FiT for purpose? Renewable energy funding in the UK

David Elliott critically assesses the financial mechanisms offered by the UK government to stimulate growth in renewable energy technologies.

Although the UK's renewable energy resources are among Europe's best, especially its wind, it is well known that we have developed these resources relatively slowly and are trailing far behind most other countries in the EU. This is partly because the UK government opted for a financial support mechanism, the Renewables Obligation (RO), which depends upon a competitive market for encouraging the adoption of renewable energy technologies. This is in contrast with most of the rest of the EU, which adopted the guaranteed-price Feed-in Tariff (FiT) approach. See the box 'RO versus FiT'.

Under its FiT system, Germany has installed 25 gigawatts (GW) of wind generation capacity, whereas the UK, despite a much better wind regime, has only managed 5 GW so far[1] – and some of that only came about because of direct state investment, introduced because the RO system was not delivering enough support for offshore projects.

Worse still, the UK's RO costs consumers more than the German FiT system. In the financial year 2005/6, the RO cost consumers 3.2 pence/kWh, whereas in 2006 the German FiT only cost consumers 2.6 p/kWh – and provided much more energy from renewable sources.[2]

The competitive nature and high costs of projects coming under the RO may also be key factors in the backlash that has occurred against wind projects in parts of the UK.

To be competitive, developers have often had to invade sensitive upland sites for high wind speeds. Under the FiT, however, developers have been able to use less invasive, lower wind-speed sites; indeed in much of Germany and Denmark that is all that is available. It has also been possible for locally owned community projects to flourish; 80% of wind projects in Denmark are locally owned. In the UK, most are owned by multinationals – mainly EDF and E.ON. So far, there are only two wind co-ops, and opposition to wind continues. Ownership brings psychological as well as financial buy-in. As the Danes say, "Your own pigs don't smell."

It was clear to many that the RO was not working and eventually, after much lobbying (by environmental groups, some sections of industry and others), the UK government brought in a FiT in April 2010 – but only for small projects, below 5 MW. That means that its focus is on domestic and community projects using smaller scale 'micro-generation' technologies, such as solar photovoltaic (PV). The overall target set is not high: it is expected that by 2020 the FiT will lead to just 2% of the UK's electricity coming from these small-scale renewable sources.[3]

Local micro-generation has its attractions. It avoids losses from long-distance transmission, which can be up to 10%. But it is currently quite expensive, solar PV in particular, meaning fairly high levels of FiT support are needed. However, FiTs do help build the market for new technologies, so that the price of these technologies falls and the FiT level can gradually be reduced. That worked in Germany for large-scale wind power, and also, on a smaller scale, for solar PV – it now has about 10 GW of PV. But this success came at a relatively high cost, to the extent that in mid-2010 the German government decided to pull back the throttle on PV to avoid too much extra cost to consumers.

This could be seen as a failure of nerve – the FiT system should have gradually reduced the cost. But the concern over cost to consumers is a valid issue, one that also emerged when the UK FiT started up. It was argued that, given the expense of solar PV installations, the way the FiT provided support to the technology was economically regressive.[4] Those who could afford to invest, say, £10,000 in a PV array might get £1,000 per annum back for the electricity they generated and used, paid for by all the other consumers, who would be charged extra via their electricity bills.

However, the actual cost per head would be small – perhaps an annual £10 surcharge on bills by 2020, since the expected size of the UK FiT scheme is small. PV retailer, Solar Century said it would be less than £3 by the time the scheme is up for review in 2013. If by then demand for expensive options is outstripping expectation, the Department for Energy and Climate Change now says a revised tariff level might be introduced, much as in Germany.[5]

So overall maybe equity is not a major issue. But getting access to the programme will still be hard for many people without the odd spare £10,000. So it is encouraging to see plans for a 'green energy loan' scheme, under which energy supply companies and others (e.g. the Co-operative Group) may offer consumers zero- or low-interest loans for installing new renewable energy systems, to be paid back from the resultant energy savings, thus avoiding extra charges on the taxpayer or the other consumers. A 'pay as you save' scheme along these lines is likely

RO versus FiT

Under the Renewables Obligation (RO), electricity suppliers must meet specified targets for supplying from renewable sources each year. They can pass on the extra cost of doing so to consumers. In return, the suppliers get Renewable Obligation Certificates ('ROCs') for each eligible megawatt hour (MWh) sold. If they manage to get more ROCs than they need to meet their obligation, they can sell them on; if they miss their target they can buy in from others. This means the ROCs have a market, and a market value. But the value of the ROCs varies. This makes it hard for developers to predict future earnings, and therefore hard to borrow money to fund projects. Interest rates on borrowings for RO projects are higher than those under the guaranteed price FiT system – where future earnings are known many years in advance. So under the RO, consumers must be charged more than they are charged under a FiT for the same type of project.

In the FiT system, each MWh of renewable electricity produced attracts a pre-set tariff when it is fed into the grid. This is why earnings can be calculated in advance and interest rates kept low. The FiT also has a built in price reduction ('degression') formula to reflect expected improvements in technology and markets (typically 2% per annum, depending on the technology), so costs are guaranteed to come down with time. By contrast, under the RO, the same number of ROCs is always given per MWh supplied, regardless of the state of development of the technology and its market. This can lead to excess earnings via ROCs by projects whose generation costs have fallen. So far, overall, around £1 billion more than was actually needed has been paid out by consumers – making the RO even more expensive. The RO mechanism has now been adjusted so that the number of ROCs varies according to the technology, making it a little more like a FiT. However, all onshore wind projects, for example, still get the same number of ROCs per MWh supplied, regardless of their level of development. So the excess payment problem to mature projects still persists.

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Pelamis wave energy converter

to be included the forthcoming Energy Security and Green Economy Bill,[6] as part of the coalition government's 'Green Deal' programme, which is expected to be available in late 2012.

There certainly seems to be support for self-generation. A YouGov survey for Friends of the Earth, the Renewable Energy Association and the Co-operative Group[7] found that 71% of the homeowners asked would consider installing green energy systems if they were paid enough cash. So perhaps, one way or another, uptake will be significant.

However, some still worry about using a FiT to push PV down its technology 'learning curve' to lower prices, given its initial high cost. The UK FiT sets the price for PV high, so that those who install it get the same rate of return (as a percentage of their investment) as those using other, cheaper technologies. For example, within the FiT system,[8] retrofit PV projects of 4 kW or less receive 41.3 p/kWh, whereas onshore wind turbines of between 1.5 and 5 MW only get 4.5 p/kWh. This difference may be fine if there is good justification for accelerating PV take-up, but that is a matter of judgement. For electricity, in the UK context, large-scale onshore and offshore wind is clearly a better bet for the moment in terms of price and the scale of the resource – the UK offshore wind resource has been estimated[9] at over 200 GW and perhaps even more than 400 GW. And although offshore wind currently costs around 14.5 p/kWh under the Renewables Obligation, the lowest level of support offered under the FiT for PV is 26.8 p/kW. But PV prices are falling, with claims that they could reach grid parity in some locations with a few years, and the potential long-term resource, even in cloudy UK, is reasonable – the government's *2050 Pathways Analysis* report talked of perhaps 95 GW peak.[10] So PV could well be next in line for expansion, and the FiT, plus the loan scheme, might be a starting point.

Even so, domestic-scale micro-generation has it limits. PV is less affected by the scale issue, as there are no economies of scale from the technical point of view, except via the bulk buying of components and the sharing of installation costs for larger projects. But it is a different situation for micro-wind generation, which is only effective in terms of the energy generated per unit cost in a very few urban locations in the UK; larger, grid-linked machines in windy places are much more efficient and cost-effective. Solar heating (to be supported under the forthcoming Renewable Heat Incentive) may be the best domestic option, but even this benefits from economies of scale e.g. for grouped-solar schemes sharing a large heat store, or even solar-fed district heating. It is a similar situation for micro-Combined Heat and Power (CHP): larger-scale mini- or macro-CHP, linked to district heating networks, are generally more efficient.

According to the report *Power in Numbers*[11] from the Energy Saving Trust, "the economics of all distributed energy technologies improves with increasing scale, leading to lower cost energy and lower cost carbon savings and justifying efforts for community energy projects". For some smaller-scale renewable systems, it adds, "it is only when action occurs at scales above 50 households, and ideally at or above the 500 household level, that significant carbon savings become available."

Fortunately the 5 MW UK FiT ceiling, although low, does provide the chance to operate at a slightly larger community scale, which may redeem the whole thing – and there are proposals for the 5 MW limit to be raised. Meanwhile, though, most larger renewable energy projects still have to cope with the RO as the UK's main support mechanism, since the belief within government and much of the industry is that it is now too late, and would be too disruptive, to change over fully to a FiT.

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