How much self-generated electricity do households with solar photovoltaics consume? How does this affect bills and demand from the Grid?

Policy brief

Addressing climate change requires a rapid transition to systems that are sustainable, affordable, and secure. Generating renewable electricity from PV has a very high level of public support[a] and can be major role as a provider of zero carbon electricity.

How much of their own electricity do PV households consume? The answer is important for solar investment valuation and policy, and allows consumers to determine the costs and benefits of installation.

The objective of this study was to generate a simple method to estimate self-consumption for a typical UK household with solar photovoltaics (PV), and to predict electricity bill savings.

Findings

Using data from over 300 residential households in North East England over 2014[b], we built and used a predictive model to estimate how much of their own electricity did the households use, ie self-consume, and what were the associated electricity bill savings. Using information on the size of a typical UK PV installation (2.9kW)[c] and gross electricity demand of 4,000kWh/yr[d], our findings indicate that such households would:

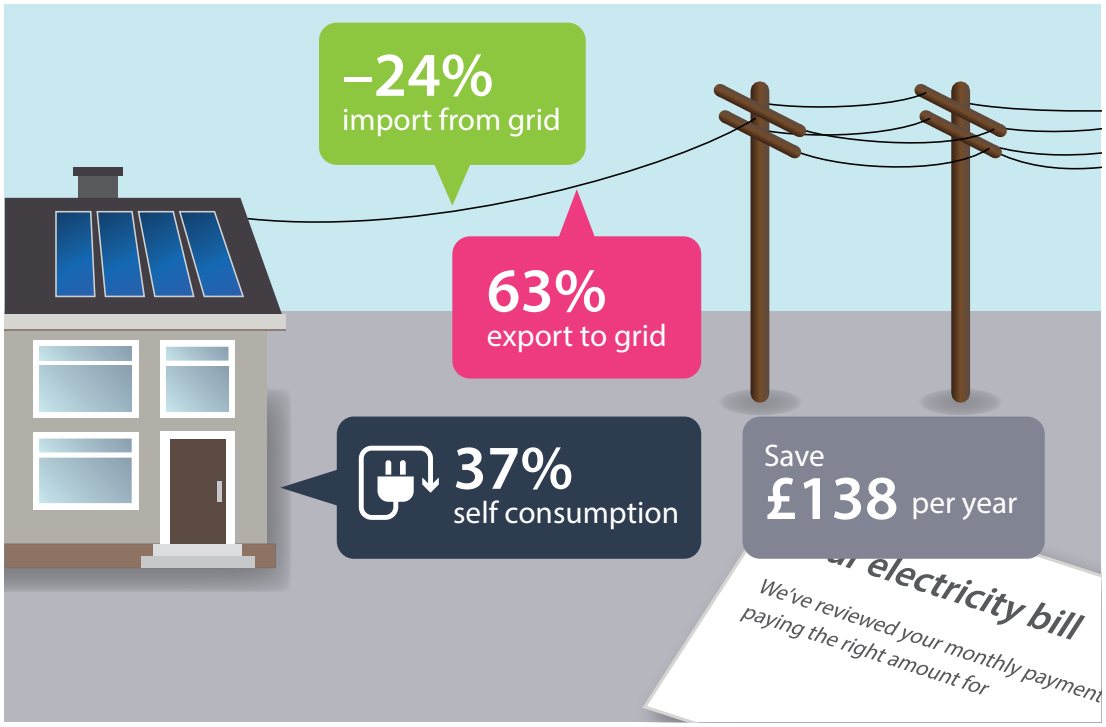
- Self-consume an average of 37% their own electricity generation;
- Demand 24% less electricity from the grid compared to households without PV; and
- Save £138 per year from electricity bills alone (i.e. not including FiT payments): this is approximately twice the UK Government estimate[d].

In addition:

- On average, PV households export 55–63% of generated electricity, compared to the 50% assumed by the FiT; and
- There is a large range in self-consumption, influenced by many factors from socio-economics to daytime occupancy.

Policy implications

- PV households reduce demand on the grid. Therefore policy instruments that support households to install PV would yield significant benefits in offsetting future demand pressures and the need for other electricity assets;
- New financial incentives could be dynamic, targeted to bundled systems (PV+battery), and /or introduce time based rules for electric vehicle charging, for example.
- Investigating the impacts of 'enabling technologies' (e.g. home batteries, electric vehicles) on self-consumption could reveal future advantages of balancing supply and demand on the national grid; and
- More research is needed to understand the factors influencing self-consumption, and this will allow greater insight and enhanced predictions on usage and economics.



Figures are based on an average UK PV installation of 2.9 kW and gross electricity demand of 4,000 kWh. These savings on electricity bills are twice the Government estimate, and do not include FiT payments.

Policy brief

References

This policy brief is based on the paper: McKenna, E., Pless, J., Darby, SJ (2018) Solar photovoltaic self consumption in the UK residential sector: New estimates from a smart grid demonstration project. Energy Policy: 118, 482 –491. doi: 10.1016/j.enpol.2018.04.006

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