Study on Residential Prosumers in the European Energy Union

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Executive summary

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Our objectives

The *Study on Residential Prosumers in the European Energy Union* aimed at gathering evidence and data on the drivers, regulatory aspects and economic performance in the area of **small scale self-generation for residential consumers** over the life-cycle of investment.

It responded to a request for services by the European Commission in the context of the release of the new package of measures called "Clean Energy for All Europeans" in November 2016. The package included proposals for legislation aiming at facilitating the transition of energy consumers to energy prosumers.

The term "**prosumers"** refers to energy consumers who also produce their own energy from a range of different onsite generators, such as diesel generators, combined heat-and-power systems, wind turbines, and solar photovoltaic systems, or solar PV.

The study focused primarily on residential prosumers using **small scale solar PV** to generate electricity and it geographically covered the EU28, Norway and Iceland.

The following were the study's key objectives:

Examine the existing policies on residential prosumers' self-generation in terms of their aim and/or effect on constraining or enabling prosumer scale-up, or accompanying the transition in incremental steps. Assess the regulatory, administrative and taxation frameworks that are applied to residential prosumers in each Member State and conduct a cross-country comparative analysis.

Examine the drivers and obstacles for residential self-generation, gathering prosumers' views on the drivers for their choice and analysing whether prosumers have the tools to make informed, rational and empowered choices and how easy or difficult it is for them to participate in the market for self-generation and exercise their choice taking into account, among others the following elements: right to self-generate, to self-consume, to store electricity, to be connected to the grid, to fully unplug from the grid, to inject excess electricity into the grid, to obtain compensation.

Make projections of the future (2020/2030) levels of residential self-generation uptake, under a number of baseline regulatory regimes and scenarios, with a view to determine the regime that produces the best outcomes for household prosumers and also to better understand the costs and benefits involved in each baseline regime.

Our methodology

To meet the above objectives, as a first step we developed a comparative legal analysis of the existing regulatory framework applicable to residential prosumers in the EU 28 Member States, Norway and Iceland. We produced one country report for each of the study's target countries, based on a standardised template, to ensure data comparability. The findings of the national reports were then summarised in country fiches, assessing the measures in place in each country according to their favourable impact on prosumers.

Our comparative legal analysis was developed based on the following criteria:

- Criteria 1: Definition of residential prosumers and indicators used to reflect the concept of small installations/micro-generation (caps);
- Criteria 2: Financial implications related to the conditions to feed and sell electricity into the grid;
- Criteria 3: Costs related to permitting requirements (application of fees and one-off costs) and grid access (network costs and charges);
- Criteria 4: Financial incentives including tariffs, tax reductions, other forms of investment support.

Besides, we also modelled take-up of solar PV by households in each Member State, Norway and Iceland over the period to 2030.

In the baseline projections, we assumed that existing financial support for self-generation would be continued. Future technology scenarios were developed to assess the impact of factors affecting cost and consumer preferences on take-up of solar PV. Specifically, the scenarios assess the impact of:

- A gradual phase out of policy support over the period to 2020;
- Relaxation of EU anti-dumping legislation in 2017;
- Growth in the number of households owning a plug-in electric vehicle (EV).

We explained the methodology applied to estimate take-up of solar PV and presented the key results for the baseline rates of take-up and the scenarios.

Furthermore, we conducted an in-depth consumer survey covering all target countries reaching out to a total of 3350 respondents. The survey questionnaire gathered consumers' feedback on:

- Switching to self-generation;
- Switching electricity provider to self-generate;
- Financial and non-financial drivers.
- Choice of self-generation technology;
- Grid connection and compensation for feeding electricity into the grid;
- Attitudes towards technologies and environment.

In addition to the consumer survey, we also carried out a "mystery shopping" exercise aimed at gathering more insight on how easy it was for future prosumers to get in contact specifically with their energy providers, and obtain from them information on:

- The procedure to become a prosumer;
- Costs, tariffs, taxes and incentives available;
- Other possible advantages or foreseable difficulties.

Finally, we designed a behavioural experiment, without actually conducting it, aimed at assessing the abilities and skills of traditional consumers to understand the offers for transitioning towards residential self-generation and storage, and seeing how consumers can make the best choice regarding self-generation with solar PV panels.

Our findings

Our key findings were presented in detail in the study and can be summarized as follows:

- No Member State has a definition of the precise term 'residential prosumers'. However, countries have adopted equivalent concepts, which may focus either on the production or consumption element of being a prosumer. Several of the countries that define prosumers in relation to their production element, refer to the installation size or generation capacity.
- Generation capacity caps, when used to determine the scope of national measures, differ across countries. A group of countries uses the 10kW capacity cap to define residential prosumers (in line with the IEA).
- There is **no harmonised regulatory framework** for residential prosumers in the EU, and Member States take different approaches.
- The majority of Member States have **simplified procedures** for setting up residential prosumer installations. They generally enable prosumers to feed the surplus of electricity into the grid.
- Member States differ in terms of **financial incentives** given to prosumers. Alongside net-metering, most countries have feed-in tariffs or premiums, but there is no strong harmonised structural approach to prosumer support. Tax reductions as well as capital subsidies and loans or other forms of investment support are also available but again they vary broadly across Europe.
- In most Member States, the regulatory framework has evolved rapidly over time; adjustments of available incentives in some Member States have prompted reactions.
- In general **incentives have played an important role in promoting the development** of self-generation, especially in the more mature solar PV markets. Incentives have also been widely utilized in other countries where the market is not yet mature.

- The development of **new technologies,** for instance storage, has proved to be slow due to the combination of financial factors (high costs) and national energy policy choices that as a result do not always encourage their use.
- **Consumer behaviour** is motivated not only by, and mainly, financial incentives, but also partly by considerations about e.g. the environment, particularly in those Member States with a more mature solar PV market.
- Besides environmental concerns, consumers' interest in new technologies, their desire to be energy self-sufficient, to feel security of energy supply, to improve their "green lifestyle" or promote their personal social image all generally featured among other **non-financial drivers** of their choice.
- Under a baseline scenario that assumes **a continuation of current policies** and a decline in solar PV equipment costs of 1.4% pa, residential solar PV capacity in the EU28 is **projected to double** (from 17GW estimated capacity in 2016 to 32GW estimated capacity in 2035).
- **Future rates of take-up** are highly affected by policy and by the development of new complimentary technologies. For example, an increase in the number of households with an electric vehicle will lead to a projected 5-15% increase in installed capacity by 2030, as the potential technology synergies would increase the attractiveness of solar PV investment and could increase self-consumption shares (e.g. in cases where EVs were charged at home during the day).

Our conclusions and recommendations

Based on our findings, the study drew conclusions and put forward recommendations on the development of a more comprehensive policy and regulatory framework for residential prosumers. Conclusions and recommendations, presented in detail in the study's full report, can be summarized as follows:

While there is no harmonised definition of prosumer at EU level, there is no evidence that this may have prevented the design of effective policies, attractive enough to convince energy consumers to start producing the energy that they need. However, the non-homogeneous definitions of prosumers and of generation capacity caps (where applicable), trigger the application of different types of measures and financial incentives to residential self-generation, which makes impossible a cross-Europe regulatory approach and comparison.

A phase-out of existing supports for residential solar PV by 2020 will limit growth of installed capacity across all counties. Our results show that in some cases, it would reduce the cost-effectiveness of solar PV to such an extent that it would stop any new investments in residential solar PV in the short term (until a point is reached in which CAPEX cost are sufficiently low, and electricity prices sufficiently high to incentivise some households to invest again).

Consumer behaviour in making the prosumer choice is still mainly motivated by financial incentives, though their feedback varies depending on the specific national situation in terms of available incentives. However, consumers' considerations about e.g. the

environment as well as their lifestyle choices are also acting as drivers, especially in the more mature markets. Therefore all aspects should be taken into account when developing the appropriate regulatory framework.

Our recommendations:

- **A common, comprehensive definition of "residential prosumers"** could be a catalyser for the development of a clear and strong EU policy and regulatory framework supporting consumers' self-generation, while respecting the subsidiarity principle described under Article 194(2) TFEU and the Member States' right to determine their choice of energy sources and the general structure of their energy mix.

- **An EU-level legal framework** could focus on the establishment of a portfolio of carefully designed incentives, tailored to the different situations and the consequences of the different measures applied over time, such as the increase of energy cost for traditional energy consumers if the uptake of prosumers increases.

- Further to **financial incentives**, the measures designed should aim at supporting the development and uptake of new technologies with an environmental objective.

- It would be useful to conduct a **more comprehensive assessment of consumers' drivers** via a well-designed behavioural experiment that aims at:
- Assessing the abilities and skills of traditional consumers to understand the offers for transitioning towards residential self-generation and storage.
- Gaining insight into how traditional consumers can make the best choice regarding self-generation with solar PV panels.
- Gaining insight into how easy or difficult it is for traditional consumers to find and assess information on self-generation and storage (and how much information can be digested).

Clearly, but beyond this study's scope of analysis, developing a more comprehensive policy for residential prosumers needs to take into account the broader variety and complexity of players, interests and issues at stake within the Energy Union.