

Improving the

With the UK having declared a 'legally binding' target on greenhouse gas emissions beyond 2020, **Brendan Tapley** considers the joint roles of energy efficiency and renewable energy to 2050

The Government has just increased its carbon reduction goal from 34% by 2020 to 50% by 2025. The announcement makes the UK the first country in the world to have declared a 'legally binding' target on greenhouse gas emissions beyond 2020.

Last year though, Cambridge Econometrics predicted that the UK will miss the lower target unless the new coalition Government implements strong policies promoting renewable energy and energy efficiency, a view that is echoed by the National Audit Office.

What is more, the UK missed its 2010 renewable energy target, producing 6.5% rather than 10% of electricity from renewables, and is some way off the 15% renewables target by 2020. All of which points to a halving of carbon emissions being extremely optimistic.

Incentives to reduce carbon, including Feed in Tariffs, Renewable Heat Incentive and the Carbon Reduction Commitment, are either

proving too costly for the Government to sustain or remain largely unproven. So how might the roadmap look for the deployment of energy efficiency and low carbon technologies across the non-domestic sector?

Scenarios for Carbon Abatement and Technology Deployment

Building the Future Today, published by the Carbon Trust, reported that a large scale implementation of both energy efficiency measures and low/zero carbon energy generation will be required to hit the 2050 target (80% carbon reduction) and 'nearly all' cost effective energy efficiency measures need to be implemented by 2020. This requires the rate of implementation of cost-effective energy efficiency to more than double. Beyond 2020, currently expensive measures of all kinds would need to be implemented 'with a more integrated approach' in using the different types of technologies.

The Figure (right) illustrates the carbon savings required from three main categories of measures:

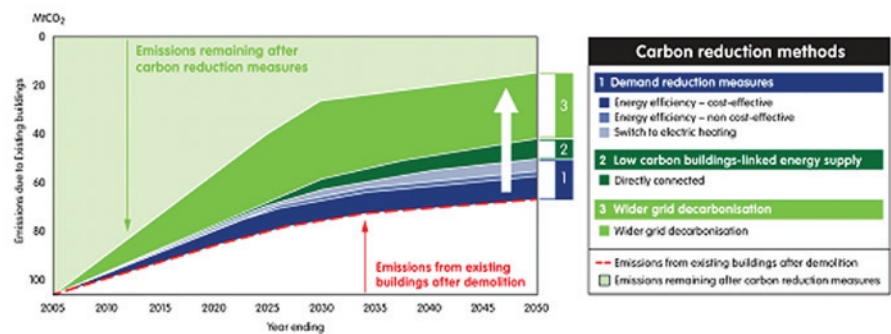
A Possible routemap to 2050: carbon reduction in non-domestic buildings

The Carbon Trust also predicted that, by 2025, the amount saved in energy spend from this approach would exceed the total investment costs by £6B, with a 50% carbon saving in non-domestic buildings. Not only would this put us on the pathway to an 80% carbon reduction by 2050, but it also presents an attractive business case for UK plc.

Key to the above is 'grid decarbonisation', primarily using onshore and offshore wind, nuclear, combined cycle gas, and coal with carbon capture and storage. This requires large scale investment, for which the business case will greatly depend on carbon and fossil fuel prices. Low carbon, decentralised energy also plays a growing role, which will be aided



power



by the Feed in Tariff incentives for small scale energy generation.

Current cost effectiveness

An example of the current cost difference between key types of measures covering energy efficiency, low and zero carbon generation can be seen in an example by the NHS Sustainable Development Unit. It ranks measures by their marginal abatement costs (MAC) which reflects the Net Present Value of the costs and savings over their lifetime. The larger the negative cost, the larger the saving.

The six top measures are all energy efficiency measures.

Marginal abatement costs for NHS estate 2010

Government price incentives through their new policies will improve the business case for renewables, but it is likely to be 2020 before they can be seen as viable substitutes for cost effective energy efficiency measures.

Leading the way

The top measure on the NHS list is volt-

Marginal abatement costs for NHS Estate 2010	
Option	£/tCO ₂
Voltage optimisation	-110
Improve lighting controls	-94
Variable speed drives	-90
Building management system	-86
Energy efficient lighting	-67
Wind turbine	-42
Biomass boiler	-6
Solar hot water	+49

age optimisation (VPO or Voltage Power Optimisation). VPO is a great example of what the Carbon Trust calls a 'cost effective energy efficiency' measure with paybacks usually between one and four years. VPO was introduced to the UK in 2001 by powerPerfect, the UK's 10th fastest growing private company in 2009.

Unlike other energy efficiency measures, VPO reduces the electricity consumption for the whole building. It, essentially, improves the quality of incoming power, providing business continuity benefits through 'transient protection'. As the entire building supply is 'optimised', downstream demand side measures can be targeted more effectively.

VPO is a happy bedfellow with onsite micro-generation projects as it maximises the benefits from the micro-generation by reducing the onsite demand. Furthermore, VPO can smooth out the voltage volatility caused by the intermittent nature of renewable energy, particularly smaller wind turbines.

The exact route the UK will take remains unclear. If new policy measures are effective, such as the Renewable Heat Incentive, then zero carbon options would play a more important role than already depicted. What this entire process demonstrates is the strategic importance of the implementation of the cost effective energy efficiency measures prior to 2020, and the importance of rolling out low- and zero-carbon measures as the technologies become cheaper up to and after 2020.

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