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insight
An energy briefing paper

Feed-in Tariffs: the energy saving option

Executive Summary

• Energy saving feed-in tariffs (ESFITs) are a relatively new concept and are designed to use the same principles as Feed in Tariffs for renewable energy (REFITs)

• They offer a promising way of improving electricity efficiency and reducing electricity demand, thereby decreasing carbon emissions

• The Electricity Market Reform proposals which form part of the 2012 Energy Bill provide a bias towards investment in new supply that could be addressed using ESFITs

• In the context of EMR, ESFITs offer a means of delivering decarbonisation with a lower impact on consumer bills

• Because ESFITs do not rely on energy companies, they would provide incentives for innovation in project delivery in a much wider range of actors including householders, community groups, local authorities and small businesses

• The concept of ESFITs is simple, but there are policy design issues that still need to be addressed

Introduction

A key aim of energy policy is to reduce carbon emissions. UKERC and other analysis shows that to achieve this at reasonable cost, it is necessary to both develop cleaner energy supplies and reduce energy demand.

Existing Feed-in tariffs for renewable energy (REFITs), which offer generators of renewable energy a guaranteed level of payment for energy they produce, are designed to promote the development of clean, carbon free electricity generation. Energy Saving feed-in tariffs (ESFITs) would be designed to use a similar approach to encourage reductions in energy use.

Historically energy efficiency improvements have made a far greater impact on reducing UK carbon emissions than supply side changes. Recent Government estimates (Electricity Demand Reduction, DECC, November 2012) indicate that improving the energy efficiency of electricity could reduce demand by more than 40% by 2030. However, in their current form, the EMR proposals within the Energy Bill offer significant subsidies for all low carbon generation technologies, but none for reducing demand. This risks an inefficient outcome with higher bills for consumers than are necessary to deliver the key aim – secure energy services with carbon emissions reduction. ESFITs could play an important role in meeting energy and carbon goals, but will require policy support to do so.

Megawatts or Negawatts?

REFITs were first set up in Germany in 1990 to encourage the development of renewable electricity generation. They are a market mechanism, designed to encourage growth and innovation among renewable generators. Renewable electricity is currently more expensive that electricity produced in conventional fossil fuel power plants. By supporting growth in the renewables market, the aim is to cut the cost of these technologies, and ultimately eliminate the need for subsidies.

In the UK, REFITs are currently used to help only small scale renewable electricity generators. However, the EMR proposals include the idea of contracts for difference (CFDs), which are essentially FITs for all new low carbon power generation – renewables, nuclear power and fossil fuel generators that use carbon capture and storage (CCS). However, neither REFITs nor CFDs address the issue of the need to improve efficiency and reduce energy demand.

ESFITs, by contrast, are conceived specifically as a way to reduce energy demand, thus reducing the need for new generation. The basic idea is to offer a fixed price subsidy for each unit of energy saved. This would encourage investment in 'negawatts' as an alternative to generation. Savings delivered via demand reduction can be thought of as creating a 'negawatt' power station. 'Generating' negawatts, rather than simply building new generating capacity, offers a number of advantages. It is cheaper than generating more electricity, does not require the building of large new infrastructure, and therefore can be delivered more quickly.

ESFIT Advantages

The introduction of ESFITs would offer a number of advantages. They are well suited to the proposed GB electricity market structure under EMR, as they would offer incentives to demand reduction that are consistent with those proposed for electricity generation.

ESFITs would largely support energy saving technologies that are already cost effective, such as high efficiency lighting in buildings and high efficiency motors in industry. This would increase the economic efficiency of providing electricity services – enabling decarbonisation at the lowest cost to consumers. It would also mean less pressure to increase low carbon electricity production quickly, which can be problematic in terms of, for example, securing planning consent, deploying new unproven technologies, and increasing consumer prices.

By offering a transparent, guaranteed price support system, ESFITs would encourage awareness of environmental issues and the importance of energy efficiency, especially its role in reducing carbon emissions. And because ESFITs do not rely on energy companies, they would provide incentives for innovation in project delivery in a much wider range of actors including householders, community groups, local authorities and small businesses.

Table 1: ESFIT advantages

REFITS	ESFITS
Supports deployment of low carbon generation	Supports use of energy efficient technologies
Helps to bring down the cost of low carbon electricity	Reduces the need to build power stations to generate more electricity
Increases consumers' electricity prices and bills	Reduces consumers' electricity bills
Helps to reduce CO2 emissions	Helps to reduce CO2 emissions

A negawatt is defined as a unit of energy saved when a more energy efficient option is used. For example, the 78 watts of electricity that is saved when a 100 watt incandescent light bulb is replaced by a 22 watt low compact fluorescent lamp (with the same light output) are negawatts. Producing negawatts by using energy efficient appliances and processes means that less electricity supply is needed. From the perspective of an electricity system operator charged with ensuring supply meets demand, negawatts and watts have equal value.

Design issues

To deliver the potential advantages ESFITs offer, there are policy design issues to be addressed.

Measuring and calculating payments
The basis for calculating ESFIT payments is a key issue. Unlike electricity generated, a quantity which can be metered, ESFITs payments would be based on energy efficiency savings that are harder to measure. Adopting a simple approach – such as using the annual reduction in energy use – risks offering payments for savings that occur due to factors unrelated to energy efficiency improvement, such as building occupancy or manufacturing output. In industrial settings it will be possible to use well-established monitoring and verification methods to address this. But for households and small companies this is not realistic. A more feasible approach is to use the expected average (deemed) savings for each technology deployed, an approach that has been well established in UK energy efficiency programmes (CERT and its predecessors) for nearly 20 years.

The most important issue is to determine the size of the appropriate payments. As the Technical Annex explains, equity with the treatment of low carbon generation technologies in EMR implies that ESFITs should be set at a level equal to the premium payment of the 'strike price' for these technologies above the wholesale market price for electricity. For example if the latter is £80/MWh and low carbon generation technologies are paid at least £118/MWh, an ESFIT of £38/MWh (3.8 p/kWh) is justified. However, there are arguments for even higher payments to address the well-established additional barriers faced by energy efficiency investments. These could be as high as the strike price itself (see Eyre, 2013).

Different fuels?
The treatment of different fuels needs consideration. Most discussion of FITs focuses on electricity, but direct use of fossil fuels also leads to carbon emissions and can also be reduced by energy efficiency. Moreover, much analysis of climate change mitigation indicates that electricity may need to replace fossil fuels for heating, and therefore that energy efficiency improvements in buildings that largely save gas today may ultimately save electricity. This points to including such measures within the scope of ESFITs.

How to pay?
The method of payment also needs attention. The biggest individual users of electricity are in the industrial sector, but two thirds of the electricity generated in the UK is used in households and non-domestic buildings. This highlights the need to target electricity saving measures at all users, and to designing approaches appropriate for all. For large industrial users capable of participation in the electricity wholesale market, payments might be made based on half hourly wholesale price. But for smaller users, payments will need to be made through the retail market. Moreover, capital grants might be more effective than kWh payments spread over the life of the project. The appropriate scale of these payments for common technologies is set out here:

Table 2: Indicative ESFIT payments

Energy efficiency technology	Initial heating technology	ESFIT single capital payment (£)
Loft insulation	Gas	£483
Cavity wall insulation	Gas	£977
A rated boiler	Gas	£145
Solid wall insulation	Gas	£2,802
Solid wall insulation	Electricity	£7,004
80% carbon reduction retrofit	Gas	£5,194
Light emitting diode lamp	Electricity	£16
A+ wet appliance	Electricity	£37
Real time display	Gas	£7
Ground source heat pump	Electricity	£6,172
Fuel cell micro-CHP	Gas	£1,753

These calculations are based on the assumptions that ESFITs would be paid as a single capital grants, equivalent to £38/MWh saved over the lifetime of the project. £38/MWh is DECC's estimate for the difference between the levelised costs of offshore wind and gas fired generation in 2012. More detail on the energy saving calculations is given in Eyre (2013).

Save and prosper

Our conclusion is that, despite the complexity of some issues, ESFITs could be designed to reward the benefits of energy efficiency, and would fit well with proposed new policies under EMR.

They would provide a transparent incentive to households and companies alike to adopt technology and procedures to save electricity. Important details remain to be worked out, but ESFITs would provide an effective complement to the proposed CFDs in EMR, improving market efficiency in delivering carbon reduction.

Further reading

Benton, D. (2011). Decarbonisation on the cheap. How an Electricity efficiency tariff can cut energy costs, Green Alliance.

Eyre, N. (2013). “Energy saving in energy market reform—The feed-in tariffs option.” Energy Policy 52(0): 190-198.

Lovins, A. (1989) The Negawatt Revolution -- Solving the CO_2 Problem. http://www.ccnr.org/amory.html

UKERC Publications reference: UKERC/BP/ED/2013/001

Technical Annex

The figures below illustrate the basic ideas underlying renewable energy feed-in tariffs (REFITs) and energy saving feed-in tariffs (ESFITs). They use highly simplified diagrams, showing the total demand for energy (x-axis) versus the price paid (y-axis). The shaded areas therefore represent total costs.

Figure 1

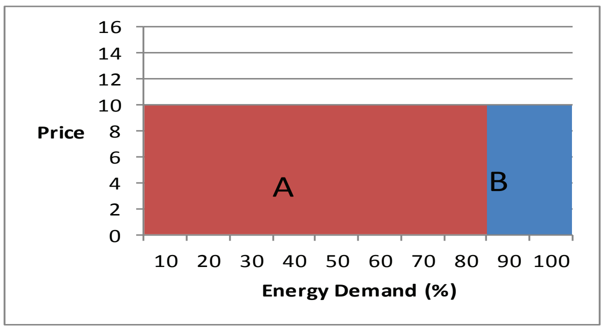

Figure 1 shows the situation with no FITs in place. The costs of are assumed to be constant (10p/unit). This is what each consumer pays and the total cost to all consumers is A+B.

Figure 2

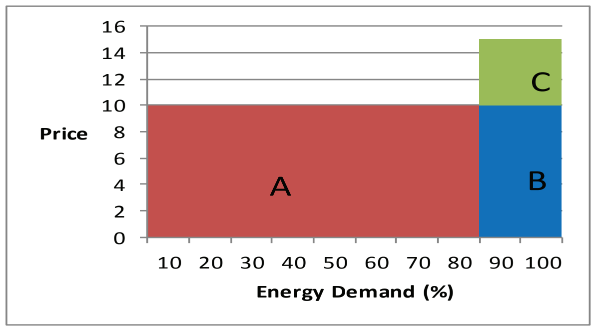

Figure 2 shows what happens if REFITs are used, for example to subsidise supply of the last 20% of demand. A premium price (say an additional 5p) is needed for each of these units and the total cost to consumers rises to A+B+C. The additional cost C is spread across all consumers, raising prices.

Figure 3

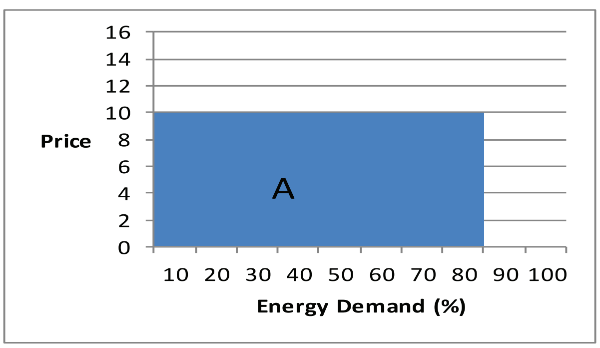

Figure 3 illustrates the use of ESFITs as an alternative. A 20% energy efficiency improvement provides the same level of energy services (comfort etc) with the same level of decarbonisation as the REFIT case. Demand falls by 20% and both B and C in Figure 2 are absent. This effect saves consumers a cost equal to B, compared to the no FIT case, and B+C compared to the REFIT case.

However, in this case, consumers need to be subsidised through an ESFIT. The subsidy goes to reducing demand rather than increasing supply and again is paid for through increased prices. However, the total costs of supplying energy services are still lower (and therefore consumers as a whole better off) than in the REFIT case, provided the total ESFIT payments are less than B+C. It can also be shown (Eyre, 2013) that all consumers (i.e. including those who do not improve their energy efficiency) are better off if the ESFIT payments are less than C. In other words, all consumers benefit if the ESFIT payment for each unit of energy saved is less than REFIT payment for each unit of clean energy generated. Put simply, consumers are better off subsidising their neighbours to save energy, if saving energy is cheaper than generating clean energy.

In practice, REFITs and ESFITs will not be in competition as described above. All studies show that both low carbon supply and demand reduction will be needed to deliver a low carbon energy system at reasonable cost. So both REFITs and ESFITs will be needed. This analysis simply shows that paying REFITs, without ESFITs at a similar level, increases the cost of decarbonising our energy supply.

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