smartEn
Smart Energy Europe

The smartEn Map

PROSUMERS

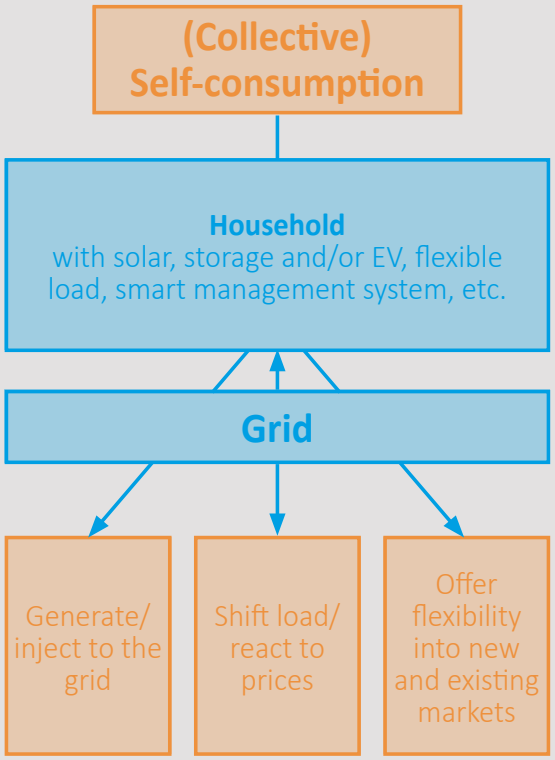
2020

The smartEn Map scoring system

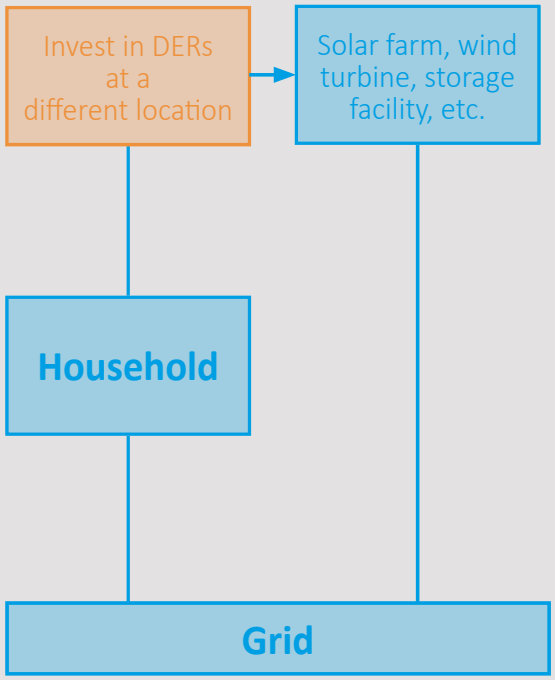
CATEGORY	DESCRIPTION	SCORING SYSTEM
Technology deployment	▪ Solar PV ▪ Stationary battery ▪ Heat pumps ▪ Water-heater ▪ Electric vehicles ▪ Smart charging ▪ Flexible loads	**0-4 based on asset-types used and their use as active technologies** **0 =** No technologies used as DER **1 =** Mostly solar PV low to medium penetration **2 =** Solar PV low to high penetration especially rooftop. And other technologies at low level **3 =** Solar PV medium to high. And/or growing presence of other technologies **4 =** Varied and widespread selection of technologies with high activity
Financial incentives	▪ Feed-in tariff or net-metering ▪ Direct payments or subsidies ▪ Tax exemptions ▪ Self-consumption ▪ Tariffs and taxes	**0-2 based on a high-level estimation of the leading financial incentives** **0 =** Not available **0.5 =** Available for legacy units or playing a very minor role **1 =** Available but limited in time and not primary financial incentive **2 =** Available and either unlimited or primary incentive
	▪ Monetisation of flexibility	**0-4 based on a high-level estimate of DSF monetisation and barriers** **0 =** No DSF monetised **1 =** Mostly basic implicit and interruptibility schemes **2 =** Explicit available but barriers exist **3 =** Explicit and implicit mostly without barriers **+1 =** Point if it is the main incentive
Roles for prosumers	▪ Self-consumption ▪ On-site optimisation	**Each category scores in the scale below** **0 =** Not applicable **1 =** Used but not main activity **-1 =** Main role for prosumers and if system interaction is disincentivised
	▪ Smart charging ▪ Vehicle to Grid (V2G)	**0 =** Non-existing **1 =** Available smart-charging but not widespread **2 =** Widespread availability of smart-charging and some V2G
	▪ Implicit use of flexibility	**0 =** Not used **1 =** Basic implicit day/night tariffs, very little use **2 =** Tariffs with dynamic components, medium usage **3 =** Varied dynamic tariff options and widespread adoption
	▪ Explicit use of flexibility	**0 =** Not used **1 =** Basic explicit use, with significant barriers. And/or interruptibility schemes **2 =** Explicit flexibility available but barriers exist **3 =** Explicit flexibility with small barriers, healthy market participation

Prosumers models

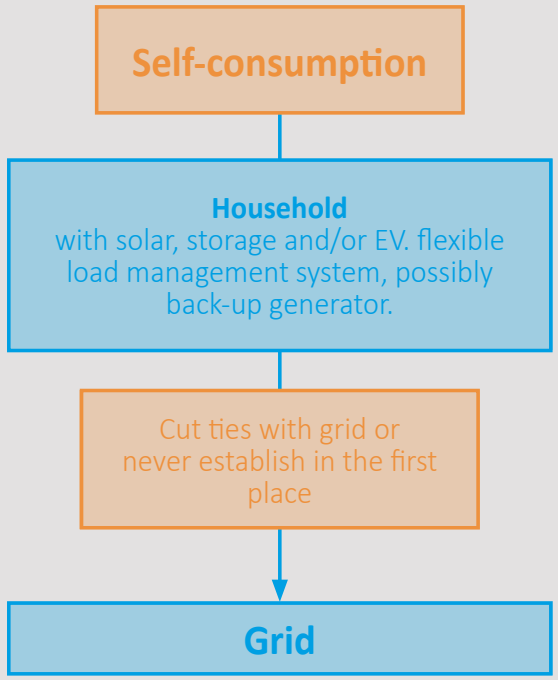
Grid-connected households with onsite PV, storage and/or flexible load

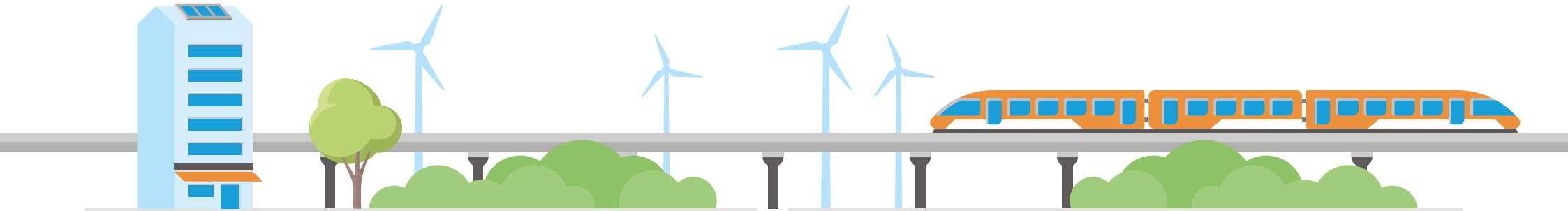


Grid-connected households with offsite DERs

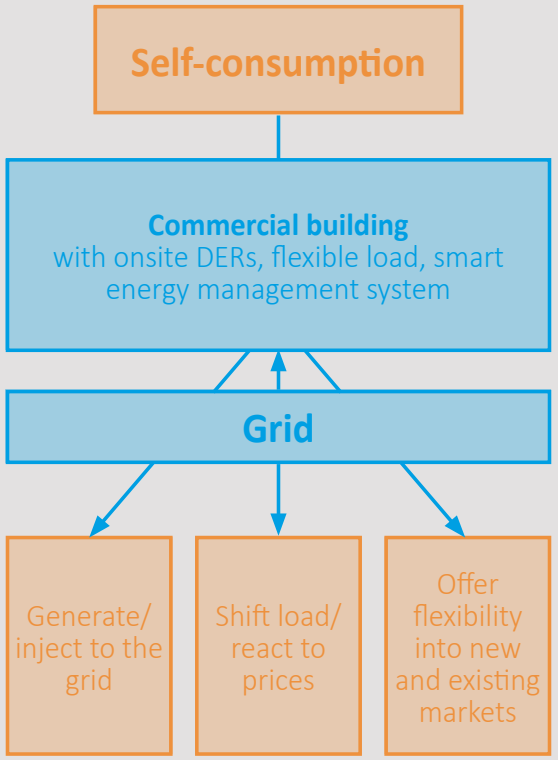


Off-grid households

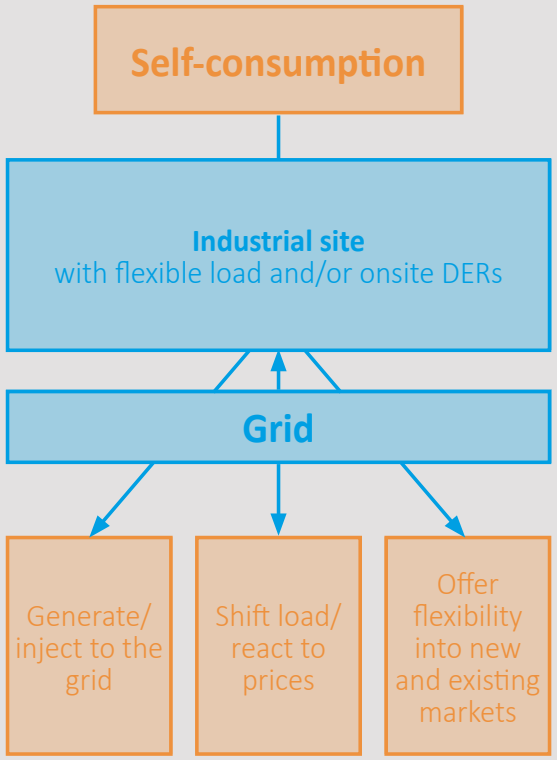




Commercial building



Industrial site



Overview

PROSUMERS 2020

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ESTONIA

Estonian prosumers are focused on two main axes. The first is production of renewable energies, particularly rooftop solar PV, together with a feed-in premium. The second is on-site optimisation and self-consumption. In both options, prosumers are supported by governmental subsidies and incentives that make it financially viable to invest in different technologies. But even for those consumers that do not want to install their own generation, options like dynamic price contracts exist to allow them to play an active role in the energy system. However, remuneration for explicit use of flexibility is quite low, making it a niche use, where only some industrial customers participate.

Technology deployment

The primary technologies used by prosumers in Estonia are solar PV and EVs, and both have seen significant growth in past years, fuelled by attractive governmental support mechanisms. Since 2018, the country has grown its solar rooftop PV market significantly, starting from 17 MW rooftop and small installation capacity, to the current 181 MW. This growth has been a direct result of new governmental support mechanisms, like feed-in tariff and feed-in premium, but also thanks to p2p RES trading business models. Additionally, a new 2020 regulation on energy efficiency in buildings which mandates the installation of rooftop solar in new and renovated buildings could have a significant impact, with estimations from the Estonian Solar PV Association reaching 50 MW installed annually. EV ownership is growing slowly, by only 5% in past years, especially considering that Estonia has one of the best public charging networks in the EU, achieved through a governmental roll-out that ensured charging stations are within 60 km of one another across the country.

Financial Incentives

Estonia has driven up the number of prosumers through significant direct subsidies and support mechanisms for solar PV, EVs and charging stations. The main incentive to install rooftop solar PV comes from the Renewable Energy Support mechanism, a feed-in premium that, for the first twelve years of generation, pays out 0,0537 €/kWh on top of the wholesale price. This tariff is valid for installations of up to 50 kW capacity.

New business models are being implemented, with an advanced direct line mechanism, where a prosumer with renewable generation can sell directly to neighbours that have a direct connection to the prosumer. This programme was previously limited to neighbouring plots and has now been extended to a broader distance with a direct connection. This business model is especially interesting for commercial areas, and business parks with several customers, where prosumers can sell their generation directly, without having to go through the distribution network, avoiding associated costs.

EVs purchased in 2020 have a direct subsidy discount offered by the government of 5 000 €. This programme financed the purchase of 232 EVs in 2019, mainly for car fleet companies. The programme has a budget of 1.2 million EUR for 2020, expecting to finance the purchase of around 200 more EVs. The programme is fully financed by the sales of EU ETS (EU Emissions Trading System), but is relatively small compared to the sale of traditional vehicles, amounting to less than 1%.

Role of prosumers in the system

Prosumers in Estonia are not limited by the ownership of technologies like solar PV and EVs, with a wide range of possibilities to play an active role in the energy system. All customer segments can opt for a dynamic price contract due to one of the most developed smart metering infrastructures in the EU. About 36% of all electricity consumption is through such contracts, amounting to 39% of all customers. The main driver for prosumers is the financial incentive from reducing their energy consumption, even though Estonia already has a very low electricity price (on average, 125 €/MWh for residential customers and 75 €/MWh for industrial customers).

Estonian generators have the option to provide their electricity through a direct line to other consumers in their area. This is being developed into power purchase agreements (PPAs) in commercial areas and business parks and is being expanded to nearby neighbourhoods.

The Estonian market is currently undergoing a regulatory reform process to fall in line with the new European Electricity Market Directive. This includes the adoption of an aggregator framework that allows the country to access all markets, from day-ahead and intraday to balancing markets. So far, independent aggregators only have access to the tertiary reserve in the balancing markets (the manual Frequency Restoration Reserve, mFRR), to which industrial customers participate most.

Several issues are keeping the participation of DSF low compared to its potential. On the one hand, the market settlement model provides reduced incentives to DSF, making the business case to offer these services very limited. On the other hand, although aggregators do not need any agreement with the supplier, they must pay a compensation through the consumer.

Markets at a local level (DSOs) are currently non-existent, but the Estonian TSO and DSO, and the Latvian TSO, are developing a regional flexibility platform that will allow DSF to participate into different markets.

Finally, especially for industrial customers in Estonia, given the limited possibilities (mainly low prices) in the current electricity markets, the main use of their flexibility and their onsite generation is self-consumption and on-site optimization.

FINLAND

Finland is an excellent example of how prosumers can take a central role in an increasingly electrified society, even without the need for governmental subsidies. Electrification of heating has brought a great amount of available flexibility to the grid, which numerous actors are exploiting by using it in the electricity markets. This has provided additional revenue streams for prosumers, decreasing the cost of the new investment. This is only possible thanks to a market design of low technical barriers that facilitates the participation of all kinds of resources, both generation and demand. Even consumers without generation or significant flexible loads can benefit from widely available, dynamic tariffs. Finland is one of the EU countries where the incentives for prosumers are integrated in the interests of the grid, creating a perfect landscape for the future growth of prosumers and flexibility.

Technology deployment

Electrification in Finland is growing significantly, incentivised through a governmental push to reach the country's climate targets, and with it, many customers are taking the leap to becoming prosumers. Given the climate, and dispersed population in rural areas, reliability is a significant concern for Finnish consumers. Electric heating is used extensively in the region by many different technologies like heat pumps, water heaters and other space heating devices, and saunas, which together consumed 3TWh in 2018. The significant amount of electric heating also provides a great flexibility stock to the grid.

Renewable generation is also growing in the Finnish residential and commercial sectors. This is characteristic of Nordic countries, where utility-scale installations are practically non-existent. In 2019, almost 80 MW of rooftop solar PV were installed in the country, with more than 90% of it in households and commercial areas. This rate of installation is expected to grow in 2020 and onwards. Battery storage adoption is growing together with solar PV, mainly due to the limited hours of sun during a significant part of the year.

EVs have also seen a significant uptake in Finland in the past two years, incentivised through tax breaks and subsidies. However, the number of EVs circulating is still smaller than Finland's Nordic neighbours. While EVs circulating in Finland grew by 93% in 2019, the absolute number is still modest, with almost 5 000 EVs. The current target expects 225 000 EVs circulating in Finland by 2025. Finland also has one of the largest penetrations of smart meters in the EU, with hourly and 15-minute measurement available, resulting in a varied offer on electricity contracts.

Financial Incentives

The main financial incentives for Finnish prosumers come from on-site optimisation and by reducing their energy bill and avoiding tariffs and taxes, with few direct subsidies offered by the government. A feed-in tariff for renewable energy exists in Finland, but solar PV production is not included in

it, making the primary incentive tariff and tax avoidance. Prices of electricity in Finland are around the EU average, and the percentage of taxes and tariffs in the energy bill are in the lower end of the spectrum (around 60%). The percentages are even lower for industrial customers. Generators that inject their excess production to the grid need to have a contract with a supplier, which will pay for the injected electricity at market prices. Small scale generators, under 100 kVA, are exempted from electricity taxation.

One of the most important financial incentives for Finnish prosumers are dynamic price contracts, which are commonly extended, with a growing number of customers using hourly pricing. This is possible due to the high penetration of smart metering devices and even more relevant now with the growth of electrification in heating and mobility.

Also important is the monetisation through explicit flexibility, marketed in particular to a wide variety of ancillary services markets where all kinds of flexible technologies are able to participate to through an aggregator.

Direct subsidies are rare in Finland and usually last for only a few years at a time. Residential buildings receive a subsidy directed at energy efficiency measures. This subsidy is one of the incentives for the electric heating transition and is valid from 2020 to 2022. Consumers that make the jump to EVs, receive, until 2021, a direct subsidy in the form of 2 000 € and a reduction in the purchase tax of 75%.

Role of prosumers in the system

Prosumers in Finland can play many different roles, facilitated by markets open to flexibility services, the implicit use of flexibility and the incentives for self-consumption. As stated in the previous chapter, prosumers with generation mostly dedicate it to self-consumption to reduce their energy bills. There are no specific limitations to injection to the grid, but prosumers are responsible for their balance, so they need to find a supplier that will take their excess production. But this is generally easy, as most suppliers have contracts for generators, where the injections are paid at market price.

Both explicit and implicit use of flexibility is readily available in Finland. Implicit DSF is widely used since metering infrastructure is very developed in the country.

All suppliers offer dynamic pricing contracts, and 11% of customers have contracts with an hourly granularity and prices linked to the day-ahead market. Explicit use of DSF, although also available, is less extended than implicit DSF. Technical requirements for most products are designed in a way that the demand side can participate without significant barriers. Around 20 aggregators, both independent and suppliers, are active in Finland, and they bring together both generation and flexible loads where clients receive a payment in exchange for the flexibility or generation provided.