowance Energy Scheme	Tax written off on eligible energy saving products.
Public Sector	
Display Energy Certificates	Certification scheme for buildings demonstrating energy and carbon efficiency
Carbon Reduction Commitment Energy Efficiency Scheme	Requirement for firms not under EUETS to monitor & report energy usage
Greening Government Commitments	Target to reduce 25% of governmental carbon output by 2015 on a 2009/10 baseline
Product Policy	European-level standards for energy efficiency of range of appliances
Salix	Publicly funded body offering 0% loans for public body energy efficiency
Other	
European Energy Efficiency Directive	European target for 20% energy efficiency improvement on BAU to be met by 2020.
Electricity Demand Reduction Pilot	Pilot scheme under the EMR Capacity Mechanism.

Table 1 - Overview of Policies

3. Policies Designed to Reduce Demand & Improve Efficiency in the Domestic Sector

3.1 The Green Deal

Total final energy savings expected by the end of 2020: 5[1] TWh (DECC, 2014h).

The Green Deal, launched early in 2013, is the Coalition's flagship energy efficiency policy designed to stimulate increased demand for efficiency improvements in the domestic sector. The Green Deal is unique in that it offers participants the opportunity to take out a loan to cover the up-front cost of the improvement works, which is then paid back through their electricity bill. The policy features a 'Golden Rule' whereby an assessment is carried out to establish if the repayments of the loan should not outweigh the anticipated savings the average household would make from the improvement works. The measures that meet this 'Golden Rule' are established by means of a initial inspection of the property called the Green Deal Assessment (DECC, 2012a). Following the inspection, consumers may organise to have measures installed and set up Green Deal Finance via a Green Deal Provider. The basic interest rates for Green Deal loans is 6.96% (this is the rate at which providers are loaned funds by the Green Deal Finance Company). However after set-up costs, and depending on the measures taken out and the timescale of the loan, the effective interest rate could reach 9.34% (Business Green, 2013).

3.2 Green Deal Home Improvement Fund

The Green Deal Home Improvement Fund (GDHIF) is a government funded incentive scheme designed to increase uptake of the Green Deal. It offers cash-back vouchers to any households that had efficiency measures installed by a registered green deal installer. It originally closed in July 2014 after just 6 weeks (closing early due to strong uptake). It reopened in December 2015 with an additional £30million of funding, £24million of which was earmarked for solid wall insulation, this section of the fund was exhausted within one day of the fund opening (DECC, 2014e). The fund is anticipated to reopen in 2015.

3.3 Green Deal Communities Scheme

This is fund has awarded £88m to local authorities to promote the roll-out of energy efficiency measures on a street-by-street basis in their areas. 24 authorities were successful (for a full list see DECC, 2014g) and are able to deploy funding in way best-suited to their areas. Authorities will report on progress of the schemes as they continue.

[1] For context, 1TWh is enough meet the energy needs of approximately 50,000 UK homes for one year - based on typical consumption figures (OFGEM, 2011).

3.4 Energy Company Obligation

Total final energy savings expected by the end of 2020: 25.4TWh (DECC, 2014h).

The Energy Company Obligation (ECO) launched on 1st January 2013[2] in conjunction with the Green Deal is a replacement for the Carbon Emissions Reduction Target (CERT) and the Community Energy Saving Programme (CESP). It was originally designed to support installation of efficiency measures in the homes of the fuel poor, and in hard-to-treat homes. The latter has been relaxed to include some 'easy-to-treat' measures but was originally put in place because some measures, such as solid-wall insulation, are likely to be too expensive to meet the Green Deal's 'Golden Rule'. ECO puts an obligation on large domestic energy suppliers (those with more than 250,000 domestic customers and supplying over 400GWh of electricity or 2,000 GWh of gas to domestic customers) to support carbon and bill reductions.

The ECO was originally scheduled to close in 2015, however the deadline to meet the targets was extended to 2017 in a government effort to relieve pressure on rising energy bills.

The ECO consists of three primary obligations:

- **Carbon Emissions Reduction Obligation (CERO)** - Initially designed to deliver efficiency measures to hard-to-treat homes, however this has been extended to any properties which require loft or cavity wall insulation. This is measured in tonnes of carbon saved.
- **Carbon Saving Communities Obligation (CSCO)** - Delivering insulation measures to low-income areas[3]. With an additional requirement for 15% of each supplier's CSCO to be met in households in rural areas (This is known as the 'Rural sub-obligation'). The CSCO is measured in tonnes of carbon saved.
- **Home Heating Cost Reduction Obligation/Affordable Warmth Obligation (HHCRO) -** Delivering insulation and heating measures to those (or those living with someone) in the Affordable Warmth Group (primarily connected to receipt of government benefit, and the nature of that benefit - sometimes connected to their income and if they have dependents) - those deemed likely to be in fuel poverty.[4] This is measured in £ of bill savings.

[2] Although energy companies have been able to count against their target measures delivered since 1 October 2012)

[3] Defined using the bottom 25% of Lower Super Output Areas from the Indices of Multiple Deprivation in England, Wales and Scotland. Rural households are considered to be those in settlements with a population size under 10,000.

[4] Only those in private tenure and in receipt of a qualifying benefit will be eligible for support under Affordable Warmth

3.5 Energy Performance Certificates

The requirement for Energy performance certificates (EPCs) came about as part of the European Energy Performance of Buildings Directive (EU, 2002) and were introduced in the UK in 2008. They show the level of efficiency of a domestic property, presented both as a score out of 100 (known as the SAP rating), and as a letter A-G, with A representing the most efficient properties, and G the least efficient. These ratings take into account factors such as thermal efficiency of the building including double glazing, the efficiency of the heating system, and installed lighting etc. Efficiency of other appliances is not considered however. The majority of properties in the UK are D-rated (See Figure 2). The vast majority of properties, including newly built homes, must have an EPC in order to be sold or rented (with the exception of listed properties, and holiday homes).

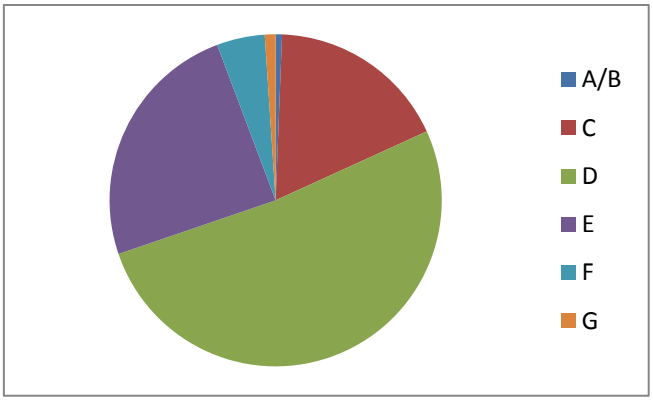

Figure 2 EPC Distribution of English Housing Stock (DCLG, 2012b)

3.6 Minimum Standards - Private Rented Sector

Government has announced that from 2018 all private rented sector landlords will be required to bring their properties up to a minimum standard of EPC grade E (assuming this can be achieved through measures which meet the Green Deal's Golden Rule). This was originally included as part of the 2011 Energy Act. There is also included a provision that from 2016 landlords will not be able to reject reasonable requests by tenants for improved energy efficiency up to grade E, providing they can be carried out at no cost to the landlord (DECC, 2015).

3.7 Building Standards

Total final energy savings expected by the end of 2020: 132TWh[5] (DECC, 2014h).

Building Regulations - Part L

Part L of the building codes relates to the conservation of fuel and power in new and existing dwellings. These (for new dwellings) give a target CO_2 emission rate (TER), expressed as kilograms per square metre of floor area per year; and a target fabric energy efficiency (TFEE) rate expressed as level of energy demand in kilowatt-hours per square meter per year. These,

[5] This figure relates only to expected benefits accrued between 2014 and 2020.

together, form a minimum energy performance standard for new dwellings, and are currently assessed using SAP 2012. (HMG, 2013b) Part L also covers extensions to existing properties (HMG, 2010).

Code for sustainable homes

The Code for sustainable homes is an accreditation system for new homes which provides a code 1 to 6 star rating for the overall sustainability performance of a dwelling. This includes, but is not limited to, the energy efficiency of a property. Higher levels of the code are voluntary, except where a local authority may require developers to meet a certain standard. Part L of the building regulations are now equal to Level 3 of the code for sustainable homes (DCLG, 2010). Beyond level 3, the levels are set relative to achievement above and beyond the standards set in Part L building standards.

Zero-carbon homes

Government targets for all new homes to be 'zero-carbon' from 2016 onwards (DECC, 2014h). There are a number of exemptions however, such as for smaller developments, and under the under the allowable solutions scheme. This gives allows developers to construct lower efficiency homes, or sites without on-site renewable generation, and compensate by contributing to developments in off-site locations. The zero-carbon homes standard will be equivalent to code for sustainable homes level 5. Constructions at level 4 will be permissible in conjunction with the allowable solutions scheme (Office, 2014).

3.8 Product Policy

Total final energy savings expected by the end of 2020: 13.2TWh (DECC, 2014h).

The European Eco-Design policies act as minimum efficiency standards for appliances and apply to a wide range of consumer products including, although not limited to, refrigerators, freezers, tumble driers, washing machines, dish washers, televisions, computers, light bulbs, boilers, cookers, and vacuum cleaners (EU, 2014). Most notable consumption reductions brought about by the Eco-Design standards are in lighting and refrigeration.

3.9 Smart Meters

Domestic smart meters are due to be installed in all UK homes by 2020 These will carry a number of features which do not currently exist in traditional ‘dumb meters’. Principal among these are the ability for energy companies to read them remotely, which will put an end to estimated billing. It will also allow for more accurate monitoring of real-time consumption patterns by DNOs, the introduction of dynamic tariffs, and the ability for meters to be switched from prepayment to standard-credit meters. All data from smart meters will be handled via an intermediary - the Data and Communications Company (DCC) (Lockwood, 2014a). The feature

which is most likely to support reduction in demand however is the combination of the smart meter with an in home display (IHD). This will allow consumers to monitor their own consumption in real time, this is expected also to lead to greater awareness of consumption habits and greater consumer engagement (DECC, 2012b).

4. Policies Designed to Reduce Consumption and Improve Efficiency in Business/Industry

4.1 Climate Change Levy

Total final energy savings expected by the end of 2020: 7TWh (DECC, 2014h).
The Climate Change Levy (CCL) was introduced in 2001 and is designed to encourage reductions in energy use. It affects consumers in the sectors of industry, commerce, agriculture, public administration and other services (HMRC, 2014b). It does not apply to domestic consumers or charities for non-business use (HMRC, 2014b). It is charged against use of Electricity, Gas, LPG, Coal, and other solid fuels when they are used for the provision of lighting, heating, and power. Rates at which the CCL is charged either per-unit or per-kilogram (depending on the commodity in question) and charges vary across commodities.

There are various exemptions to the CCL including for small businesses below the VAT threshold. It is also possible to qualify for a reduced rate through arrangement of a Climate Change Agreement (CCA) - discussed below. Various industries receive levels of exemption from the CCL, for example Mineralogical and metallurgical industries are 100% exempt (HMRC, 2014a). Other energy intensive industries can receive partial exemptions providing they sign up to voluntary efficiency targets known as Climate Change Agreements (below). It is also possible for businesses to purchase their electricity from green energy suppliers. In this instance the supplier is able to offer them Levy Exemption Certificates (LECs) to demonstrate their compliance.

Additionally, small consumers are automatically treated as domestic (and therefore exempt), even if they are businesses. The threshold levels of consumption to qualify for these levels are 1000kwh of electricity, and 4397kwh of gas per month (HMRC, 2014a). These are respectively approximately 3.75 times and 3.9 times greater than OFGEM's typical consumption values for a household consumer (OFGEM, 2013). For threshold levels of other commodities see (HMRC, 2014a).

4.2 Climate Change Agreements

Total final energy savings expected by the end of 2020: 5TWh (DECC, 2014h)
These are voluntary targets for efficiency improvements in exchange for CCL discounts. There are two forms of Climate Change Agreement (CCA) - umbrella agreements and underlying agreements. Umbrella agreements are negotiated between DECC and sector associations, which agree sector-wide targets for efficiency improvements. This agreement is held between the sector association and the Environment Agency. An underlying agreement is held by a specific site, or group of sites owned by an operator. These underlying agreements are managed by sector associations (Martin *et al.*, 2009).

4.3 Product Policy

Total final energy savings expected by the end of 2020: 13.2TWh (in conjunction with savings from public sector product policy) (DECC, 2014h).
EU eco-design policy also affects the industrial sector for appliances such as industrial fans, or industrial furnaces.

4.4 Carbon Reduction Commitment Energy Efficiency Scheme

Total final energy savings expected by the end of 2020:26TWh (DECC, 2014h)
The Carbon Reduction Commitment (CRC) Energy Efficiency Scheme, introduced in April 2010, is a UK-wide scheme designed to cut energy use and CO2 output of both public and private organisations that are deemed to be large energy users that do not fall under the CCA or EU ETS.

Participants are required to monitor and report their energy usage, against which a carbon impact is calculated based on standard conversion factors (Environment Agency, 2014a). Against this participants are required to purchase and surrender allowances to offset their emissions - buying allowance for every tonne of carbon they emit. Allowances may either be bought at a fixed rate, or traded on a secondary market. The fixed annual price for the first phase of the policy is £12 per tonne.

Qualification for the CRC is assessed at the group level, not at the level of individual subsidiary companies. Where a firm is owned by an overseas organisation, all the UK subsidiaries owned by that overseas organisation must be considered together under the CRC, unless the undertakings are disaggregated (Environment Agency *et al.*, 2013).

Any company or group that uses in excess of 6000MWh of electricity per year, and has at least one settled half-hourly electricity meter is eligible (Environment Agency, 2014b). There are additional exemptions for sole traders.

4.5 Building Standards

Total final energy savings expected by the end of 2020: 65 TWh (DECC, 2014h).
Part L of the building code also applies to new non-residential properties (HMG, 2013), and in cases of renovation (HMG, 2013; HMG, 2010) setting minimum standards for energy performance of the building.

4.6 Green Deal

Total final energy savings expected by the end of 2020: 3TWh (DECC, 2014h).
Small businesses are also eligible to apply for the Green Deal in the same way as domestic consumers, with some differences in the measures that may be deemed appropriate, the process of application and implementation are very similar (DECC, 2011).

4.7 Private Rented Sector - Non-Domestic

The government is in the process of responding to a consultation on minimum standards of energy efficiency for the non-domestic private rented sector. The proposed policies are similar to those of the domestic sector, in that they will be required to meet a minimum standard E, subject to some possible exemptions such as renovation work must be able to be completed at no upfront cost to the landlord, or if the tenant objects to the renovation. However such exemptions would not last indefinitely, and would be subject to regular review (DECC, 2014a).

4.8 Energy Saving Opportunity Scheme

Total final energy savings expected by the end of 2020:16 TWh (DECC, 2014h).
The Energy Saving Opportunity Scheme (ESOS) is being introduced to comply with the EU Energy Efficiency Directive (Directive 2012/27/EU) requiring all large companies to undertake energy audits. This is designed to raise awareness of business consumption within the business community (Carbon Connect and Sustainable Business Forum, 2013). Eligible firms must carry out ESOS assessments to monitor their energy consumption over a 12 month period and then report their compliance to the Environment Agency. Part of this process will also include the identification and costing of potential energy saving opportunities (DECC, 2014g).

4.9 Enhanced Capital Allowance Energy Scheme

This offers first year allowance for investments in certain energy-saving plant and machinery. The cost of qualifying products (or the published qualifying value) can be written off against a firm's taxable profits for the year in which the product was purchased. A wide range of products qualify for capital allowances including those relating to lighting, heating, refrigeration, electrical back-up, motors, and monitoring equipment (HMRC, 2012).

5. Policies Designed to Reduce Consumption and Improve Efficiency in the Public Sector

5.1 Display Energy Certificates

Much like EPCs in the domestic sector, Display Energy Certificates (DECs) show an energy efficiency rating, and CO_2 output of a public sector building quantified both as a letter (A-G) and a numeric value (0 ->150). As with the EPC, A-rated buildings are the most energy efficient, however the numerical values are reversed with values in excess of 150 signifying the least efficient buildings. These values are calculated based on the actual consumption of the building during the previous 12 months (DCLG, 2012a). Any public sector building with a floor area in excess of 500m^2, which is regularly visited by the public is required to display a DEC. There has however been a recently launched consultation which may affect whichbodies are required to have a DEC (DCLG, 2015).

5.2 Carbon Reduction Commitment Energy Efficiency Scheme

In addition to private sector bodies, some public bodies are included in the CRC irrespective of consumption levels (mandated participants), these include all government departments, executive agencies, non-departmental public bodies and devolved administrations.

5.3 Greening Government Commitments

The government has committed to a range of environmental targets to be met by 2015, one of which is a 25% reduction on governmental carbon output by 2015, from a 2009/2010 baseline (HMG, 2013d).

5.4 Product Policy

Products purchased by public sector organisation are also covered by the various eco-design policies.

5.5 Salix

Total final energy savings expected by the end of 2020:6 TWh (DECC, 2014h).
Salix is a financial body funded by a number of public bodies including DECC, DfE, Higher Education Funding Council for England (HEFCE), the Scottish Government, and the Welsh Government. Salix offers interest-free loans to public bodies to invest in energy efficiency. Loans are awarded subject to certain lending criteria around payback periods, and maximum cost-per-tonne of carbon saving (DECC and Local Partnerships, 2012). To date, Salix has loaned over £300 million to over 12,000 projects, giving a projected life-time carbon saving of 6.2 million tonnes (Salix, 2014).

6. Other Areas

6.1 European Energy Efficiency Directive

The European Energy Efficiency Directive (Directive 2012/27/EU) began in December 2012 and sets out a range of targets and policy requirements upon the EU member states. The principle target is that Europe must achieve a 20% improvement on energy efficiency by 2020.[6] Within this each member state was required to submit an indicative energy efficiency target to be met by 2020, to which the UK committed to an 18% reduction in final energy demand compared to the 2007 business as usual projection (DECC, 2014h) (see Figure 1). There are also requirements for the rollout of smart meters, for public sectors to reduce their consumption, and for large firms to carry out regular energy audits.

6.2 Electricity Demand Reduction Pilot

The capacity mechanism, which makes up one tranche of the Electricity Market Reform includes a pilot scheme focussing on electricity demand reduction. This is designed to test the suitability of permanent electrical demand reductions as a contributor to ensuring future security of supply (DECC, 2014c).

7. Concluding Remarks

Overall it is clear that there exists a broad range of policies designed to reduce consumption and improve efficiency across a number of sectors, and that these are likely to vary significantly in terms of their scale of impact. The range of policies that are put in place may be considered an outcome of the governance structures in place. Policies which support a reduction in overall demand whilst maintaining or increasing levels of energy service, may be generally considered to be facing in the right direction. However, as is observed in other IGov working papers (for example Lockwood, 2014b and Mitchell, 2014), such policies must be taken within the broader context of UK energy policy. Other UK policies, regulations and rules frequently serve to increase supply, often of fossil fuels, thereby limiting the overall net benefit in terms of transition to a low carbon economy.

[6] Set at 1483 Mtoe of primary energy and 1086 Mtoe of final energy.

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