

# Less Waste, More Growth

Boosting energy productivity



[www.lesswastemoregrowth.co.uk](http://www.lesswastemoregrowth.co.uk)

## The opportunity: Energy productivity, lower costs and higher growth

There is an immense opportunity to improve our energy productivity, cutting energy bills, creating jobs and building a stronger economy<sup>1</sup>.

Energy productivity is a measure of how much energy is required to produce a pound in the economy. Boosting energy productivity supports the UK economy by getting more for less.

Currently  
**54%**

of the energy used to produce electricity is lost by the time it arrives at a UK home or business, where further losses occur<sup>2</sup>.

This lost energy is worth

**£9.5 billion a year,  
the equivalent of  
£354 per household**

more than half the average home's annual electricity bill<sup>3</sup>. It also represents the annual carbon emissions equivalent to every car in the UK<sup>4</sup>.

ENERGY  
**100**

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**46**

**51  
LOSSES**

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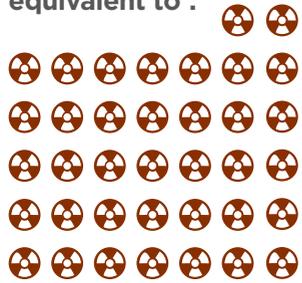
1. The methodology used for all calculations in this report are available at [www.lesswastemoregrowth.com/report](http://www.lesswastemoregrowth.com/report)

2. DECC, 2015, *Digest of United Kingdom Energy Statistics*, Chapters 5 and 7

3. The average domestic electricity bill is £592 in 2014, for a consumption of 3,800 kWh per year. DECC, 2015, *Average annual domestic electricity bills by home and non-home supplier (QEP 2.2.1)*

4. DEFRA, 2014. Greenhouse Gas Conversion Factor Repository and DFT, 2014, *Vehicle Licensing Statistics*.

The energy waste across heat and electricity is equivalent to<sup>5</sup>:



**37** nuclear power stations

...an area the size of England covered in bioenergy crops

...or energy from enough wind turbines to cover 40% of Scotland.



All of this land use and infrastructure impacts the environment, affecting sensitive landscapes and wildlife habitats, such as our uplands and coastal areas.

Wasted energy creates an unproductive energy system, undermining efforts to create a competitive, modern economy. While some losses in the energy system are inevitable, specific policy measures could reduce those losses and as a result lower energy costs by billions of pounds, while improving energy security and cutting emissions.

UK energy productivity, measured as GDP per unit of energy, has improved by 79% since 1990. However, power generation efficiency has improved by only 7% and electricity networks efficiency has improved by only 0.2%<sup>6</sup>.

We do not have to accept this scale of wasted energy which undermines our economy.

Germany aims to improve its energy productivity every year to 2020<sup>7</sup>, and the United States plans to double its energy productivity by 2030<sup>8</sup>.

**Recommendation:** We should seize the opportunity to address system-wide energy productivity, in the interests of business and householders alike, as well as reducing emissions. The Government should aim to improve energy system productivity year on year as is done in competitor countries like the United States and Germany, with the purpose of reducing energy costs for users.

5. David MacKay, 2008. *Sustainable Energy Without the Hot Air*.

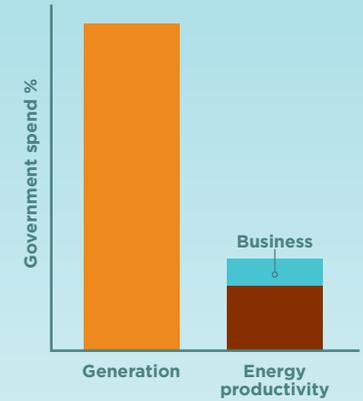
6. DECC, 2015, *Digest of United Kingdom Energy Statistics*, Chapter 1

7. German Federal Government, *Energy concept*, September 2010.

8. US Energy Department. "Energy Department Takes Major Steps to Increase U.S. Energy Productivity and Manufacturing," 17 September 2014.

## Ways to improve energy productivity

The budget for energy productivity is less than 20% of that for generation policy<sup>9</sup> and very little of that policy is aimed at improving electricity generation or electricity network productivity.



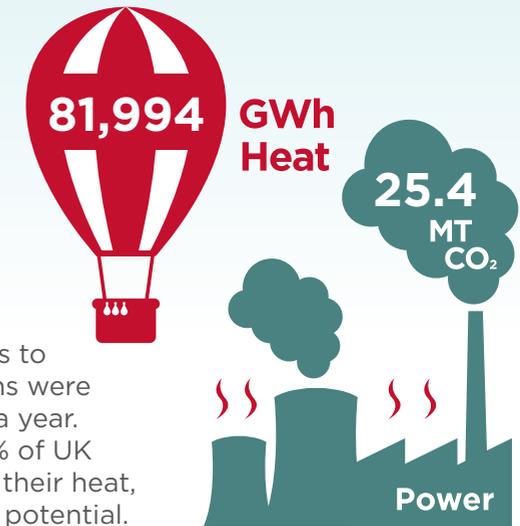
While not all energy waste can be stopped, there are immediate, practical, cost-effective steps which could save:

**OVER £3 bn a year** = equivalent to **£116 off every householder's energy bill.**

We explore these potential saving in detail below, breaking down the opportunities between three sectors: power generation, networks, and businesses.

### Power generation

If all cost-effective opportunities to recover heat from power stations were taken<sup>10</sup>, it would save £2 billion a year. However, currently less than 10% of UK thermal power stations capture their heat, just a third of the cost-effective potential.

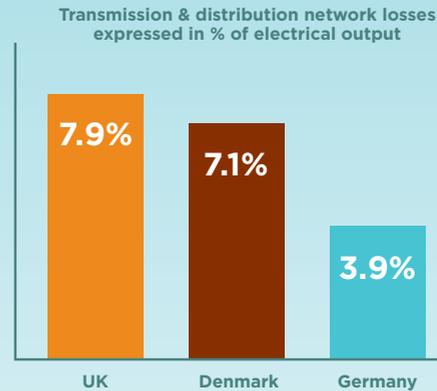


9. ADE analysis. Compares total annual cost of RHI, CfD, RO, Capacity Market, small-scale FIT and CCS budget, with the total annual cost of EDR, DSR in the Capacity Market, ECO, Green Deal, CCA, and CHP reliefs.

10. Ricardo-AEA, 2013. *Projections of CHP capacity and use to 2030*. Report for DECC. Cost effective potential based on a discount rate of 15% over 10 years.

## Electricity networks

Better targeting losses on electricity networks could help reduce bills for energy users. Network efficiency has not improved since 1990. If UK transmission and distribution losses were equivalent to those in Germany<sup>11</sup>, the best in Europe, energy users would save £605 million a year, the equivalent of £23 per household.



UK networks are required to reduce losses as far as 'reasonably practical' or economically viable<sup>12</sup>. Beyond a requirement for local networks to report on losses and mitigation efforts<sup>13</sup>, the regulator, Ofgem, can reward network companies for reducing losses up to £32m over the next five years<sup>14</sup>. This £32m is dwarfed when compared to the Capacity Market, which will potentially add more than £1 billion onto consumer bills to build new power generation every year.

There are also very limited efforts to reduce network losses such as congestion reduction, or by recognising losses through wholesale prices, or distribution network demand side flexibility<sup>15</sup>.

If half of current centralised thermal generation was instead directly connected at the distribution level near demand, the avoided transmission losses would save energy users £135 million annually<sup>16</sup>.



- The World Bank data, based on the International Agency Statistics (OECD/IEA) 2012. Electric power transmission and distribution losses in Germany represent 4% of the electrical output, and it is 7.9% for the UK and 7.1% for Denmark.
- European legislation requires a number of measures on distribution networks, securing more than £30m in annual savings by 2022. DNOs have identified a potential additional £16m in savings.
- Ofgem, 2015, *Energy Efficiency Directive: An assessment of the energy efficiency potential of Great Britain's gas and electricity infrastructure*
- Ofgem, 2015, *Losses Discretionary Reward (LDR) Guidance Document - changes in response to March 2015 consultation*
- Competition and Markets Authority, 2015. *Energy Market Investigation: Notice of provisional findings made under Rule 11.3 of the Competition and Markets Authority Rules of Procedure (CMA17)*
- While distributed generation does not pay for the transmission system (through the Embedded Benefit), there is no incentive to encourage distribution level connections to deliver system productivity improvements.

## Businesses and other energy users

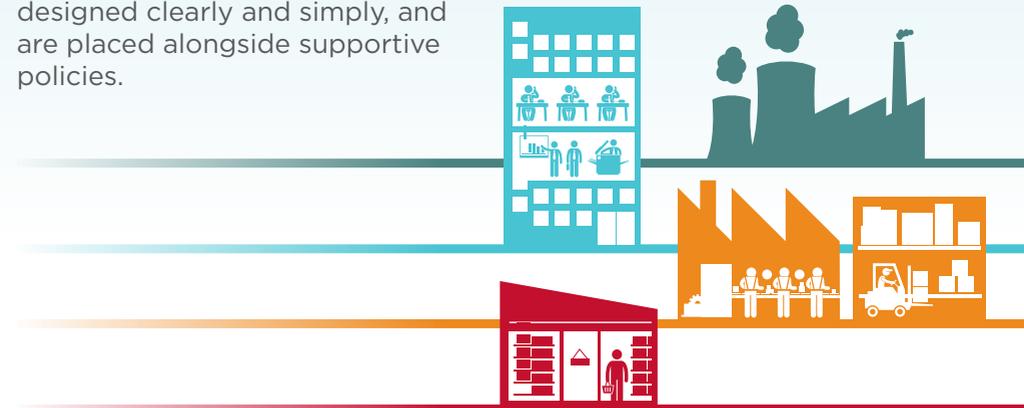
The UK needs to be seen as an internationally competitive location for business and manufacturing, using state-of-the-art, low carbon, energy-efficient technology.

DECC has estimated that with appropriate policy support business and public sector energy use could be cost effectively reduced by 9 TWh annually between 2012 and 2020<sup>17</sup>, saving these customers more than £570 million in energy costs, in addition to carbon and competitiveness benefits.

A third of the UK's energy efficiency spending is aimed at businesses<sup>18</sup>, and some of the most cost-effective opportunities are found in this sector.

Existing policy has focussed on either regulation, such as products policy, or taxation to trigger business energy productivity investment. By 2020, the cost of industry's carbon taxes will be up to six times the value of the policies that help them mitigate cost risk by improving their energy productivity<sup>19</sup>.

Carbon taxes can drive business productivity only when they are designed clearly and simply, and are placed alongside supportive policies.



- DECC, 2012. *Energy Efficiency Strategy*, Annex E, page 87
- ADE analysis. Compares total annual cost of RHI, CfD, RO, Capacity Market, small-scale FiT and CCS budget, with the total annual cost of EDR, DSR in the Capacity Market, ECO, Green Deal, CCA, and CHP reliefs.
- DECC, 2014. *Estimated impacts of energy and climate change policies on energy prices and bills*.

Previous policy measures, such as the Electricity Demand Reduction scheme, have lacked significant ambition with only a fraction of the funding compared to generation investments or their design has prevented most businesses from participating.

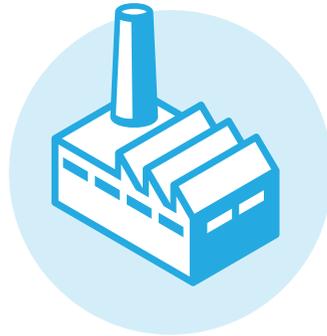
The current cross-Government business energy tax review should be used as an opportunity to increase, not decrease, our energy productivity ambition.

**Recommendation:** Electricity generators, networks and businesses should be able to help contribute to a strong, more productive economy.

For businesses, this means combining a revised energy tax regime with clear, simple and investable policy to leverage improvements in energy productivity, allowing them to participate in and benefit from the energy system.

For electricity generators and electricity networks, this requires a clear policy and regulatory framework to drive improved energy productivity across the system.

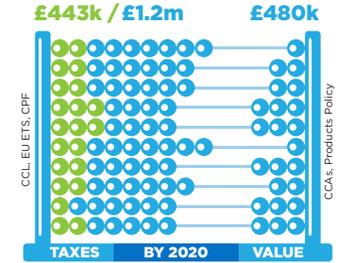
### Energy Intensive Business



#### Rising business energy costs



#### Energy taxes paid vs value received



Without relief With relief

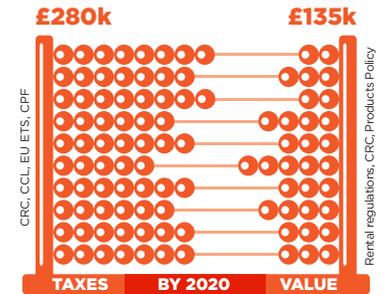
### Medium Business



#### Rising business energy costs



#### Energy taxes paid vs value received



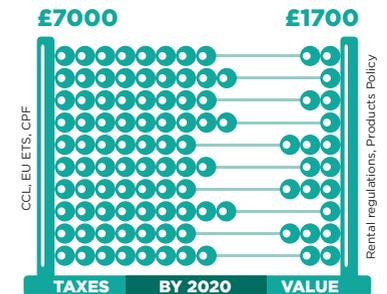
### Small Business



#### Rising business energy costs



#### Energy taxes paid vs value received

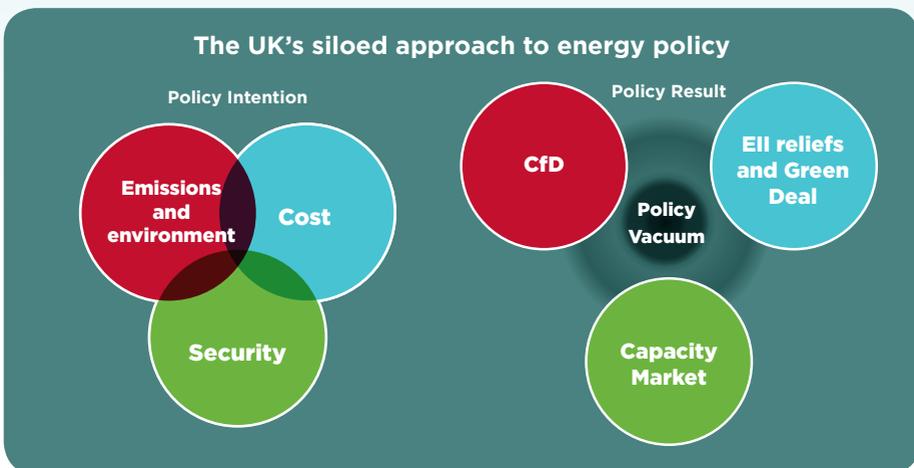


# The challenge to delivering better energy productivity

The energy productivity opportunity has been missed largely for three key reasons:

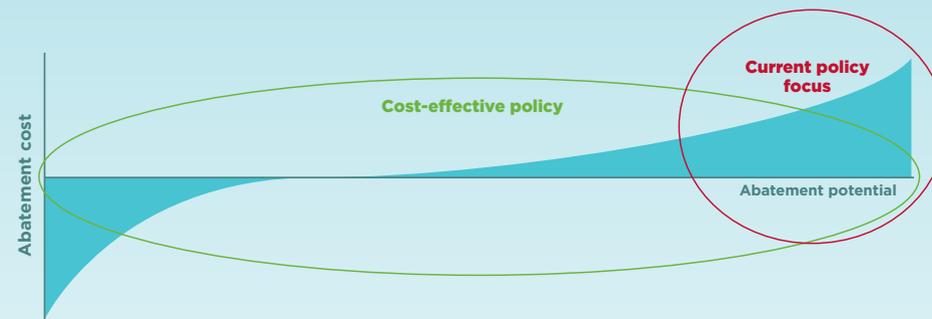
1. A reduction in electricity demand does not reduce just one unit but two and a half times the energy used because of the losses avoided throughout the rest of the electricity system. However, no one part of the electricity system – generator, network and customer – is able to capture that full value, limiting investment.
2. Energy policy is approached in silos, separately addressing carbon and the environment, security, and cost, resulting in policies pulling against one another.

The 2014 Contracts for Difference auction aimed to deliver renewable generation at least cost, but did not consider the impact on security of supply. In contrast, the 2014 Capacity Market auction aimed to deliver electricity security at least cost, but took no interest in carbon emissions. The result was 1 GW of inefficient new build generation (enough to power 2.3 million homes), with winners' carbon emissions estimated to be 22% higher than losing participants<sup>20</sup>



20. Agus, E, James, P, Loyd, S, Mansion, M, 2015. *Conflicting Messages? – Investigating the Impacts of Legislation on the Future UK Electricity Generation Mix*. Ramboll.

3. Government often only intervenes for the least cost-effective approaches. More cost-effective energy efficiency approaches are given little support, leading to significant under deployment, while some generation technologies are supported at a cost of over £800 per tonne of CO<sub>2</sub><sup>21</sup>.



This approach is starting to change. The Contracts for Difference scheme's move to competitive allocation now seeks the cheapest way to deliver the policy aim reducing attempts to deliver specific returns for specific technologies. This approach saved £110 million in the 2014 auction<sup>22</sup>. However, this auction is limited to renewable approaches, missing efficiency opportunities.

**Recommendation:** The government should enhance the natural market direction with a more solution-based approach to its energy policy assessments and allow the demand side and supply side to compete equally.

- We should limit support for specific technologies and approaches and instead look to deliver our energy objectives at best value for consumers and taxpayers.
- To determine best value, policy makers should consider the energy system as a whole and measure the contribution of interventions on economic productivity, energy affordability, and environmental impacts.

21. The cost of carbon abated under the domestic RHI scheme from July to December 2014, based on data published by Ofgem, with gas as the counterfactual. The £800/tCO<sub>2</sub> figure is for Ground Source Heat Pumps. Biomass is the least expensive technology and has a cost of £202/tCO<sub>2</sub> abated.

22. DECC, 2015. "World-leading auctions to provide major green electricity boost". Press release.

# Who we are

The energy productivity agenda is an opportunity to bring together diverse interests behind a common approach, and is supported by organisations from across the energy system

From environmental advocates to large-scale industrial energy users to building service providers, we are able to agree on the opportunity energy productivity provides to create jobs, drive growth and help the environment.

