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Power from the People

Prosuming Solar Electricity in the UK, beyond the Feed-in Tariff

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Domestic solar PV installations have increased rapidly in the UK since 2010, peaking in early 2012, thanks to generous government incentives through Feed-in Tariffs (FITs). However, recent cuts in FIT rates have reduced solar development drastically and are bringing storage at the forefront of domestic energy (Jones et. al., 2017).

Alongside solar PV cost reduction forecast and increase of electricity retail prices, the incorporation of battery storage is the main option to sustain rooftop PV uptake. Growth in battery units is primarily due to the opposing trends in household electricity prices and FITS in conjunction with government incentives for battery storage. High electricity prices and low support for feeding power produced at home into the grid benefits those who can consume their own power. Battery storage can assist in this. Besides lowering household grid imports through increased on-site PV self-consumption, smart storage systems are presented as a solution to solve some of the problems of intermittent generation, to help matching supply and demand, and eventually increase profitability for prosumers.

However, PV-storage systems also raise significant challenges related to system level cost efficiency and grid integration. The prospect of profitable self-sufficiency brings about distributional problems and sparks discussions on the economic efficiency of the grid system as a whole.

Paper summary:

1. Prosuming in the UK

Prosumers are private households which produce their own electricity in addition to traditional energy consumption. This electricity may be used on site and/or fed back into the grid, hence without an obvious distinction between self-consumption (of solar electricity) and consumption (of grid electricity).

In the UK, the literature often operates with concepts that refer indirectly to prosumers, for example by focusing on technology, using terms such as “micro-generation” or “decentralized energy” (Inderberg, Tews & Turner, 2018). “Self-consumption” refers to the share of PV electricity consumed on the total electricity generation from PV, while “self-sufficiency” represents the share of self-consumed PV electricity on the total electricity demand (Luthander et al., 2015).

Most relevant data on prosumption in the UK come from the official Feed-in Tariff data, in which installations of <4 kWp are typically domestic installations. According to OFGEM (2017), there were 755 000 residential solar PV prosumers in 2015, accounting for 2,7% of British households.

2. The end of Feed-in Tariffs : a “solar coaster”

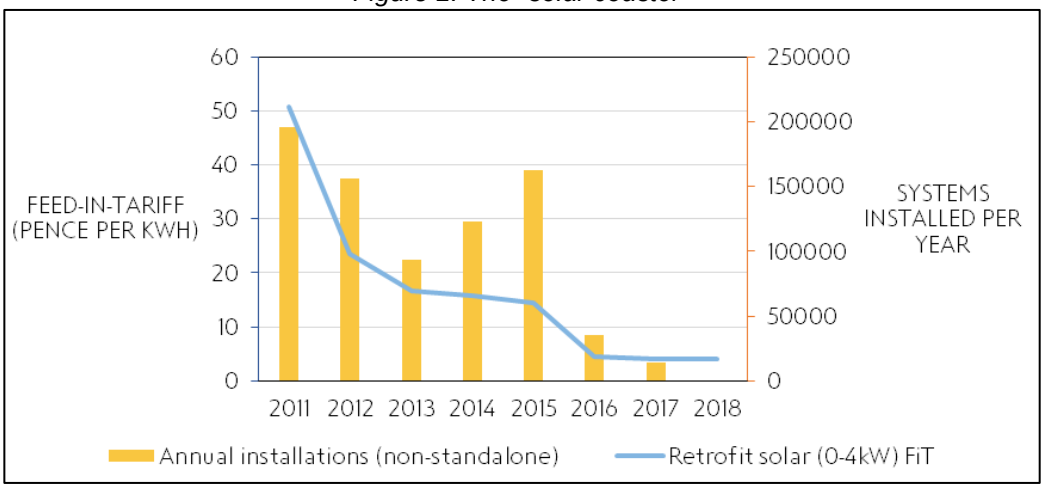
In the UK, and more generally in the EU, political support for renewable energy technologies in the last decade, particularly micro-generation, has encouraged a significant development of solar prosuming. In 2010, the government launched the Feed-in Tariff (FIT) Scheme specifically for installations of less than 5MW (later reduced to 50kW) to encourage homes and businesses to generate their own renewable electricity, with the most desirable tariff going to <4kWp installations.

During the first two years of the scheme, the return on investment on domestic PV installations was much more enticing than, for example, individual savings accounts or other financial products available for private investors. “Being green” became not only affordable, but financially attractive.

The Feed-in Tariff presented a good investment opportunity not just for private households, but for commercial investors as well. Private companies initiated “Free Solar” schemes, also referred to as “Rent-a-Roof” schemes, by installing PV systems on private dwellings at no cost to the owner, enabling householders to use the electricity generated by the system, while the Feed-in Tariff payments went to the investor.

A first cut on the generation tariff was scheduled from December 2011 (delayed until April 2012 following judicial appeals) due to the fact that people were applying for the FIT scheme in numbers exceeding DECC forecasts and funding allocations. After a period of unstable tariffs (referred to as the “solar coaster” by solar professionals), Renewable energy subsidies were slashed from January 2016 after a significant cut from 12.47p per kilowatt hour to 4.39 p/kWh (Figure 1). The cut led some new adopters not to bother registering with the FIT, which has raised issues about how to source reliable statistics on micro-generation.

Figure 1. The "solar coaster"



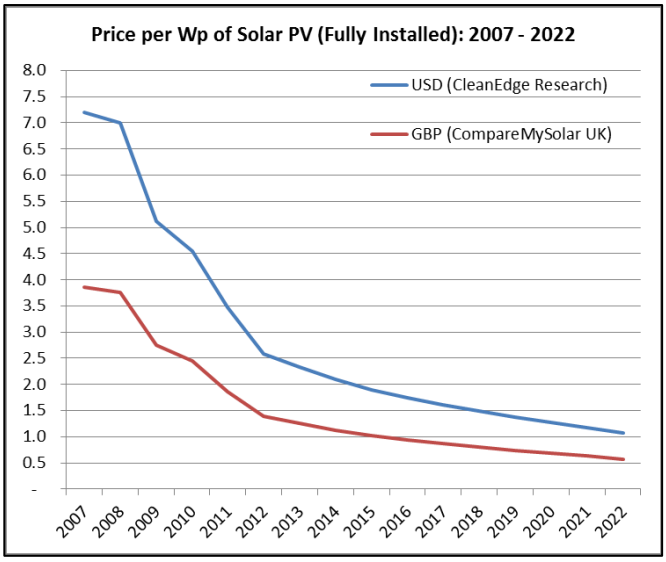
Source : Neweconomics.org

3. Cost and storage, new drivers of self-consumption

The drastic reduction of FIT has several implications for prosumers. First, prosumers must look for other forms of cost reduction or profitability. The cost reduction in purchasing solar PV, driven by Chinese imports, is a major influence for PV development in the UK, but the decline in purchasing price has decelerated during the last five years (Figure 2).

Battery storage today increasingly appears as a promising option to maximize solar power generation by households, lower electricity grid imports and increase profitability. The operation of battery storage coupled to a residential PV can minimise the effect of variable PV output while introducing more flexibility into grid management. Local batteries, including electric vehicle batteries, can store excess generation from solar. This can later be used within the household or even fed back into the grid during peak demand. Combined with smart metering and diversified "time-of-use" power tariffs, PV-storage systems may create significant economies for householders (and companies) while avoiding grid overload.

Figure 2. Solar PV price



Source: Renewableenergyhub.co.uk

The uptake of PV-storage systems is sensitive to a range of factors including technology costs, geographical factors, electricity retail prices and policy regulations (Khalilpour & Vassallo, 2016). Recent studies indicate that in the UK, domestic PV-storage systems are not yet profitable for adopters, but this may change with expected technology cost reductions and higher electricity prices (Bëtsch, Geldermann & Lühn, 2017). Also, time-of-use tariffs, can boost the economic case for PV in combination with battery storage, while standalone PV systems can become less attractive.

The release of the Clean Growth Strategy in October 2017 by the UK government announced significant investments in order to make the UK a leader in storage: "£265 million in smart systems to reduce the cost of electricity storage, advance innovative demand response technologies and develop new ways of balancing the grid" (BEIS, 2018). But for the storage industry, the development of storage technology will also depend on removing administrative barriers: facilitating "double charging" (the possibility to charge from and discharge back into the grid), as well as reducing levy charges and VAT rates for PV-storage systems.

4. Distributional challenges ahead

The end of the FIT is making self-consumption and self-sufficiency more attractive, raising new kinds of concerns for distribution networks and the electricity retail business (Khalilpour & Vassallo 2015).

In short, an increase in the number of self-consumers could lower the total grid demand and jeopardize the economic and social efficiency of the grid system as a whole. As consumers pay (through grid charges) to meet the costs of maintenance of the grid infrastructure as a whole, those who invest in PV-storage systems will contribute less to maintaining the system while still enjoying the security of supply from being connected to the grid. Consequently, a smaller number of households (who cannot afford a PV-storage system) will have to bear the costs of the grid system. Electricity retailers will be able to supply only a small share of the households' total electricity demand, which will negatively affect their business model (Bertsch, Geldermann & Lühn, 2017).

Policy makers need to discuss how the costs for grid system maintenance can be levied in a way that distributes the cost in a fairly way. For instance by introducing "demand tariffs", or capacity-based charges – of which time-of-use is one sub-type (Simshauser 2016; Kaschub et al. 2016). Finally, the generalisation of self-sufficiency for individual households should spark a discussion on the efficiency of the system as a whole.

5. References

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6. Further Information

"Power From the People" (2015-2018) is a research project funded by the Research Council of Norway (ENERGIX Programme), led by Hege Westskog (CICERO Centre for International Climate Research, Oslo), with significant partners including Durham University and Fridtjof Nansen Institute, Oslo.

The main objective of "Power From the People" is to identify the driving forces and hindrances behind households becoming electricity "prosumers" – not only consumers, but producers as well. Part of the project is comparing prosumer conditions between the UK, Germany and Norway, with special focus on prosumer public policies and participation.

More information: https://www.fni.no/projects/power-from-the-people-article299-277.html

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