Green Alliance policy insight
January 2020

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A smarter way to save energy

Using digital technology to increase business energy efficiency

Summary

“A new wave of digital technologies could transform businesses’ approach to energy management.”

The UK’s ambition to reach net zero greenhouse gas emissions by 2050 has made energy efficiency a national priority. As business is responsible for a quarter of the UK’s greenhouse gas emissions, much more energy efficient buildings and industrial processes are needed.

Digitally enabled energy efficiency is an inexpensive way to reduce energy demand, avoiding unnecessary investment in power generation and network infrastructure. It also cuts business costs. The government’s 2030 energy efficiency target for business could save small and medium enterprises (SMEs) around £2.7 billion a year by 2030, and £6 billion a year for UK business as a whole.

More importantly, from an industrial strategy perspective, energy efficiency has been directly responsible for a quarter of the UK’s economic growth, by increasing productivity.

However, despite this, investment in energy efficiency is not a priority for many businesses. Improvements have flatlined, particularly in sectors where energy is a small share of total business costs and payback periods are long. While the government has introduced some regulatory measures, these are yet to drive the kind of step change needed to reach the net zero target or to promote further productivity growth across UK businesses.

What is certain is that, in a net zero world, business as usual is no longer acceptable. A new wave of digital technologies could transform businesses’ approach to energy management by:

Optimising energy performance with low capital investment
Cheap, smart sensors combined with optimising algorithms can cut the energy use of buildings by up to 17 per cent.

Strengthening the business case for larger capital investment
Digital measurement and energy performance monitoring in the National Australian Built Environment Rating System (NABERS) scheme has led to investment in equipment and insulation to improve the efficiency of commercial buildings.

This has driven a 38 per cent reduction in the energy intensity of office buildings rated under this scheme over 13 years.

Enabling new business models and financing schemes
By lowering verification costs and allowing better assessment of potential investments, digital technology helps energy service companies to enhance efficiency in sectors that may not currently see it as a priority. This will be important to support SMEs, which are responsible for over half of total energy used by businesses across the UK.

Designing efficient new buildings and equipment
Digital monitoring can inform better understanding of the real world performance of existing assets. Insight gained through the NABERS scheme has led to new commercial buildings in Melbourne using less than half the energy of new buildings in London.

"The government should lead a more innovative, digital centred approach."

The government should lead improvements in business energy efficiency through a more innovative, digital centred approach.

It should:

Promote the uptake of digital technology for better energy use, by ensuring equipment is smart by default and through business energy efficiency and digitalisation programmes.

Boost markets for smart energy efficiency, through mandatory disclosure of business energy performance, coupled with regulation to raise minimum efficiency requirements over time, as well as an energy efficiency obligation scheme to support smaller businesses, delivered by energy service companies.

Avoid repeating poor design in new buildings, by using data from existing commercial building energy performance to deliver more efficient assets from the start, and by requiring developers to verify the actual performance of new buildings in use against their predicted performance.

Why business should use energy better

Greater energy efficiency to reach net zero

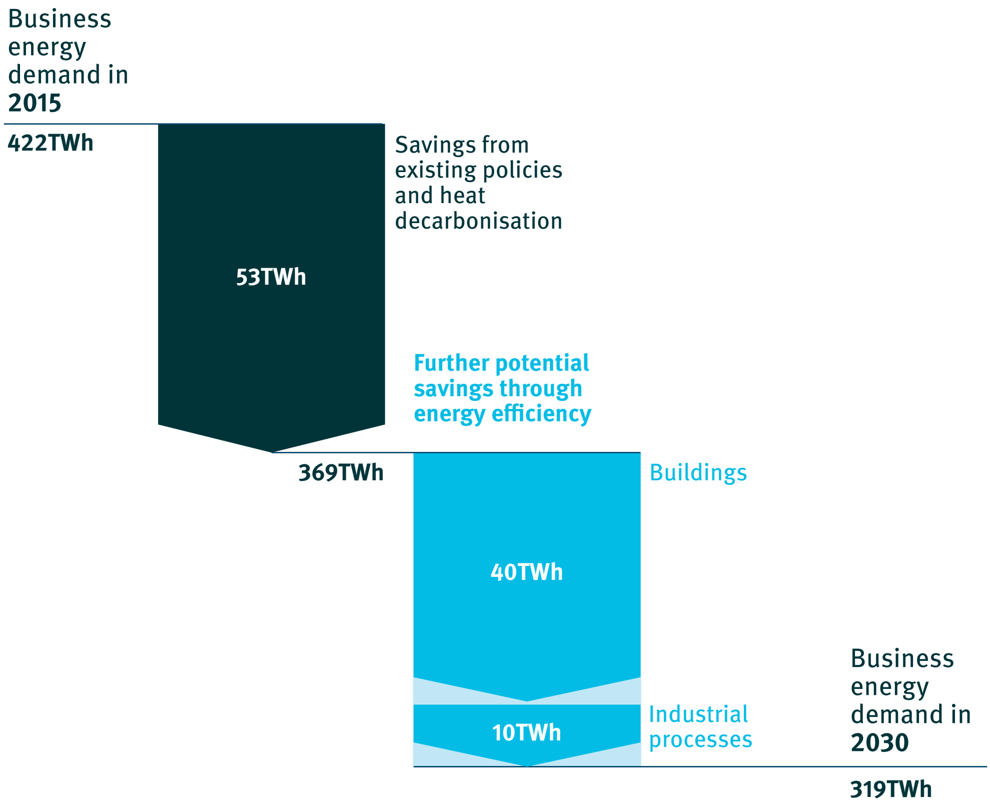
> "Energy efficiency has been directly responsible for a quarter of the UK's economic growth since 1971."

Meeting the UK's net zero target requires emission cuts across all sectors of the economy. Industry and service sector businesses, which are currently responsible for around a quarter of UK emissions, should be leading the way because they have substantial, low cost opportunities to reduce energy use.[1]

Energy efficiency measures taken by businesses have already played a major role in lowering emissions. Energy use per million pounds of output has fallen by 44 per cent since 1990 in non-industrial sectors and 48 per cent in industry. Studies suggest that around half of the reduction in industrial energy intensity (ie the amount of energy per unit of output) between 1997 and 2013 can be attributed to energy efficiency rather than other factors, like changes in industry composition.[2,3,4] Equally significantly, energy efficiency has been directly responsible for a quarter of the UK's economic growth since 1971.[5]

However, the scale of the climate challenge means much more needs to be done. And there is plenty of scope to step up action, given that the energy efficiency of some sectors has flatlined since 2010.[6] *The clean growth strategy* has set a target to cut business energy use to at least 20 per cent below 2015 levels. But only about half of this can be delivered through existing policy. Additional savings of 50TWh, identified by the government, will require new policies.[7] And further improvements over the next decade are likely to be needed to accelerate decarbonisation towards net zero.[8]

Further energy efficiency is needed to cut business energy use by at least 20 per cent by 2030[9]

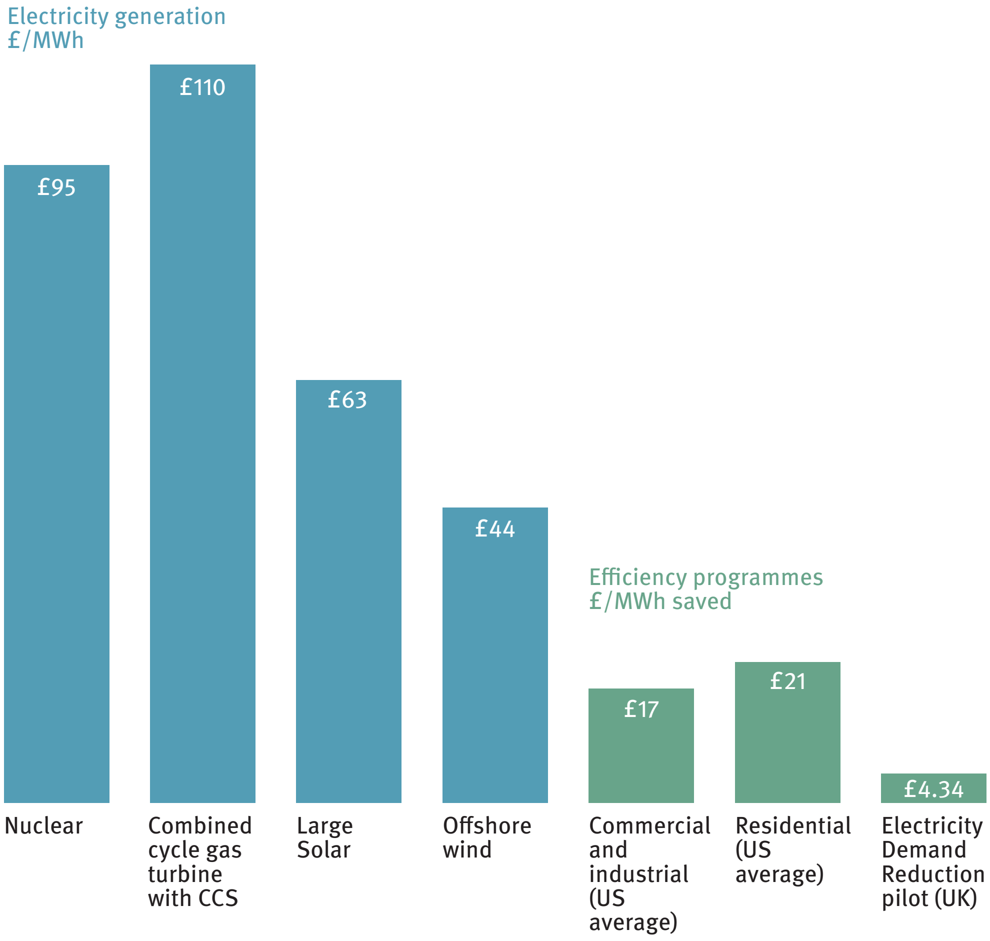


Keeping energy system costs low

The Committee on Climate Change (CCC) estimates that total power demand could double by 2050 due to the electrification of heat, transport and new industrial processes. This could be higher still under some heat decarbonisation scenarios.

Investing in efficiency, particularly in the near term, is essential to curb this rise and will limit the need for costly new electricity generation and network infrastructure. As business is currently responsible for 65 per cent of UK power demand, reducing its share will be particularly important.[10,11] Energy efficiency has other benefits, including lowering network losses, cutting heat demand and improving health and comfort.[12]

Cutting energy use is cheaper than new generation[13]



Adding to the business bottom line

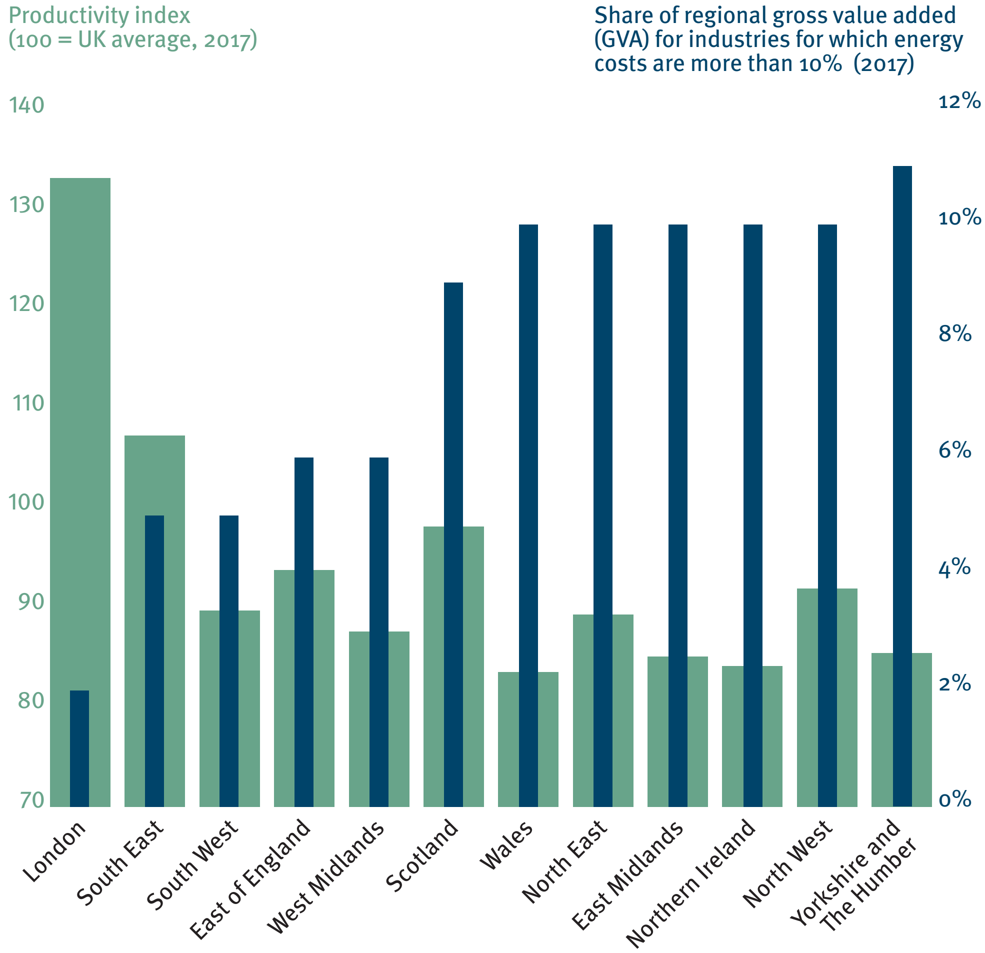
Better energy management can make business more profitable and resilient. For a few energy intensive sectors, energy costs account for over ten per cent of their expenditure.[14] Energy efficiency can add to the business bottom line over time, even if the initial costs of some measures are relatively high.

As energy intensive industries represent a significant share of the local economies of some areas outside London and the South East, further improvements could also help to address regional disparities in productivity.[15]

Yet, these sectors are not the only ones that will benefit. *The clean growth strategy* estimates that investment in energy efficiency could lead to substantial cost savings right across the economy. By 2030, it could save businesses around £6 billion a year, including a £2.7 billion saving for SMEs.[16]

"*The clean growth strategy* estimates that investment in energy efficiency could lead to substantial cost savings right across the economy."

Efficiency improvements in high energy using sectors could help to rebalance the economy[17]



Progress has been too slow

"There is often a discrepancy between expected energy performance, based on theoretical calculations, and actual performance."

Companies have underinvested in energy efficiency. In the decade between 2002 and 2012, while some manufacturers were able to achieve efficiencies of over 50 per cent, most achieved only 10-15 per cent.[18] And, since 2015, while almost 80 per cent of businesses complying with Energy Savings Opportunity Scheme (ESOS) audits – a mandatory energy assessment scheme for large UK organisations – have implemented some energy efficiency measures, the vast majority of these were related to lighting. Less than 30 per cent of businesses invested in more efficient processes and only 22 per cent in improved ventilation systems.[19] Progress in improving efficiency of commercial buildings has also been limited, with energy use per unit of area effectively flatlining since 2002.[20]

There are a host of reasons for this, including the relatively small proportion of expenditure on energy by individual companies in some sectors, unwillingness to accept payback periods beyond a couple of years and lack of access to relevant finance or skills.

Low visibility of business energy performance has amplified these barriers and made the case for investment harder, particularly among less energy intensive businesses. It has also limited the opportunity for investors, lenders and customers to demand improvements.

Where companies have invested in new buildings and equipment, or upgrades, there is often a discrepancy between expected energy performance, based on theoretical calculations, and actual performance. This is a particular issue for commercial buildings, exacerbated by the lack of a detailed framework to monitor energy efficiency.[21]

Government policy has fallen short. One reason could be that energy efficiency is often not perceived as an exciting topic to promote, even though it is core to business competitiveness and resilience On the buildings side, there have been various efforts to stimulate investment but these have largely relied on voluntary initiatives, and development of effective tools and benchmarking has been half-hearted. When it comes to industrial energy efficiency, there is a mass of policy but nothing has so far been transformational in addressing the main barriers to investment.

New digital technologies can help

Business as usual is no longer acceptable. While energy efficiency may seem a marginal issue for individual companies to address, digital technologies can make it easier to achieve and lead to significant savings.

No need for large capital investment

"Smart sensors are easy to retrofit and are falling in price."

Current energy metering provides limited insight into business energy use. Often only entire building or site consumption data are available, with little information on the performance of specific equipment and energy use patterns.

Smart sensors can provide more granular data, to allow fine tuning of energy management and improved operational performance. Energy audits carried out under ESOS have shown that 80 per cent of manufacturing sites need better monitoring and that smart sensors could cut electricity consumption across industry by four per cent.[22]

The use of analytics and machine learning programmes could enable further energy saving opportunities, for example modulating a building's energy needs based on real time occupancy.[23] Examples from the US based company BuildingIQ (see below) have achieved savings of up to 17 per cent, with payback of less than a year. If a comparable system was applied to the commercial office buildings in the City of London, the companies could, together, cut their energy bills by over £13 million in under a year.[24]

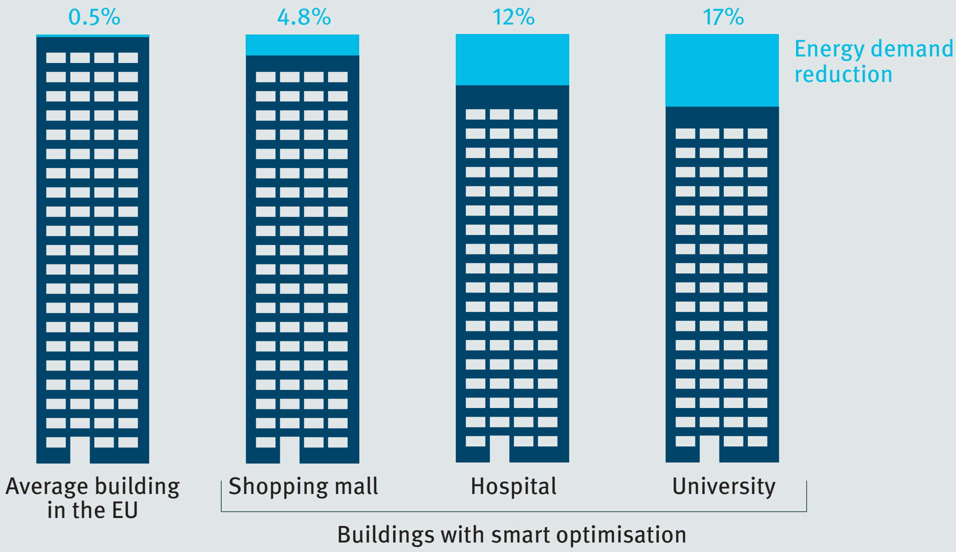
This kind of improvement can be achieved at minimal cost. Smart sensors are easy to retrofit and are falling in price. Analysis by Goldman Sachs suggests the average Internet of Things (IoT) sensor was $1.30 in 2004, $0.60 in 2014 and is predicted to be $0.38 by 2020.[25]

Advanced building energy management

BuildingIQ provides an AI system which offers an advanced form of building energy management. Its software creates a thermal model of the building to account for the building fabric, external temperature forecasts, solar gains and the activities of occupants.

The system is enabled by IoT sensors throughout the building, wireless controlled pumps and motors, and algorithms that can understand responses to internal and external changes. This has enabled energy savings across a number of building types of up to 17 per cent, with payback in under a year.

BuildingIQ has cut energy use in buildings by more than 30 times the current average annual energy reduction for a typical building in Europe[26]



“More detailed, digital data on energy consumption can better predict where improvements are needed ”

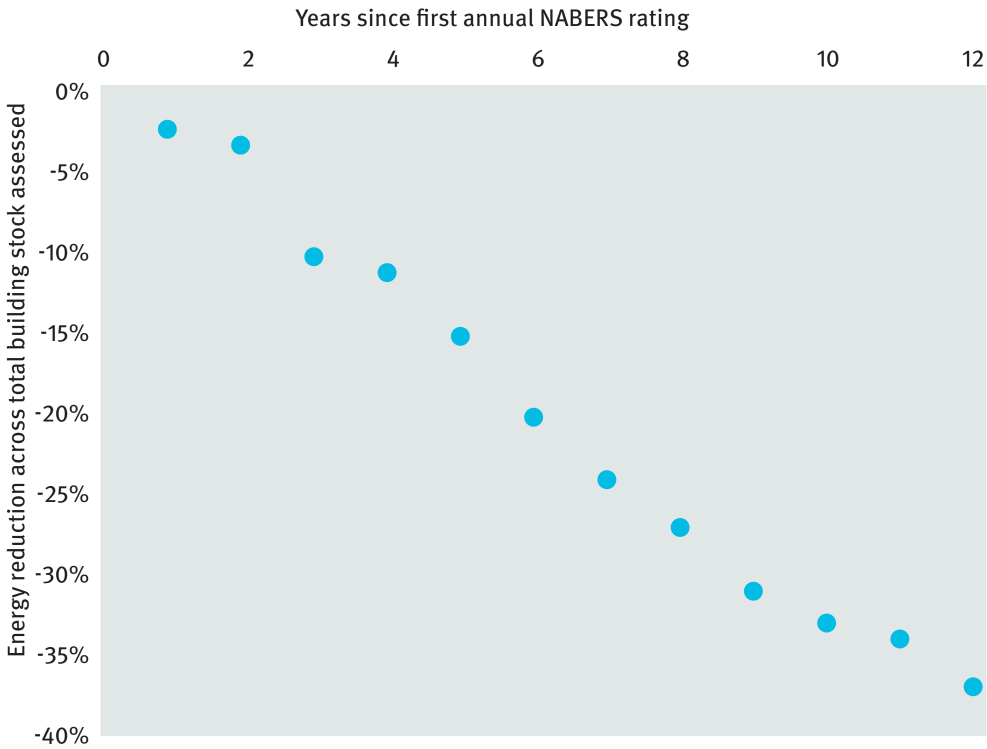
A strong case for further investment

Businesses will have to invest in more efficient equipment and improved building insulation to realise their full energy saving potential.[27] ESOS audits conducted in 2015 suggest that business electricity use could be cut by a further 14 per cent with better equipment.[28]

More detailed, digital data on energy consumption can better predict where improvements are needed and the likely outcome, giving firms more confidence to spend money on improvements.[29] For example, while energy performance ratings for UK commercial buildings are based on theoretical calculations, the National Australian Built Environment Rating System (NABERS) scheme in Australia requires reporting of in-use energy data for offices, data centres, hotels and shopping centres. This has driven year on year investment in energy efficiency, achieving a nearly 40 per cent reduction in energy use across the rated office building stock over just 13 years and a 24 per cent reduction for shopping centres in only eight years.[30]

In the UK, public sector organisations are already making use of data to support investment. Organisations seeking interest free loans for energy efficiency investments under the Salix Finance scheme have to collect detailed data. Nearly all participants have relied on this to justify future energy efficiency investment.[31]

The NABERS scheme has helped to reduce energy use in Austrialian offices[32]



"SMEs are responsible for over half of total business energy use across the UK."

Digital technologies can drive efficiency in SME

SMEs are responsible for over half of total business energy use across the UK.[33,34] Motivating them to invest in energy efficiency has so far been a challenge, given their more limited resources and that energy costs generally represent a smaller share of their total input costs.

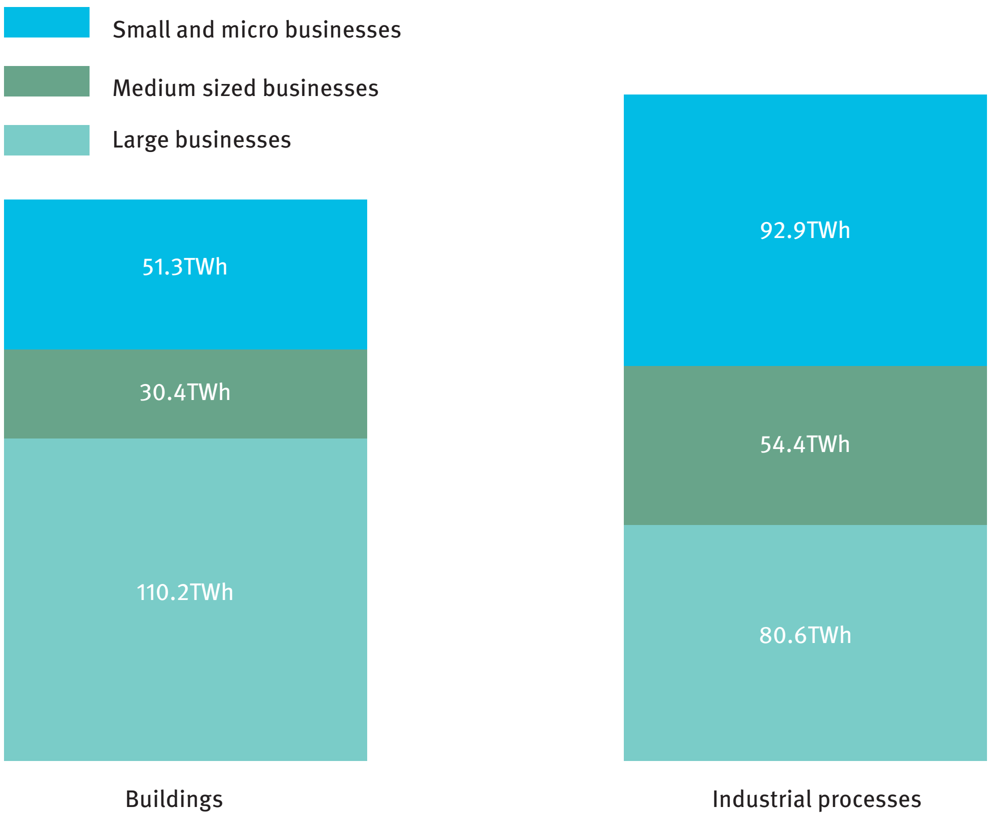
However, digital technologies can offer new routes to promote investment. For example, smart sensors and analytics open up the option to contract an energy service company (ESCO) to implement efficiency measures, circumventing issues with internal capacity, access to finance and requirements for rapid payback. ESCOs can aggregate and profit from cumulative small energy savings made at a range of sites, and accept longer payback periods.

Digital solutions benefit ESCOs by lowering verification costs and helping them to assess possible investments, both of which also help to secure insurance against possible lower than expected savings. Limited assessment of industrial projects so far suggests there is significant scope to support the market for ESCOs through better data provision: only 8.8 per cent of industrial energy efficiency projects have been verified across the UK, and 12 per cent across all other projects.[35,36]

Furthermore, better data can inform new financial incentives for energy efficiency. For example, since 2017, ING has only offered new financing for commercial buildings in the Netherlands that meet a minimum level of energy efficiency.[37] And Lloyds has set up a £1 billion Clean Growth Finance Initiative which offers a favourable discount rate for large loans that meet sustainability criteria, one of which is providing energy performance data to the lender.[38]

A large share of total business energy use is from SMEs

Energy demand by business size, 2015[39]



“Actual building emissions rates were between 1.8 and ten times higher than estimates.”

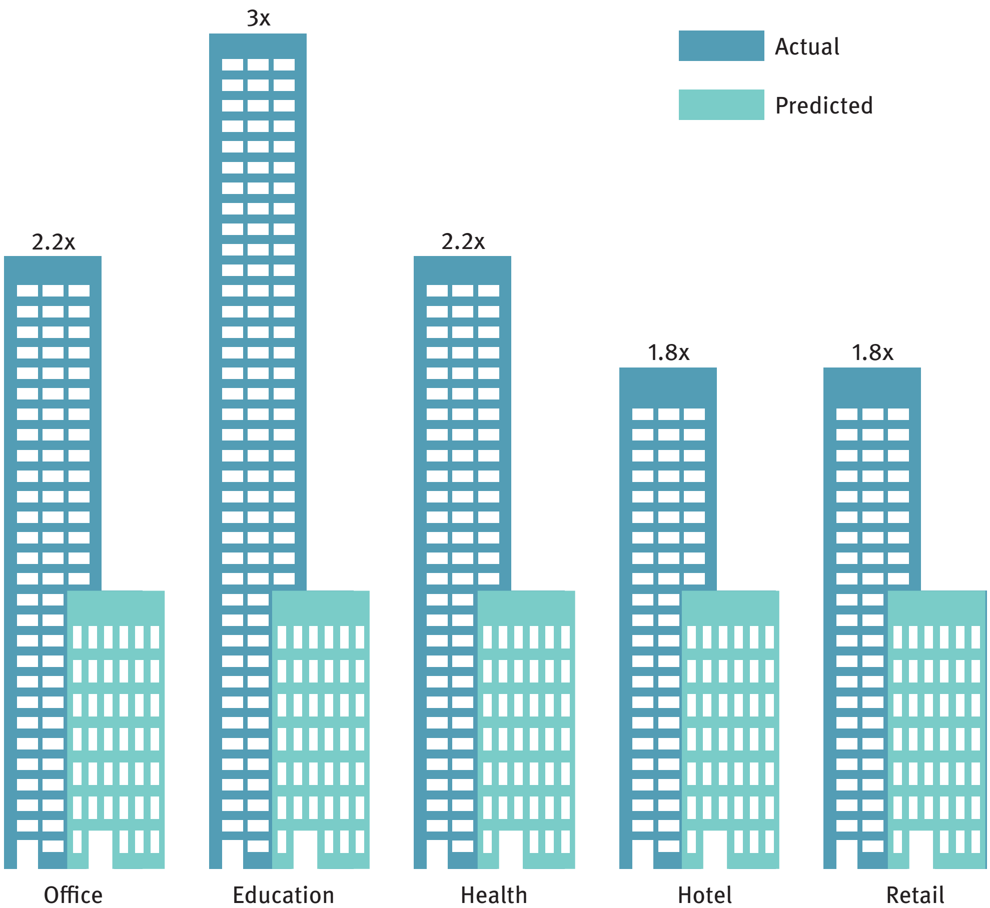
Better data improves the design of new assets

Rather than relying on theoretical calculations that have, so far, resulted in poorly performing assets, in-use digital data can inform the design of products and buildings with improved energy efficiency from the start.

The performance gap is particularly well established in buildings. Innovate UK found that effectively actual building emissions rates were between 1.8 and ten times higher than estimates given to comply with regulations. They also reported that comparison of in-use performance (based on display energy certificates, a type of rating that indicates actual energy use) with EPC ratings shows little correlation.[40]

Instead, data can help developers to understand how buildings are actually used and identify ways to reduce energy consumption. Thanks to the better understanding of energy performance in buildings gained thorugh the NABERS scheme, new prime office buildings in Melbourne now use 40 – 70 kWh per square metre, compared to 80 – 160 kWh per square metre for a similar new office in London. When the scheme started in 1999, Melbourne’s building energy performance was comparable with London’s. Better data also helps understand use of unregulated energy, ie the energy associated with plug-in appliances which, for some types of building, contributes up to two thirds of total emissions.[41]

Actual building emissions are around two to three times the predicted emissions on average[42]



The government is not using digital solutions effectively

"One of the most innovative energy efficiency measures the government has implemented in recent years was the energy demand reduction pilot."

The clean growth strategy set a firm commitment to address business energy efficiency.[43,44] Yet most of the current discussion about digital energy solutions is focused on demand response rather than reducing demand and there is little indication that the government intends to wholeheartedly embrace the new energy efficiency opportunities that digital technology could offer.

For example, despite "unanimous agreement" amongst respondents to the government's consultation on reducing business energy use on the importance of granular energy performance data, there seems to be little urgency from the government to encourage its use.[45] Ample evidence of the performance gap between modelled and real energy use in non-domestic buildings is still unaddressed. So far, there is a commitment to consult on this issue in 2020 but there have been no further details on how or when this will happen.[46]

More generally, one of the most innovative energy efficiency measures the government has implemented in recent years was the energy demand reduction (EDR) pilot. This had its failings – including those resulting from the limited availability of data – but it was a rare example of more progressive policy in this field. The availability of better data would free policy makers up to run more experiments of this nature, learning from evidence based approaches used elsewhere by the government.[47]

Meanwhile, it is disappointing that the main initiative driving the adoption of new digital technologies, the Made Smarter North West pilot, does not explicitly target energy efficiency.

Smart solutions to cutting energy use

As the UK makes plans to cut carbon further and faster, the government cannot afford to miss the opportunities that new digital technologies offer to maximise the energy efficiency of business. It must make effective use of these solutions if it is to help companies stop wasting energy unnecessarily in existing assets and ensure that new buildings and industrial processes are fit for a net zero world.

We propose three areas of action:

1. Promote the use of digital technology

Support business adoption

"Energy efficiency should be explicitly addressed as part of government initiatives to support digitalisation of manufacturing, such as the Made Smarter review. "

Government energy efficiency programmes should support the uptake of digital solutions for energy efficiency, alongside investment in hardware. For example, the Industrial Energy Transformation Fund (IETF) should require improved monitoring and analytics from all the capital investment projects it supports. This would make savings more visible and inform future roll-out, particularly for more innovative solutions, as well as enabling participants to identify further opportunities for efficiency.[48]

Schemes to inform business action, such as mandatory ESOS audits, should identify how to make better use of new digital technologies and potentially roll-out submetering as part of the audit, to enable more granular assessment of energy use by equipment and sections of buildings. The energy technology list, which offers guidance on energy efficient equipment, should be updated to include digital solutions. And the government should accelerate the installation of building automation and control systems, with embedded smart features, in new and existing non-domestic buildings, as required by the EU's Energy Performance in Buildings directive. Uptake should be encouraged through stringent monitoring and enforcement.

In parallel, energy efficiency should be explicitly addressed as part of government initiatives to support digitalisation of manufacturing, such as the Made Smarter review. The roll-out of new technologies and business solutions supported by Made Smarter could have substantial implications for future energy performance and savings. Close monitoring and assessment of the energy and resource impacts of its current pilot scheme in the North West is vital for optimal deployment of novel technologies and should inform their future roll-out.[49]

Make equipment smart by default

The government should speed up the development of smart specifications for both industrial and commercial equipment. These should enable effective data gathering and maximise the role of energy efficiency (and flexibility) in the power system by ensuring effective communication with, and automated response to, the electricity network. Building on the work of the British Standards Institute on smart standards for electric vehicle charging, the government should work towards requirements for a wider range of technologies and introduce regulation to increase uptake and ensure consistency.[50]

Ecodesign standards should build on this to promote smart energy efficiency. For example, a recent EU scoping study identified substantial energy savings from building automation and control systems.[51] The full preparatory study started in the summer of 2019, and the UK should align with future revisions of this and other product standards as a minimum in future if it wants UK businesses to benefit and remain competitive.

2. Boost markets for smart energy efficiency

A new efficiency scheme for smaller businesses

A business energy efficiency obligation scheme to support SMEs should be introduced, delivered in partnership with energy service companies (ESCOs), to ensure expert delivery of energy efficiency projects at scale. Texas has similar scheme, known as the Standard Offer Programme (SOP). This requires transmission and distribution utilities to pay third party organisations to deliver a set level of energy efficiency improvements.[52]

This scheme would have to be adapted for the UK energy market, but payment to ESCOs could be structured in a similar way as for the SOP, combining incentives for peak energy demand reduction and a total reduction, as well as being modulated depending on the type of efficiency innovations employed. Improvements should be rewarded on the basis of operational, rather than modelled, energy consumption to promote better understanding of energy performance and saving opportunities.

"Improvements should be rewarded on the basis of operational, rather than modelled, energy consumption"

Use data to increase investment

With regards to non-residential buildings, the government should mandate the public disclosure of their operational energy performance from 2020 and promote the development of in use energy ratings. This should be combined with a tightening of minimum energy efficiency standards, and be subject to interim targets, to achieve energy rating 'B' by 2030, including for owner occupied non-domestic properties.[53] This could build on tools the public sector already uses and should require additional submetering of energy use within buildings to help identify whether it is the landlord or tenant that is responsible for improvements, since this is reported to be one of the current barriers to investment.

To encourage greater industrial energy efficiency, the government should benchmark sectoral energy performance, based primarily on data collected through the Streamlined Energy and Carbon Reporting requirements, and use it to promote improvements. It should also require central elements of ESOS audits to be publicly available and for businesses to provide feedback on the measures they take. Given that only about a quarter of businesses responded to recommendations from the first round of ESOS audits, there is significant room for improvement, and the government should consider mandating implementation of cost effective measures identified by the audit.[54]

These disclosures could, over time, underlie new criteria for access to finance, along the lines of the financing scheme that ING runs for commercial buildings in the Netherlands (see page 9). The government should implement the recommendations set out by the Green Finance Taskforce on promoting green loans and fiscal incentives, building on this evidence.

3. Avoid repeating poor design in new buildings

Learn from existing business energy performance

"New buildings should be designed to be net zero carbon compatible from 2025 at the latest."

The UK cannot afford to construct new buildings with the same energy performance failings as existing stock.

All new buildings should be built for net zero carbon in operation (ie including heating) from 2030. London has already committed to net zero for new buildings in the city, but national policy is needed to increase the adoption of higher standards across the country. For carbon neutral operations by 2030, new buildings should be designed to be net zero carbon compatible from 2025 at the latest and developers should include submetering.[55]

Energy use data from existing stock should inform new design and improve the modelling of expected operational performance. Developers should be required to complete post-occupancy assessments of new builds to verify actual against predicted performance.[56] Designing buildings with higher efficiency standards from the start not only lowers energy bills but is also much cheaper than retrofit.[57]

The government should work with industry to establish a net zero compatible approach to closing the energy performance gap in buildings. It should set a timeline for its adoption as mandatory practice for all new builds by 2025 at the latest.

Endnotes

1 Department for Business, Energy and Industrial Strategy (BEIS), 2018a, *Business energy statistical summary*
2 CREDS, 2019, *Shifting the focus: energy demand in a net-zero carbon UK*
3 L Hardt et al, 2018, 'Untangling the drivers of energy reduction in the UK productive sectors: efficiency or offshoring?', *Applied Energy*, 223, pp124–133
4 Z Hausfather, 2 February 2019, 'Analysis: why the UK's CO2 emissions have fallen 38% since 1990', *Carbon Brief*
5 J Barrett, P Broackway and P Taylor, 22 February 2019, 'Energy efficiency contributed 25% of UK economic growth since 1971', *Carbon Brief*
6 BEIS, 2019a, *Energy consumption in the UK*
7 BEIS, 2017, *Clean growth strategy*; BEIS analysis suggest that there are 40TWh of energy efficiency potential in commercial and industrial buildings, and 10TWh of potential in industrial processes.
8 CREDS, 2019, op cit, p38; BEIS committee, 26 March 2019, 'Oral evidence: energy efficiency', HC 1730, Q368.
9 BEIS, 2019b, *The non-domestic private rented sector minimum energy efficiency standards: the future trajectory to 2030*; total demand from industry and business is 422 TWh.
10 Committee on Climate Change (CCC), 2019a, *Net zero technical report*; electricity generation was 300TWh in 2017, of which 34 per cent from businesses and 31 per cent from industry.
11 BEIS, 2017, op cit
12 CCC, 2019a, op cit; Green Alliance, 2014, *Kickstarting the negawatts market*
13 Levelised cost estimates: nuclear, large scale solar and CCGT-CCS based on: BEIS, 2016, *Electricity generation costs* (for project commissioning in 2025); offshore wind based on: S Evans, 20 September 2019, 'Analysis: record-low price for UK offshore wind cheaper than existing gas plants by 2023', *Carbon Brief* (projects due to start operating in 2023-24); residential and commercial and industrial (C&I) efficiency programmes based on: I Hoffman et al, 2018, *The cost of saving electricity through energy efficiency programs funded by utility customers: 2009-2015*; EDR pilot cost based on Green Alliance, 2015, *Getting more from less: realising the potential of negawatts in the UK electricity market*
14 BEIS, 2018a, op cit
15 Industries included: mining and quarrying; manufacture of food products; manufacture of beverages and tobacco products; manufacture of textiles; manufacture of paper products; manufacture of coke, refined petroleum and chemicals; manufacture of rubber, plastic and non-metallic minerals; manufacture of basic metals; water supply and sewerage; libraries, archives, museums and other cultural activities
16 BEIS, 2018b, op cit; £5 billion of the £6 billion annual savings estimated in 2030 are from buildings; measures in buildings could include better insulation, improved lighting and control, and installation of building management systems in commercial and industrial buildings; for industrial processes, measures include heat recovery systems, and more efficient motors and high and low temperature processes.
17 Green Alliance analysis: ONS, 2019, UK input-output analytical tables 2015; ONS, Regional and subregional productivity, 'Regional GVA per hour worked indices, 2017 data.
18 Green Alliance, 2018, *Lean and clean*; G Lavery et al, July 2013, *The next manufacturing revolution: non-labour resource productivity and its potential for UK manufacturing*
19 BEIS, 2017, *Evaluation of the energy savings opportunity scheme*
20 P Mallaburn, 2018, 'Principles of successful non-residential energy efficiency policy', *ECEEE industrial summer study proceedings*; BEIS committee, 2019, op cit; CCC, 2018, *Reducing UK emissions: 2018 progress report to parliament*
21 BEIS committee, 2019, op cit
22 EEF, 2016, *Upgrading power*
23 Z Zhai and A Salazar, 2020, 'Assessing the implications of submetering with energy analytics to building energy savings', *Energy and Built Environment*, vol1, pp27-35; furthermore, automated reporting can highlight equipment performing poorly which may be in need of maintenance, providing further efficiency savings.
24 Full methodology for the numerical analysis is available online at www.green-alliance.org.uk/resources/A_smarter_way_to_save_energy_methodology
25 Goldman Sachs, 2014, *The internet of things: making sense of the next mega-trend*.
26 https://buildingiq.com/resources/case-studies.The platform has shown a 4.8 per cent decrease in total energy demands in a shopping mall, a 12 per cent reduction in a hospital and a between 14 – 19 per cent when applied to university buildings.
27 BEIS, 2018a, op cit; main energy efficiency measures listed for building energy efficiency are: insulation and glazing, controls and other thermal efficiency, ventilation and heat recovery, BADS, lighting etc; EEF, 2016, op cit also summarises main efficiency measures for ESOS, beyond monitoring: variable speed drive (VSD), heating, ventilation, and air conditioning (HVAC), lighting etc
28 EEF, 2016, op cit
29 As reported in US Department of Energy, 2015, *Barriers to industrial energy efficiency*. "Lack of disaggregated energy consumption data, such as process unit and equipment-level energy consumption data, and tools to evaluate such data, can prevent identification and evaluation of opportunities."

[30] NABERS *Annual report* 2018-19, nabers.info/annual-report/2018-2019/ life-of-program-statistics/, accessed on 4 December 2019
[31] UCL Energy Institute, 2016, *Salix research stage 2: energy savings, monitoring and reporting*; all participants of the SALIX scheme were surveyed, 72 per cent of organisations responded and of these 95 per cent used data to justify investment.
[32] NABERS *Annual report* 2018-19, op cit, 'Average reduction in energy use after multiple ratings for offices' (base and whole buildings)
[33] BEIS, 2018a, op cit; BEIS, 2018b, op cit
[34] BEIS, 2019, *Helping businesses improve the way they use energy: government response*
[35] Examples include Allianz, Munich RE and Hannover RE; this type of insurance is becoming available from a number of suppliers and typically involves a technical audit by the insurer so they can assess the risks and sign off on efficiency estimates.
[36] 'De-risking energy efficiency platform', deep.eefig.eu
[37] ING, 15 December 2016, 'ING will only finance 'green' office buildings in the Netherlands after 2017'
[38] M&G Real Estate, 2018, *Green buildings: what are the finance benefits for investors?*
[39] BEIS, 2018a, op cit
[40] Innovate UK, 2016, *Building performance evaluation programme: findings from non-domestic projects*
[41] B Bordass, R Cohen and P Bannister, 2016, *Design for performance: feasibility study final report*; VERCO, 2018, *Design for performance pilot programme: technical report*; the Better Buildings Partnership has been developing a Design for Performance system; in cases where in-use data does not match the modelled estimates, the actual energy use is fed into the simulation alongside real weather conditions for the year in question to help understand the source of the deviation, address any performance issues and improve future modelling.
[42] Green Alliance analysis based on Innovate UK, 2016, op cit. Full methodology is available at www.green-alliance.org.uk/resources/A_smarter_way_to_save_energy_methodology
[43] CCC, 2019b, *Reducing UK emissions – 2019 progress report to Parliament*; the CCC points out that government priorities for the coming year should include detailed policy for to achieve the target to improve energy efficiency by 20 per cent by 2030, as it highlights on p57: "There have been a number of further policy developments on energy efficiency. […] However, the Government has not set out how the improvements of 20% in business energy efficiency committed to in the *Clean Growth Strategy* will be achieved"
[44] BEIS committee, 2019, op cit, points out that "in the intervening time, there are insufficient policy instruments in place to deliver the Government's target for a 20 per cent increase in business energy productivity by 2030; majority of businesses not aware of the target, and those that are do not think it will be met".
[45] BEIS, 2018b, op cit; evidence from the Electricity Demand Reduction (EDR) pilot also highlighted that uncertainty around savings, combined with limited ability to accurately meter savings to be able to participate.
[46] Minimum energy efficiency standards are currently the principal regulatory driver.
[47] See for instance the work of Behavioural Insights Team in trials and What Works Centres in collating and assessing evidence (www.gov.uk/government/organisations/behavioural-insights-team and https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/136227/What_Works_publication.pdf)
[48] One of the objectives of the government's IETF is to "Bring down costs and risks of deep decarbonisation technologies by demonstrating those technologies".
[49] *Made Smarter*, www.madesmarter.uk/made-smarter-north-west-pilot
[50] British Standards Institute, *The energy smart appliances programme*
[51] European Commission, *Ecodesign preparatory study for building automation and control systems (BACS)*, ecodesignbacs.eu/planning, accessed on 4 December 2019
[52] Green Alliance, 2012, *Creating a market for electricity savings*; Texas Energy Efficiency, 'Program basics', www.texasefficiency.com/index.php/utility-programs/program-basics
[53] Rather than only for rented properties, as currently suggested in the government's consultation: BEIS, 2019, *Non-domestic private rented sector minimum energy efficiency standards: future trajectory to 2030*
[54] BEIS, 2017, op cit
[55] See also: Chartered institute of building services engineers, 2019, *Steps to net zero carbon buildings*
[56] Based on this information, developers should be required to fine tune performance in the building, as well as use it as input for the design of future buildings.
[57] Currie & Brown and AECOM, 2019, *The costs and benefits of tighter standards for new buildings*

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A smarter way to save energy
Using digital technology to increase business energy efficiency

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Acknowledgements
We are also grateful to the attendees of our stakeholder workshop on smart clean growth in the energy sector, and for additional input from the following experts: Todd Holden, Paul Ruyssevelt, Sarah Ratcliffe, Paul Addison, Mark Jenkinson, Paul Stepan, Cliff Elwell, John Parsons, Susanne Baker, Mat Colmer, James Griffiths, Joe Ritchie, Yselkla Farmer, Emma Fryer and Jake Verma.

This report was produced as part of Green Alliance's Tech Task Force programme. This business led group is a forum for ambitious business thinking to influence policy innovation for clean growth.

Tech Task Force members:

Green Alliance
Green Alliance is an independent think tank and charity focused on ambitious leadership for the environment. Since 1979, we have been working with the most influential leaders in business, NGOs and politics to accelerate political action and create transformative policy for a green and prosperous UK.

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Published by Green Alliance
January 2020
ISBN: 978-1-912393-47-3

Designed by Howdy