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Demand Response and Energy Prosumers:

A Legislative Comparison Between Estonia, France and Norway

Research paper

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Introduction

Household electricity prices started sharply rising in the second half of 2021, with prices standing at €23,7 per 100 kWh compared to €21,3 per 100 kWh the same time the previous year.[1] This was triggered by the increase of gas prices, the increase of carbon prices in the EU Emissions Trading Scheme, and the gradual lifting of the Covid-19 restrictions around the world.[2] The rising prices do not show any signs of slowing down and the current crisis has been predicted to last at least another year.[3] In the past, the EU has repeatedly amended its energy regulation to liberalise the energy market and promote competition on it.[4] The past few years have additionally seen changes to the energy policies, with focus on a larger proportion of renewable energy in the Union energy mix.[5] The decarbonisation of energy production and implementation of energy efficiency measures is necessary to combat climate change and pave the way for carbon neutrality by 2050.[6] However, in the preceding months, the Commission has been urgently working on energy security problems and dealing with the market failure. All policies combined, the Union is now aiming at faster development of clean energy, securing long-term supply contracts with gas-producing States other than Russia, and facilitating new storage and transmission infrastructure.[7] EU energy policies are changing faster than they can be adopted in the Member States.

The current surge in electricity prices is not sustainable, as all people cannot afford these prices and risk going without electricity. This is in conflict with the EU's aim at reducing energy poverty.[8] Regardless of these unprecedented circumstances, the EU energy law in

[1] Electricity and gas prices in the second half of 2021. (29.04.2022). Eurostat. Available: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220429-2
[2] EU energy prices. Energy. European Commission. Available: https://energy.ec.europa.eu/topics/markets-and-consumers/eu-energy-prices_en
[3] Guénette, J.-D., Khadan, J. (22.06.2022). The energy shock could sap global growth for years. Let's Talk Development. World Bank research findings. World Bank Blogs. Available: https://blogs.worldbank.org/developmenttalk/energy-shock-could-sap-global-growth-years
[4] See the European Union's First, Second and Third Energy Packages.
[5] See for example, Article 3 (1), Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (hereafter, "Renewables Directive"). Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC
[6] A clean energy transition. Energy and the Green Deal. European Commission. Available: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/energy-and-green-deal_en
[7] REPowerEU: A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition. (18.05.2022). Press release. European Commission. Available: https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131
[8] Article 5 (2), Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June

force must be followed. All of the problems mentioned above in mind, we have to develop new measures for facilitating electricity supply while promoting green energy and bringing the prices down. Up until now, the electricity grid has been balanced by modifying the supply since demand is difficult to predict and out of the control of transmission and distribution system operators. With the Clean Energy Package, the EU has introduced mechanisms for managing the grid using flexibility services, including demand-side management.[9] This paper will discuss two of such intertwined measures - demand response and energy prosumers. Although they were introduced in the EU in 2019, they are yet to gain wider implementation and popularity in the Member States. Since Member States have discretion as to how to implement the measures domestically and they haven't been tried out thoroughly yet, the best regulatory model is still yet to be figured out. At the same time, legal academics have already pointed out possible legal challenges in implementing the respective regulations, ranging from conflicts of competition to breaches of data protection.[10]

In this paper, we concentrate on three of such legal challenges which arise in incorporating demand response and energy prosumers in the electricity market. These are: conflicts between the roles of aggregators, wholesale suppliers and retailers; technical modalities for allowing demand response and energy prosumers to participate in the market in line with their capabilities; and data protection issues. The purpose of the paper is to analyse more closely the corresponding regulation in Estonia, France and Norway, and conclude whether the chosen challenges are present in these States or not.

The first part of the paper elaborates on how the electricity system works and how it is regulated in the EU, in order to understand where demand-side management fits in. Moving on, the paper explains the concepts of demand response and energy prosumers, and then touches upon the three legal challenges we chose related to the implementation of the two mechanisms. The second part of the paper consists of individual and

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2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (hereafter, "Recast Electricity Directive"). Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L0944

[9] Nouicer, A., Reif, V., Schittekatte, T. (09.09.2019). Flexibility mechanisms: from the Clean Energy Package to the Network Codes. Florence School of Regulation. Available: https://fsr.eui.eu/flexibility-mechanisms-what-is-it-about/

[10] Zancanella et al. (2017). *Why is demand response not implemented in the EU? Status of demand response and recommendations to allow demand response to be fully integrated in energy markets?* ECEEE 2017 Summer Study – Consumption, Efficiency & Limits. Pages 457-466. Available: https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2017/2-policy-governance-design-implementation-and-evaluation-challenges/why-is-demand-response-not-implemented-in-the-eu-status-of-demand-response-and-recommendations-to-allow-demand-response-to-be-fully-integrated-in-energy-markets/2017/2-278-17_Zancanella.pdf/

comparative analysis of the respective regulatory spheres of the examined States, examining whether the discussed (or other novel) obstacles arise in them or not. The three States allow for interesting comparison thanks to their largely varying geopolitical, socio-economic, and regulatory positions. It is worth noting, ahead of the following research, that Norway has not adopted the Clean Energy Package and therefore does not succumb to rules regarding demand response and energy prosumers.

The EU electricity market and demand-side management

The balancing of the grid

For the electricity grid to work, it has to be balanced. That means, demand and supply at a given time have to be equal.[11] Balancing is *prima facie* the responsibility of market participants themselves, but once the trading has ended for the day, the intricate task is trusted with transmission system operators (TSO). The latter have to fix any imbalances in order for the electricity grid to function and consumers to have access to electricity.[12]

The day-to-day schedule of an energy system looks like this. First, the energy retailer buys electricity from the generators (wholesale suppliers) to meet the predicted demand. Unless long-term electricity supply contracts (power purchase agreements) have been concluded, the wholesale trade takes place on short-term markets.[13] The most common (short-term) electricity market is the day-ahead market, where electricity is separately priced and sold for every hour of the next day. Energy is supplied starting from 00:00 CET.[14] Supplementing the day-ahead market, intraday market serves as an opportunity for electricity producers to change their schedules and correct their imbalances. For example, when a wind energy producer generates less energy than predicted and sold on the day-ahead market, it has to buy electricity from another producer to meet the promised amount of supply. Therefore, intraday markets act as a tool for electricity producers to balance themselves.[15] Intraday trading ends 15 minutes before the start of an operating hour.[16] When the "gate" closes, and an imbalance occurs, TSO has to find another way for sourcing additional electricity; it will have to buy balancing services on the balancing market.[17] Traditionally, the balancing relates to supply-side management.

Recently, demand-side management has been introduced to fix the balancing problem. Instead of being flexible with the supply and trying to meet the demand, consumption is

[11] Zsiborács, H. et al. (2021). Grid balancing challenges illustrated by two European examples: Interactions of electric grids, photovoltaic power generation, energy storage and power generation forecasting. Energy Reports, Volume 7, 2021. Pages 3805-3818. ISSN 2352-4847. Available: https://doi.org/10.1016/j.egyr.2021.06.007

[12] Recital 13, Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (hereafter, "Recast Electricity Regulation"). Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0943

[13] What is Day-Ahead Trading of Electricity? Next Kraftwerke. Available: https://www.next-kraftwerke.com/knowledge/day-ahead-trading-electricity

[14] Day-Ahead and Intraday - the backbone of the European spot market. Basics of the Power Market. EPEX SPOT. Available: https://www.epexspot.com/en/basicspowermarket

[15] Recital 13, Recast Electricity Regulation.

[16] Articles 8 (1) , 8 (2) and 8 (4), Recast Electricity Regulation.

[17] Recital 13, Recast Electricity Regulation.

being rethought. Bringing the consumption down or up at critical times to meet the supply achieves the same goal of a balanced, functioning grid.[18]

The internal energy market

One of the main objectives of the European Union is the European single market, as established in Article 3 (3) TEU ("The Union shall establish an internal market.") and Article 26 (2) ("The internal market shall comprise an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured in accordance with the provisions of this Treaty."). The reasoning behind developing an internal market is to promote cross-border competition between the Member States as well as Iceland, Lichtenstein, and Norway through the Agreement on the European Economic Area, and Switzerland through bilateral treaties.This is achieved through the "four freedoms", i.e. the free movement of goods, capital, services, and people.[19] The increased competition results in lower prices for the customers, more business for efficient competitors, and innovative technologies among other benefits.[20] The single market covers all goods produced and services offered in the EU. Among these is electricity, which is considered "goods", although being a very special commodity.[21]

The generation, transmission and distribution of electricity comprises a distinct internal energy market. Traditionally, all of these were controlled by vertically integrated state companies. In order to create more competition and introduce new market participants, EU legislators started pushing for the liberalisation of the energy market. Rules were introduced in order to first allow third party access to energy infrastructure, e.g. transmission lines, and secondly to unbundle generation, transmission and distribution of electricity.[22] Under Article 194 TFEU, energy is a shared competence of the EU and the Member States. Although the EU can decide on the energy policies guiding the Member States, the latter still have discretion when it comes to the exploitation of their energy resources, choosing their national energy mix, and deciding the general structure of their energy supply.[23] Three preceding regulatory phases have resulted in the latest legislation,

[18] Zsiborács, H. et al. (2021).
[19] The internal market: General principles. Facts Sheets on the European Union. European Parliament. Available: https://www.europarl.europa.eu/factsheets/en/sheet/33/the-internal-market-general-principles
[20] Single market for goods. Internal Market, Industry, Entrepreneurship and SMEs. European Commission. Available: https://ec.europa.eu/growth/single-market/goods_en
[21] In *Costa v E.N.E.L.*, the Court first accepted that electricity may fall within the scope of Article 37 TFEU, and thus be regarded as a good. Case C-6/64 *Costa v E.N.E.L.* [1964]. ECR 1141. Available: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:61964CJ0006
[22] See the First, Second and Third Energy Package.
[23] Energy policy: general principles. Fact Sheets on the European Union. European Parliament.

the Clean Energy Package, adopted in 2019.

EU energy law

The three pillars of EU energy policy are sustainability and decarbonisation of energy generation and consumption, energy security, and competitive energy market.[24] Aside from these, the EU also strives for market coupling, i.e. forming an interconnected European market for electricity. Market coupling links control areas and market areas in order to harmonise different systems of electricity exchanges and to reduce price differences.[25] The Clean Energy Package of 2019 builds upon these principles. Currently, the internal market for electricity is mainly regulated by Regulation (EU) 2019/943 and Directive (EU) 2019/944, also known as the EU Electricity Regulation and the EU Electricity Directive.

The aim of the Third Energy Package was to support the creation of an internal energy market, i.e. liberalising the energy sector, promoting cross-border trade and competition, and allowing for third-party access.[26] Regulation 2019/943 (from the current Clean Energy Package), however, promotes a higher share of renewable energy to achieve the climate goals; obliges Member States to incorporate demand response, energy storage and energy efficiency in their electricity markets; empowers consumers to participate in the market and manage their energy consumption; establishes fair rules for cross-border exchanges in electricity; and facilitates a well-functioning and transparent wholesale market, contributing to energy security.[27] The reasoning behind the new policies and regulatory amendments are the rapid technological advancements that allow for consumer participation in the electricity markets and the growing proportion of renewable energy generation. These two factors enable the EU to now promote retail competition.[28]

Directive 2019/944 aims to ensure affordable, transparent energy prices and costs for consumers, a high degree of security of supply and a smooth transition towards a

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Available: https://www.europarl.europa.eu/factsheets/en/sheet/68/energy-policy-general-principles
[24] Zancanella et al. (2017). Page 457.
[25] What is Market Coupling? Next Kraftwerke. Available: https://www.next-kraftwerke.com/knowledge/market-coupling
[26] Third energy package. Energy. European Commission. Available: https://energy.ec.europa.eu/topics/markets-and-consumers/market-legislation/third-energy-package_en
[27] Recitals 4, 5, 7, 8, 23, 29 and Article 1, Recast Electricity Regulation.
[28] Herrera Anchustegui, I., Formosa, A. (05.09.2019). Regulation of Electricity Markets in Europe in Light of the Clean Energy Package: Prosumers and Demand Response. Pages 4, 5 and 7. Available: http://dx.doi.org/10.2139/ssrn.3448434

sustainable low-carbon energy system.[29] The recitals describe the EU's vision of active citizens taking ownership of the energy transition and the need to organise electricity markets in a more flexible manner to fully integrate all market players, including producers of renewable energy, new energy service providers, energy storage and flexible demand.[30]

All customer groups (industrial, commercial and households) should have access to the electricity markets to trade their flexibility (for instance through energy storage, through demand response or through energy efficiency schemes) and self-generated electricity.[31] In this regard, legal and commercial barriers shall be removed.[32] Furthermore, this ties into the idea of citizen energy communities which offers an inclusive option for all consumers to have a direct stake in producing, consuming or sharing energy.[33]

Products should be defined on all electricity markets, including ancillary services and capacity markets, so as to encourage the participation of demand response, and rules for independent aggregators shall be composed.[34] Moreover, consumers should have the possibility of participating in all forms of demand response.[35] The Directive also calls for the introduction of smart grids and smart metering systems, and providing consumers with their consumption data to enable informed decisions.[36] Where full deployment of smart metering systems has been negatively assessed, consumers shall still be able to choose to have a smart metering system and a dynamic electricity price contract.[37]

The Clean Energy Package requires that ancillary services are market driven instead of being at the discretion of the TSO, and open to all forms of flexibility. New obligations are discharged on DSOs to procure equivalent ancillary services on their distribution networks. Therefore, DSOs will start balancing the grid alongside TSOs, since more flexible generation and flexible demand is located on the distribution network.[38]

What is demand response?

As explained above, up until now the electricity grid has been balanced solely thanks to supply flexibility because the demand side has been found inelastic. Recently, however,

[29] Article 1, Recast Electricity Directive.
[30] Recitals 4, 5, 6 and 10, Recast Electricity Directive.
[31] Recital 39, Recast Electricity Directive.
[32] Recital 42, Recast Electricity Directive.
[33] Recital 43, Recast Electricity Directive.
[34] Recital 39, Recast Electricity Directive.
[35] Recital 37, Recast Electricity Directive.
[36] Recitals 51, 52 and 56, Recast Electricity Directive.
[37] Recital 37, Recast Electricity Directive.
[38] Herrera Anchustegui, I., Formosa, A. (05.09.2019). Page 11.

the EU has started to promote demand flexibility in order to balance the grid. Demand-side management mainly involves four activities: energy efficiency, energy savings, self-production and load management.[39]

One of the many outputs of demand-side management is demand response which means a measure established to incentivize a consumer to change their electricity consumption in response to market signals. **Explicit (or active) demand response** is the kind where the consumer changes their electricity consumption either according to a signal from the aggregator or by making an offer of available flexibility on the market (independently or through an aggregator). Consumers can change their consumption loads manually or automatically (i.e. the aggregator has control over the consumer's appliances). When responding to a signal by the aggregator, the consumer receives as a reward compensation; when making an offer on the market, the consumer will earn money if its offer is purchased. **Implicit (or passive) demand response**, on the other hand, is not triggered by a request from outside and doesn't involve explicit market participation. It is the act of a consumer simply deciding to use less electricity when the prices are high or more when the prices are low. In this case, the consumers have dynamic electricity contracts and are subject to variable electricity prices. These kinds of contracts promote energy efficiency via customers changing their habits and getting more conscious of their consumption.[40]

The difference between the two types is that explicit demand response allows for aggregators to pile up the changes in the load and to sell it on the market. Implicit demand response, on the other hand, just leaves more supply available on the grid in the first place; it does not move it from the predicted consumers to other interested parties via aggregation. Therefore, explicit demand response competes with wholesale supply, balancing and ancillary services in selling electricity to the system operators to balance the grid, whereas implicit demand response does not allow a consumer to participate alongside generation in a market. Explicit DR provides for standby electricity loads available for use, while implicit DR doesn't form a guaranteed backup since the consumers haven't taken a legal obligation of modifying their consumption on request. The two types of demand response have different conditions for participating in them and serve different purposes on the markets. While the purpose of explicit DR is to manage consumption in order to stabilise electricity prices, implicit DR comes into play when prices are already high and contributes to overall decrease in energy consumption

[39] Gellings, C. W. (2009). The smart grid: enabling energy efficiency and demand response. CRC Press, Boca Raton. Available: https://doi.org/10.1201/9781003151524
[40] Zancanella et al. (2017). Page 459.

and therefore energy efficiency. For maximum benefit to the electricity market, it is necessary to enable customers to participate in both, i.e. make both dynamic contracts and demand response programs available.[41]

Below you can see a table of different options regarding energy efficiency and demand-side management.[42]

	Static (long-term)		Dynamic (short-term)	
Consumer activity	Passive (**legislation**)	Active (**consumer choices**)	Passive (**aggregation contracts, automatisation**)	Active (**active participation by consumers**)
Examples	Energy efficiency standards for appliances	Isolating housing (for long-term energy savings)	Incentive-based automatised DR programmes	Changing consumption based on dynamic prices, load management

Similar to as explained above, DRP is divided into price-based programs (implicit DR) and incentive-based programs (explicit DR). Consumers are asked to take part in either: peak-clipping (to decrease energy consumption), valley-filling (to utilise excess available electricity), or load shifting (to shift electricity consumption from one time to another). When signing a demand response program contract, the consumer takes the obligation to respond to the relevant market signals; if it doesn't, it might have to pay a penalty.[43]

Price-based programs are essentially electricity supply contracts between the supplier and the consumer which determine different electricity prices depending on time or the market situation, or conditions for consumers on how to consume electricity in critical

[41] Zancanella et al. (2017). Page 459.
[42] Rosin et al. (2014). Tarbimise juhtimine. Suurtarbijate koormusgraafikute salvestamine ning analüüs tarbimise juhtimise rakendamise võimaluste tuvastamiseks. Elering. Tallinna Tehnikaülikool. Eleringi toimetised nr 3/2014 (8). Page 13. Available: https://elering.ee/sites/default/files/attachments/Tarbimise_juhtimine_1.pdf
[43] Nojavan, S., Zare, K. (2020). Demand Response Application in Smart Grids. Concepts and Planning Issues - Volume 1. Springer. Page 3. Available: https://link.springer.com/content/pdf/10.1007%2F978-3-030-31399-9.pdf

times. These include: **time-of-use programs**, which divide the day into off-peak, mid-peak, and on-peak hours and determine different prices for them; **real-time pricing** programs (dynamic pricing) in which the price of electricity varies every hour or even every minute; and **critical peak pricing** programs which are limited to times that system reliability is at risk, i.e. for a few days in a year, when the electricity price rises sharply at peak times to reduce consumptions immediately.[44]

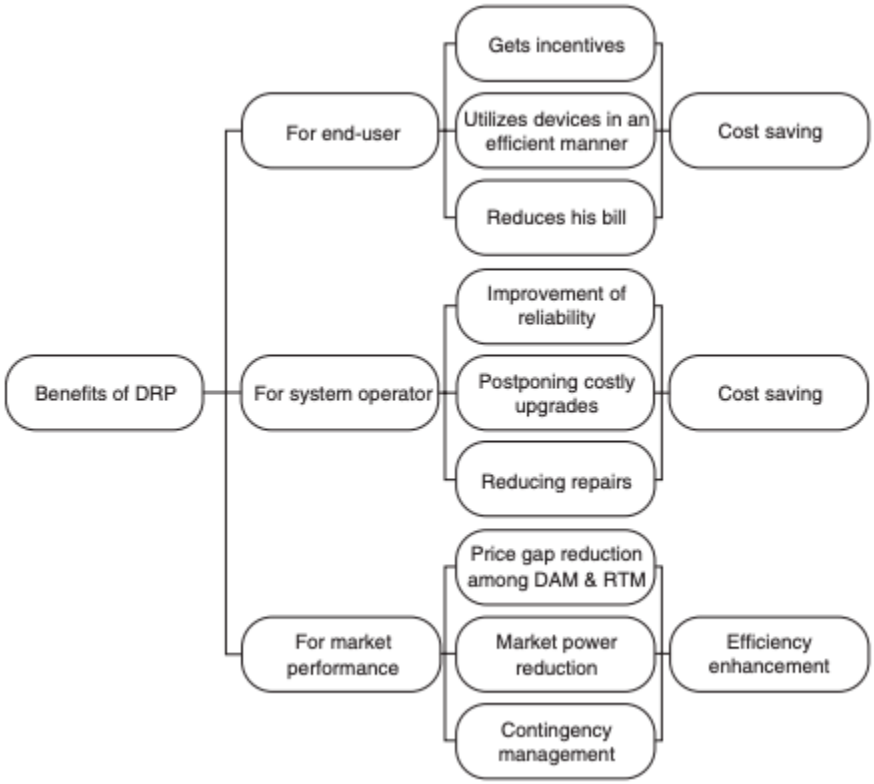
Incentive-based programs can be concluded between aggregators (either independent or under a retailer) and consumers. Consumers participating in incentive-based programs will be paid to modify their consumption according to a signal. In order to implement DR, i.e. to send signals to consumers or to automatically change their electricity consumption, smart grids are required. Explicit DR programs include: **demand bidding** in which consumers can voluntarily provide curtailment quantity and price offers in the energy market (either independently or through an aggregator); **capacity market programs** where consumers have a contractual obligation in front of the system operator to provide load curtailment whenever the grid is in a hazard; and **ancillary services** programs where consumers act as operating reserve generators making loads available for services such as frequency regulation.[45]

As for the benefits of demand response, there are many. Firstly, when activating explicit demand response, the electricity price decreases as a consequence of the reduction in electricity purchases. This is because the electricity supply curve is upward sloping, i.e. the more electricity is supplied, the more expensive the electricity unit will be due to capacity constraints. Lower prices benefit all consumers as a whole while also providing demand response participants financial rewards. Furthermore, using demand-side management for system efficiency reduces the need for additional investments and system expansion, i.e. for the construction of new power plants and the expensive activation of “peaker plants” (only activated for peak times). As such, DR prevents market power exertion by large electricity suppliers and facilitates renewable energy penetration in the electricity markets. The latter is enabled as DR balances the volatility of renewable energy, decreasing consumption when there is less available and increasing consumption when there is more generation, instead of turning to non-renewable energy. On the whole, DR promotes energy efficiency and energy savings which is even better than just clean energy consumption.[46]

The benefits of demand response programs for end-users, system operators and market

[44] Nojavan, S., Zare, K. (2020). Pages 4-5.
[45] *Ibid.* Pages 4-5.
[46] Herrera Anchustegui, I., Formosa, A. (05.09.2019). Page 13.

performance are showcased on the following figure.[47]



EU demand response regulation

To start off, it is important to note, that while the Electricity Regulation is directly applicable on the Member States, the Electricity Directive has to be transposed into every single national legislation. Therefore, although regulation on demand response might exist on the Union level in the Directives, some of it isn't binding on the nationals of Member States until the Member State has enforced these rules domestically.

The first EU legislation to regulate demand response was the **Energy Efficiency Directive (Directive 2012/27/EU)**, namely Article 15[48], which requires Member States to adapt the technical and contractual modalities if necessary in order to make energy efficiency measures (demand response among them) available on the market.[49] Furthermore, Member States shall remove those incentives in transmission and

[47] Nojavan, S., Zare, K. (2020). Figure 1.2. Page 7.
[48] Article 15 (1), Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (hereafter, "Energy Efficiency Directive"). Available: https://eur-lex.europa.eu/eli/dir/2012/27/oj
[49] Zancanella et al. (2017). Page 460.

distribution tariffs that are detrimental to the overall efficiency of the generation, transmission, distribution and supply of electricity or those that might hamper participation of demand response, in balancing markets and ancillary services procurement.[50]

The **Recast Electricity Directive (Directive (EU) 2019/944)** seeks to achieve the general EU energy objectives while empowering consumers to participate in energy transition.[51] Therefore, it introduces the concepts of active consumers, aggregation and demand response. It puts extra focus on allowing active customers and aggregators easy access to electricity markets, discharging obligations on Member States to adapt their network regulations to suit the capabilities of small or flexible market participants and to eliminate any discrimination between supply and flexibility services.

Under point (20) of Article 2 of the Electricity Directive, 'demand response' is defined as the change of electricity load by final customers from their normal or current consumption patterns in response to market signals, including in response to time-variable electricity prices or incentive payments, or in response to the acceptance of the final customer's bid to sell demand reduction or increase at a price in an organised market as defined in point (4) of Article 2 of Commission Implementing Regulation (EU) No 1348/2014, whether alone or through aggregation. This definition includes three different options of demand response. The first is "price-based" or "indirect" DR, where demand varies based on price fluctuation (dynamic tariffs); active consumers react to changes in electricity prices. The second is "incentive-based" DR, where the final customer is remunerated for participating in a DR programme organised by their electricity supplier, TSO/DSO or aggregator; here, the consumer either reduces consumption according to a signal, or is connected to an automated system where the supplier or aggregator can control the consumer's appliances and reduce their load. The third option is "direct" or "explicit" DR in which consumers themselves offer their availability to consume more or less on the market, either directly or through an aggregator.[52]

Member States shall ensure that their national law does not hamper consumer participation, including through demand response.[53] Thus, final customers as active customers shall not be subject to disproportionate or discriminatory technical,

[50] Article 15 (4), Energy Efficiency Directive.
[51] Article 1, Recast Electricity Directive.
[52] Herrera Anchustegui, I., Formosa, A. (05.09.2019). Page 14.
[53] Article 3 (1), Recast Electricity Directive.

administrative or financial requirements.[54] Active customers shall be able to consume, store or sell their self-produced energy, participate in the electricity markets directly or through aggregation, take part in flexibility and energy efficiency schemes, and more.[55] The Directive also grants active customers who own energy storage facilities a list of rights in order to promote distributed and seasonal energy storage.[56] The Directive sees that consumers are free to conclude aggregation contracts independently from their supply contracts and that they can access the relevant data on demand response and supplied electricity.[57]

Under Article 16, consumers shall be able to participate in citizen energy communities. The members of these communities shall not lose their rights as household or active consumers and shall be entitled to leave the community. Unless Member States allow energy communities to own and operate their own distribution networks, DSOs shall cooperate with the communities by enabling them to transmit the self-produced energy to their members.[58] Energy communities shall have access to all electricity markets, be treated in a non-discriminatory manner, and have the rights of an active customer under article 15.[59]

Under Article 17, demand response through aggregation shall be enabled in all Member States. Final customers shall be allowed to participate alongside producers in all electricity markets in a non-discriminatory manner.[60] This is emphasised regarding the procurement of ancillary services.[61] Article 17 goes on to list a number of elements that shall be included or regulated in the Member States. Among these, it is required that transparent and non-discriminatory rules on data exchange between aggregators and other electricity undertakings are established which at the same time protect commercially sensitive information and consumers' personal data.[62]

All the new market participants -active customers, energy communities and aggregators- bear balancing responsibility, i.e. they are financially responsible for the imbalances they cause in the electricity system. They are, however, allowed to delegate their balancing responsibility to another party in accordance with Article 5 of Regulation (EU)

[54] Article 15 (1), Recast Electricity Directive.
[55] Article 15 (2), Recast Electricity Directive.
[56] Article 15 (5), Recast Electricity Directive.
[57] Articles 13 (1) and 13 (3), Recast Electricity Directive.
[58] Articles 16 (1) and 16 (2), Recast Electricity Directive.
[59] Article 16 (3), Recast Electricity Directive.
[60] Article 17 (1), Recast Electricity Directive.
[61] Article 17 (2), Recast Electricity Directive.
[62] Article 17 (3), Recast Electricity Directive.

2019/943.[63]

Under Article 23, Member States shall regulate who has access to data of the final customers.[64] Data shall be managed in a way as to ensure efficient and secure access to and exchange of it, while ensuring data protection.[65] The processing of personal data within the framework of this Directive shall be in conformity with the General Data Protection Regulation.[66] Final customers shall be able to access their data for no charge.[67]

Member States may put in place a method for compensating electricity undertakings directly affected by demand response activation.[68] This is reasonable since other participants, such as electricity retailers, may have already made purchases according to expected consumption patterns which will not materialise due to demand response; these participants will therefore incur financial losses.[69] Regulatory authorities shall adopt technical requirements for participation of demand response in all electricity markets.[70]

Article 31 reiterates that DSOs shall treat flexibility services equal to other market participants when procuring products and services necessary for the efficient, reliable and secure operation of the network.[71] Member States shall provide the regulatory framework to allow and incentivise DSOs to procure flexibility services to improve efficiencies in the operation and development of the distribution system, unless the procurement of such services is not economically efficient or such procurement would lead to severe market distortions or to higher congestion.[72]

DSOs or the regulatory authority shall establish the specifications for the flexibility services procured and, where appropriate, standardised market products for such services at least at national level. The specifications shall ensure the effective and non-discriminatory participation of all market participants. Distribution system operators shall exchange all necessary information and shall coordinate with transmission system operators in order to ensure the optimal utilisation of resources, to ensure the secure and efficient operation of the system and to facilitate market

[63] Articles 15 (2) (f), 16 (2) (c) and 17 (3) (d), Recast Electricity Directive.
[64] Article 23 (1), Recast Electricity Directive.
[65] Article 23 (2), Recast Electricity Directive.
[66] Article 23 (3), Recast Electricity Directive.
[67] Article 23 (5), Recast Electricity Directive.
[68] Article 17 (4), Recast Electricity Directive.
[69] Herrera Anchustegui, I., Formosa, A. (05.09.2019). Pages 15-16.
[70] Article 17 (5), Recast Electricity Directive.
[71] Article 31 (8), Recast Electricity Directive.
[72] Article 32 (1), Recast Electricity Directive.

development.[73] When composing the rules for demand response, procurement rules for flexibility services and the network development plans, the regulatory authority and system operators must consult all market participants.[74]

Similar to DSOs, TSOs must procure balancing services under transparent, non-discriminatory and market-based procedures, allowing the participation of all qualified electricity undertakings and market participants, including those offering energy from renewable sources, engaged in demand response or aggregation, and operating.[75] The previous shall also apply to the provision of non-frequency ancillary services by TSOs, unless the market-based provision is economically not efficient.[76] TSOs shall establish the specifications for the non-frequency ancillary services procured and, where appropriate, standardised market products for such services at least at national level. The specifications shall ensure the effective and non-discriminatory participation of all market participants. Transmission system operators shall exchange all necessary information and shall coordinate with DSOs in order to ensure the optimal utilisation of resources, to ensure the secure and efficient operation of the system and to facilitate market development.[77]

DSOs shall publish a network development plan at least every 2 years which shall provide transparency on the medium and long-term flexibility services needed and include the use of demand response, energy efficiency, energy storage facilities or other resources that the DSO is to use as an alternative to system expansion.[78] TSOs have an obligation of the same substance when putting together their ten-year network development plans.[79] On a similar note, Member States shall consider the alternatives to the construction of new generating capacity, such as demand response solutions and energy storage, when granting authorisation for new capacity.[80]

Lastly, the **Electricity Regulation (Regulation (EU) 2019/943)** sets as an aim to establish principles which among other goals empower consumers, ensure demand response, energy storage and energy efficiency on the markets, and facilitate aggregation of

[73] Article 32 (2), Recast Electricity Directive.
[74] Articles 17 (5), 31 (6), 32 (4), 40 (4) and 40 (6), Recast Electricity Directive.
[75] Article 40 (4), Recast Electricity Directive.
[76] Article 40 (5), Recast Electricity Directive.
[77] Article 40 (6), Recast Electricity Directive.
[78] Article 32 (3), Recast Electricity Directive.
[79] Article 51 (3), Recast Electricity Directive.
[80] Article 8 (2) (l), Recast Electricity Directive.

distributed demand and supply.[81] According to Art 2 (25), aggregators and demand response or energy storage service operators are considered market participants.

Article 6 (1) requires that balancing markets, including prequalification processes, shall be organised in such a way as to ensure effective non-discrimination between market participants taking account of the different technical needs of the electricity system and the different technical capabilities of generation sources, energy storage and demand response; and to ensure non-discriminatory access to all market participants, individually or through aggregation, including for electricity generated from variable renewable energy sources, demand response and energy storage.

Moreover, under Article 7 (2), day-ahead and intraday markets shall be organised in such a way as to ensure that all market participants are able to access the market individually or through aggregation.[82] Nominated electricity market operators shall provide market participants with the opportunity to trade in energy in time intervals which are at least as short as the imbalance settlement period for both day-ahead and intraday markets, i.e. 15 minutes.[83] Moreover, they shall provide products for trading in day-ahead and intraday markets which are sufficiently small in size, with minimum bid sizes of 500 kW or less, to allow for the effective participation of demand-side response, energy storage and small-scale renewables including direct participation by customers.[84]

Any capacity mechanism shall be open to participation of all resources that are capable of providing the required technical performance, including energy storage and demand side management.[85]

The dispatching of power-generating facilities and demand response shall be non-discriminatory, transparent and, unless otherwise provided, market based. Under certain conditions, demand response participants might enjoy priority dispatch.[86] Redispatching of demand response shall be based on objective, transparent and non-discriminatory criteria and open to all demand response, including those located in other Member States unless technically not feasible. The resources that are redispatched shall be selected from among demand response using market-based mechanisms and shall be financially compensated.[87]

[81] Article 1, Recast Electricity Regulation.
[82] Article 7 (2), Recast Electricity Regulation.
[83] Article 8 (2), Recast Electricity Regulation.
[84] Article 8 (3), Recast Electricity Regulation.
[85] Article 22, Recast Electricity Regulation.
[86] Article 12, Recast Electricity Regulation.
[87] Article 13, Recast Electricity Regulation.

Article 57 requires DSOs and TSOs to cooperate with each other in order to achieve coordinated access to resources such as distributed generation, energy storage or demand response that may support particular needs of both the distribution system operators and the transmission system operators. The network charges shall not discriminate either positively or negatively against energy storage or aggregation and shall not create disincentives for self-generation, self-consumption or for participation in demand response.[88]

On the whole, the EU legislation sets a plethora of requirements for the Member States to amend their national laws according to. Although these regulatory elements are required to be incorporated in the national jurisdictions, Member States are left with multiple options or total discretion on many topics. The national regulations are therefore bound to develop many different faces, some more welcoming of demand-side management and active customers than others.

Who are energy prosumers?

In the Communication of 18th May 2022, "Short-Term Energy Market Interventions and Long Term Improvements to the Electricity Market Design – a course for action", the European Commission urged the effective implementation of the Electricity Directive, "in particular provisions that support active consumers and demand response".[89] Since this article already broadly discussed the demand response mechanism, the closely tied concept of "prosumers" (or "active customers") cannot be overlooked. Demand response is indeed part of the prosumer spectrum, as the consumer is given the choice to adapt its demand to fit the reality of the market. Nevertheless, some consumers feel the need to go even further and play a rather more active role in the process. Energy prosumers, as it will be demonstrated throughout this part, seem to be the perfect example of what local energy transition can already appear like nowadays and will definitely be in the future.

Who are energy prosumers? A short portrait of who you may already be, know or become

There are miscellaneous ways of being a consumer and being a prosumer might seem to

[88] Article 18, Recast Electricity Regulation.
[89] European Commission. (18.05.2022). *COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. Short-Term Energy Market Interventions and Long Term Improvements to the Electricity Market Design – a course for action*. Page 8. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A236%3AFIN&qid=1653032581730

be just one of them. But can it be only reduced to that? Writing this article was indeed an opportunity to question what consuming meant when it comes to energy consumers. In their research paper entitled "The Regulatory Consumer: Prosumer-Driven Local Energy Production Initiatives"[90], Anna Butenko and Kati Cseres emphasise four types of consumption patterns energy consumers can engage in - passive, active, responsible, and prosuming consumption.

Passive consumption, on the one hand, is described as the "default option of energy consumers"[91] where the consumer does not actively engage in the market and therefore isn't usually expected to compare or change suppliers nor try to lower its energy bills. Active consumption, on the other hand, is depicted by the "active participation in the market and active interaction with the energy suppliers".[92] It becomes an active investigation and this involvement of the consumer in the market ultimately results in an effervescence of competition between suppliers.

In a way, one can argue that responsible consumers and prosumers are subcategories of the active consumer's archetype. Although their motives may intersect, the responsible consumer will take "public policy factors into account, such as the presence of the renewable energy sources in the energy mix of the supplier"[93] whereas energy prosumers take it a step further by deciding to produce their own energy. Therefore, energy prosumers exit the traditional energy supply model[94] as they not only consume but produce. The fact remains that when it comes to prosumers, it ends up being so much more than consuming, as it obviously involves possessing the adequate facilities and therefore drives the consumer to invest its time and above all its money in the process.

Electricity prosumers have been defined by the European Parliamentary Research Service (EPRS) as "consumers who both produce and consume electricity".[95] It might be surprising to know that these electricity prosumers not only consume the electricity they produce but can also sell their excess production to the market. On the concern of their

[90] Butenko, A., Cseres, K. (November 2015). The Regulatory Consumer: Prosumer-Driven Local Energy Production Initiatives. Amsterdam Law School Research Paper No. 2015-31, Amsterdam Centre for European Law, and Governance Research Paper No. 2015-03. Available: http://dx.doi.org/10.2139/ssrn.2631990
[91] *Ibid.* Page 9.
[92] *Ibid.*
[93] *Ibid.* Page 10.
[94] *Ibid.* Pages 10-11.
[95] Briefing produced by Nikolina Šajn for the members of the European Parliamentary Research Service. November 2016. Available: https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/593518/EPRS_BRI(2016)593518_EN.pdf

own production not being able to meet their needs, they can still import their electricity from the grid.

As far as the profiles of prosumers can be depicted, the EPRS categorises them in four types: "residential prosumers who produce electricity at home – mainly through solar photovoltaic panels on their rooftops; citizen-led energy cooperatives or housing associations; commercial prosumers whose main business activity is not electricity production; and public institutions like schools or hospitals."[96]

Understanding the concept of "prosumers" requires taking a broader approach than its definition. Indeed, it is more than relevant to highlight the reasons for its rise. In *Regulation of Electricity markets in Europe in light of the Clean Energy Package*[97], Dr. Ignacio Herrera Anchustegui and Andreas Formosa list the following three main explanations. First, an economic reason which is related to the accessibility of the needed technologies, such as solar panels, that has been increased not only because of the drop of their actual cost in the globalised market but also thanks to financial support offered in different Member States to encourage their democratisation especially among citizens. Secondly, an ethical-oriented reason consists of more and more people being aware of climate change and taking it into account when it comes to their energy consumption. Finally, one might argue that another reason is linked to the concern of energy security, with some prosumers feeling safer producing their own energy instead of getting it from suppliers from the public grid, which they sometimes distrust.

Making all pieces of the puzzle fit together is not worth considering without recognizing the underlying theme when it comes to prosumers: individuals but also collectivities now feel the need to be empowered when it is a matter of energy. This urge seems to be recognized and even celebrated by the European Union, betting more and more on prosumers to change the market and to help create the transition to renewable energy. Nevertheless, if empowering the consumers can, and sometimes must, be done through legislative actions, the decentralised aspect of this phenomenon can make it harder to regulate. Every so often, legislation can even put a curb on the potential of prosumers, whether it comes from the European Union or from the national level.

EU energy prosumer regulation

With the European Union's aim to achieve a sustainable energy transition in the coming years, the involvement of citizens has become a key issue. Therefore, prosumers are in

[96] Briefing produced by Nikolina Šajn for the members of the European Parliamentary Research Service. November 2016.
[97] Herrera Anchustegui, I., Formosa, A. (05.09.2019). Page 9.

the limelight. Nevertheless, the concept of “prosumer” does not have one definition in the European Union law but is rather mentioned under different names throughout secondary law. The increasing mention of this concept embodies the shift that took place with the adoption of the Clean Energy for All Europeans Package[98] in 2019, aiming to decarbonize the EU energy system in line with the European Green Deal objectives.

First, the idea of prosuming can be found in the Renewables Directive 2018/2001 which commits to increasing the level of renewable energy sources in the EU’s energy consumption up to 32% by 2030. Its Article 21 acknowledges “renewables self-consumers” and states that “Member States shall ensure that consumers are entitled to become renewables self-consumers”. It is specified that these renewables self-consumers are both entitled to generate electricity, including for their own consumption, but also to sell it and receive a remuneration at a market price.

Secondly, the Common rules on the international market in electricity Directive 2019/944 highlights the notion of “active customers” under its Article 15. It states that “Member Sates shall ensure that final customers are entitled to act as active customers without being subject to disproportionate or discriminatory technical requirements, administrative requirements, procedures and charges, and to network charges that are not cost-reflective”. Therefore, active customers can consume, store, or sell the electricity they produce, but never as a professional activity.

The transition to a low-carbon energy supply calls for putting new actors such as prosumers at the heart of the energy market. Therefore, in “The Regulatory Consumer: Prosumer-Driven Local Energy Production Initiatives”, Anna Butenko and Kati Cseres argue that “prosuming consumption contributes to all three objectives of the European energy policy: sustainability, competitiveness, and security of supply".[99] However, this focus on prosumers can also be criticised as Lanka Horstink, Julia M. Wittmayer and Kiat Ng explain: “While the new EU regulatory framework for energy now recognises civic-inspired prosumer initiatives such as energy communities, little is known about the full range and diversity of collective actors in renewable energy self-consumption as well as how they engage with the changing energy system.”[100]

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[98] Clean energy for all Europeans package. Energy. European Commission. Available: https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en#electricity-market-design

[99] Butenko, A., Cseres, K. (November 2015). Page 12.

[100] Horstink, L., Wittmayer, J. M., Ng, K. (2021). Pluralising the European energy landscape: Collective renewable energy prosumers and the EU's clean energy vision. Energy Policy, Volume 153, 2021. 112262, ISSN 0301-4215. Page 1. Available: https://doi.org/10.1016/j.enpol.2021.112262

Moreover, these authors insist on the cons of this decentralised energy system which puts in perspective the lack of a shared precise and relevant legal framework. They explain that "the rise of prosumerism has met with widely differing cultural, political-legal and geographic factors across European countries and consequently experienced very different growth rates."[101] They follow it up by arguing that "while the match between developing RES technologies and a country's natural resource endowments will often determine prosumer success, unexpected barriers may arise from what Butenko (2016) has called a 'regulatory disconnection', where the existing regulatory framework of the country is no longer responsive to the market innovation."[102]

Writing this paper mostly as a comparative analysis between the legal frameworks of France, Norway and Estonia, these issues were quick to rise. It is therefore insightful to review these national regulations on prosumers.

Legal challenges arising in the implementation of demand response and energy prosumers' regulation

Both academic literature assessing demand response and active customers as well as practice from actually implementing the novel EU regulation, reveal an array of difficulties which arise in incorporating the mechanisms in the existing energy regulation and markets. The main paper we chose as the backdrop for our research is "*Why is demand response not implemented in the EU? Status of demand response and recommendations to allow demand response to be fully integrated in energy markets?*" by Zancanella et al (2017)[103]. Whereas the 2017 paper by Zancanella et al focuses on the implementation of Art 15 of the Energy Efficiency Directive (Directive (EU) 2012/27), the paper at hand draws from DR regulation in the Electricity Regulation and Electricity Directive of 2019. The most relevant paragraph of the Energy Efficiency Directive regarding DR, Art 15 (8), has been repealed and replaced by Art 17 in the Electricity Directive; therefore, the same rules, as examined by Zancanella et al, are still in force. Regardless of changes in regulation, we find that the legal challenges remain the same and can be still examined, especially since some years have gone by and the EU/EEA

[101] Horstink, L., Wittmayer, J. M., Ng, K. (2021). Page 2.
[102] *Ibid.*
[103] Zancanella et al. (2017). *Why is demand response not implemented in the EU? Status of demand response and recommendations to allow demand response to be fully integrated in energy markets?* ECEEE 2017 Summer Study – Consumption, Efficiency & Limits. Pages 457-466. Available: https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2017/2-policy-governance-design-implementation-and-evaluation-challenges/why-is-demand-response-not-implemented-in-the-eu-status-of-demand-response-and-recommendations-to-allow-demand-response-to-be-fully-integrated-in-energy-markets/2017/2-278-17_Zancanella.pdf/

Member States have new legislation to transpose into its national laws. From within the paper by Zancanella et al, we chose three legal challenges to review:

1) The authorisation of demand response and aggregation in all electricity markets, as well as conflicts between the roles of aggregators, wholesale suppliers and retailers

2) Technical modalities for allowing DR and energy prosumers to participate in the market in line with their capabilities

3) Data exchange and protection

Although the chosen legal challenges have been identified by Zancanella et al regarding demand response, we say that the same challenges apply to incorporating energy prosumers in the electricity markets. This is because both consumers generating their own energy and consumers participating in flexibility services come from a position of less power and newly acquired rights, trying to enter the market next to experienced and established energy suppliers. All the conflicts arising are related to this aspect: creating compatible technical modalities for small bids, solving the competition issues (which arise both in relation to energy prosumers participating independently or through an aggregator on a market), and the accessibility as well as protection of consumers' data.

The first issue lies in enabling aggregators **equal footing with wholesale and retail suppliers**. An aggregator collects either all the consumption loads (electric heating and cooling, fans, water boilers, freezers etc.) made available by consumers or the self-generated surplus energy of prosumers and sells it as single units in the electricity markets. The aggregator can act independently or under a retailer, and the entity is necessary for explicit demand response. It is difficult for retailers to take on the parallel role of an aggregator since they lack knowledge of the aggregator business model and because demand response could disturb their existing revenue streams from generation and balancing. That is, retailers can earn more money from supplying energy at a high price and charging consumers for taking on their balancing risk, than providing demand response services (i.e. their consumers deciding not to consume energy at the market price and instead making it available on the market) and meanwhile losing the profit from providing protection against balancing costs. Meanwhile, there are very few independent aggregators emerging, i.e. no significant competition arising next to wholesale and retail suppliers, and little opportunity for consumers to participate in DR or for the market to become more energy efficient. To promote the establishment of independent aggregators, the national legislations must set favourable conditions for

aggregators to enter the market and guarantee them equal treatment with other market participants firstly, on the balancing and ancillary services markets (where they have more potential), and secondly, on the capacity market.[104]

The second problem exists regarding **technical modalities** which up until now have been designed to facilitate the participation of centralised generation units in the electricity markets. With new market participants entering the market, such as small electricity producers (whether independent energy prosumers or energy communities) and consumers participating in demand response, these old technical modalities aren't compatible anymore. Zancanella et al have divided this problem into three parts.[105]

Firstly, demand response resources must be authorised to compete alongside supply. This means that DR resources shall be pre-qualified, measured, verified and paid as well as accountable for their imbalances. For all of this to happen, there has to be in place a transparent and public baseline methodology for calculating the volume of demand side flexibility. Consequently, the flexibility made available can be measured and compared to the offer of energy as well as paid accordingly. All of these processes shall be undertaken at the aggregated level to relieve consumers from the cumbersome procedures and to at the same time bring technical modalities in line with the capabilities of consumers.[106]

Secondly, aggregation must be legalised and enabled in all markets, i.e. the role of an aggregator must be included in national legislation as a market participant with defined rights and responsibilities. One of the key issues is clarifying the different roles of retailers and independent aggregators and allowing for fair competition between them. Until aggregators are legally enabled to participate independently in the market, consumers have no way of taking part in such flexibility services, since retailers are not encouraged to take on aggregation for economical reasons cited above. Because aggregation services compete against the retail suppliers on the balancing and ancillary services markets, retailers alone would block the entry of aggregators on the market. Therefore, aggregation must be legalised and consumers shall be enabled to contract with aggregators.[107]

In this regard, the legal framework must define: standardised processes for assessing the volume of traded energy; compensation to retailers or their balance responsible parties

[104] Zancanella et al. (2017). Page 459.
[105] *Ibid.* Page 457.
[106] *Ibid.* Page 461.
[107] *Ibid.* Pages 461-462.

for the average sourcing costs of the energy not used by consumers participating in demand response; rules for necessary data exchange between the balance responsible parties, aggregators and TSOs whilst avoiding the sharing of commercially sensitive information; and, an appeal process for dispute resolution.[108]

Thirdly, technical modalities must be adjusted in all markets to be in line with consumer capabilities and market requirements. Currently applicable participation requirements block low-cost demand-side resources and therefore inflate procurement costs. The main obstacles for demand response to enter the energy markets are: the low frequency of auctions (auctions should be held more often, e.g. every week); the required size of a bid (the minimum bid size should be made smaller, e.g. a couple of MW or less); the duration of the call (the length of time a participant should be required to adjust consumption should be as short as possible; e.g. 1-2 hours); the high frequency of activations/short recovery periods (consumers require time to rest between activations); the lack of asymmetric bidding (the possibility for consumers to increase and decrease consumption unequally). Moreover, energy prosumers who just sell their surplus of generated energy shouldn't be required to register as electricity undertakings or to undertake lengthy pre-qualification and risk-assessment procedures before they can participate in the market. Too many obstacles for small independent prosumers prevent them from taking part in the market; participation should be easy and comfortable. All in all, the regulators should enable a range of resources of different characteristics to participate in the market, including consumers, whether they are participating in demand response or selling surplus self-generated energy.[109]

Lastly, we decided to look into whether the market participants rights in **data privacy** are protected under the national demand response and energy prosumer legislations. This topic was mentioned beforehand, but we highlight it as an independent research category. The problem involves the data privacy of consumers' consumption data as well as the commercially sensitive information on wholesale and retail suppliers, balance responsible parties and aggregators, for whom participation in the market is an economic activity. Related to this, data exchange rules shall be adopted, especially with regard to aggregators and consumers participating in DR who need data on the loads activated in DR.

Zancanella et al divided the European Union Member States into three groups based on their implementation of demand response regulation; while France fits into the

[108] Zancanella et al. (2017). Pages 461-462.
[109] *Ibid.* Page 462.

exemplary group succeeding in the implementation, Estonia has been regarded as an inactive regulator. Norway has still not transposed the Energy Efficiency Directive, the Recast Electricity Regulation or the Recast Electricity Directive into its legislation and is therefore not subject to the relevant EU legislation. Thus, Zancanella et al have not branded Norway (as a non-EU member) in any of the groups. Five years have gone by since the publishing of this paper, therefore our further analysis will reveal whether anything has changed in the examined States or not.

National regulation of demand response and energy prosumers

France

National regulations on demand response

Article L271-1 of the *French Energy Code*[110] defines the French demand/response inspired mechanism, known as "*effacement de consommation*" (erasing of consumption), as an action aiming to temporarily reduce the request level for electricity of one or several consumption sites on the grid compared to its usual intakes, thanks to punctual solicitations of consumers in case of imbalance between the supply and demand.

This mechanism was born in France in the 50s when hydroelectric dams often produced too much electricity compared to the existing needs in the area. It was firstly put in place through contracts between *EDF* (electricity of France) and industrialists that were then able to buy cheaper electricity if they agreed not to consume it on selected days.[111]

It relies on a "*consommation de référence*" (consumer baseline load) deducted from the consumption history that is then compared by the grid operator to the actual consumption[112] – if the consumer actually "erases" its usual consumption as requested by their contract, they are rewarded, otherwise penalised.[113]
This mechanism can take various forms such as contractual monitoring or advantageous tariffs.

Contractual monitoring or interruptibility
Through contractual monitoring, important consumers of electricity allow the grid operator to instantly adjust their consumption when needed[114] – the energy erased by

[110] Code de l'Energie - Art L271-1.
https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000031067893#:~:text=L'effacement%20peut%20avoir%20pour,est%20une%20%C3%A9conomie%20d'%C3%A9nergie
[111] APA, Piatek, J. M., & Béhin, R. (2012) « *Effacement électrique en fonderie, une nouvelle manière de consommer l'énergie* ».
[112] RTE, « *Équilibrer l'offre et la demande* ».
https://www.rte-france.com/chaque-seconde-courant-passe/equilibrer-loffre-et-la-demande-delectricite
[113] ENGIE, 2021, « *Tout savoir sur l'effacement diffus de la consommation électrique* ».
https://particuliers.engie.fr/economies-energie/conseils-economies-energie/conseils-eco-gestes-au-quotidien/tout-savoir-effacement-electrique.html#1
[114] RTE, « *Équilibrer l'offre et la demande* ».
https://www.rte-france.com/chaque-seconde-courant-passe/equilibrer-loffre-et-la-demande-delectricite

important consumers thanks to this adjustment shall be of at least 1MW.

Advantageous tariffs

Through advantageous tariffs, the idea is to decrease consumption on days or hours of the day of high demand thanks to price signals. The domestic consumer is encouraged to plan their consumption according to the different prices throughout the day (for example), to schedule energy consuming tasks that are not urgent during low demand periods.[115]

In these two cases, consumers are being financially rewarded for their consumption erasure in a certain period.

This mechanism is helped by the development of smart electricity meters also known in France as "*compteurs Linky*", allowing consumers to measure precisely, and then control, their consumption. This precious data makes it possible for anyone to understand how they could reduce their consumption but also if they could produce electricity, if selling it would be worth considering, and so on. It appears therefore to be an incredible tool to help individuals in their energy transition, on top of helping them be more aware of energy efficiency.

They spread around Europe in voluntary Member states and especially France thanks to two European directives from 2006[116] and 2009[117] concerning the common rules for the internal market in electricity. Its deployment through the French territory is based on article L.314-4 of the Code de l'énergie.

However, these new generation electricity meters have been at the heart of the controversies in France, as they have been accused of increasing the consumptions recorded, and to invade the privacy of consumers[118] that did not want to get equipped with such a precise technology measuring their consumption second-by-second. In fact, this smart device comes across as invasive as it is installed in the consumer's home and the data it collects can be very sensitive and valuable, reflecting the consumer's everyday

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[115] EDF, 2022, "*Comprendre l'option heures creuses proposée par EDF dans votre contrat d'électricité*".
https://particulier.edf.fr/fr/accueil/gestion-contrat/options/heures-creuses.html

[116] Directive 2006/32/CE of the European Parliament and the Council.

[117] Directive 2009/72/CE of the European Parliament and the Council.

[118] Nantcy Leone, 8 mars 2020, "*Compteur Linky : cette atteinte à la vie privée dénoncée par certains usagers*".

lifestyle. The stress point emerges from a binding legal framework[119] which grew into a hindrance to the public acceptance and understanding of the tool, as it was made impossible to refuse its installation in one's property. This situation triggered public distrust, a lot of people invoking their rights of property and of privacy to refuse the installation. In fact, a lot of "anti-Linky" consumers claimed a right of refusal before the Court, which was actually recognized by the Court of Appeal of Bordeaux in 2020.[120] For Jean-Sébastien Boda, some consumers saw it as "a Trojan horse of an aggressive and malicious modernity" and some "feared a danger to health, safety or privacy".[121] This led to numerous litigations,[122] dividing citizens and sowing discord.

National regulations on prosumers – Heterogeneous legal frameworks and various issues

Historically, French consumers were relegated to a passive role as the energy sector was nationalised and therefore centralised. This is particularly striking in the law n° 46-628 *on Nationalisation de l'électricité et du gaz* from the 8th of April in 1946. Still, the European openness to competition and the need to increase the share of renewable energies pushed governments to implement new energy policies.

Nowadays, the French legislation provides a whole chapter dedicated to prosuming, which is called "*Autoconsommation*" (self-consumption) in the Code de l'Energie, starting under the article L. 315-1. Yet, this legislation is strictly reserved to electricity prosumers and distinguishes between individual prosuming and collective prosuming.

Thus, a paradigm shift can be noticed in the energy market in France. With this new legislation, citizens' initiatives are multiplying, particularly when it comes to prosumers. However, major obstacles remain and prove the need to rethink the legal approach in

[119] Article 29 of French law n°2015-992 from the 17th of August 2015, dedicated to the environmental transition, precisely defines the obligation for owners and co-owners' associations to give access to meters. The article says: "For the application of Articles L 322-8 and L 432-8 of the Energy Code, the owners or, in the case of co-ownership, the syndicate represented by the syndic allow the operators of the natural gas and electricity distributors and the operators of the companies acting on their behalf access to the works relating to the distribution of natural gas and electricity.".

[120] Court of Appeal of Bordeaux, November 17th 2020, N° RG 19/02419.

[121] Boda, J.-S. (2018). Le déploiement des dispositifs de comptage Linky, source d'un phénomène contentieux en droit administratif. Énergie – Environnement – Infrastructures, 12 (décembre). Page 1. Available: http://www.boda-avocat.com/index.php/k2/item/179-la-lutte-contre-le-deploiement-des-dispositifs-de-comptage-linky-une-synthese

[122] See for example CAA Bordeaux, 17th of November 2020, Enedis c. M.A et autres, N°RG 19/02419.

relation to the practical reality.

To illustrate these difficulties, two examples will be developed.

The first issue accurately embodies the struggle of decentralising the energy sector. Thus, when national policies aim to promote the use of renewable energies, governments often resort to direct or indirect financial aid to make them more attractive and accessible. However, such a public support to this renewable energy can fall within the scope of the Article 107 of the European Functioning Treaty and therefore be legally qualified as a state aid. When such a qualification happens, it then must be notified to the European Commission and has to go through the compatibility process.

Yet, the French government laid down the conditions for the purchase of electricity generated by wind-power installations. Therefore, the purchase of the electricity generated by wind-power installations was at a higher price than its market price. This decision was the subject of an action for annulment before the Conseil d'Etat (French Council of State) brought by Association Vent de Colère! Fédération nationale and 11 other applicants, claiming that this introduced State aid within the meaning of Article 107 TFEU and constituted an advantage liable to affect trade between Member States and to have an impact on competition.

Thus, the Conseil d'Etat (French Council of State) requested for a preliminary ruling under Article 267 TFEU. In a judgement of the Court from the 19th of December in 2013, it was ruled that this mechanism was in fact a State aid, as it had to be regarded as an intervention by the State or through State resources. Hence, this State aid should have been notified to the European Commission and because it had not been, it had to be declared illegal. As a result, 47 million euros of aid were supposed to be refunded to the French State by the wind energy sector .

The second issue depicts how the legal framework can impact the involvement of the public in the process, particularly regarding prosumers. This issue is discussed by Anna Butenko and Kati Cseres, who explain: "If technological developments make this active consumer role possible, there is in fact also a gap between law and technological development, which can lead to the problem of 'regulatory disconnection.' These problems are especially present in the EU energy sector, where technical developments such as smart meters, solar panels, decentralised energy storage, etc., enable a proactive role of energy consumers."[123]

[123] Butenko, A., Cseres, K. (November 2015). Page 3.

Logically, to be empowered, citizens need to be given the right tools and to understand how they work, their potential and their limits. As seen previously, being a prosumer becomes easier everyday thanks to the evolution of law but also because of technological advances. Nevertheless, there seems to be what can be called “dissonances” between these new tools, their legal framework, and the public acceptance.

According to Sai Bravo,[124] prosumers are a direct consequence of smart-grids deployment in the electricity market. Paradoxically, the Linky device which was supposed to help consumers take an active role in their consumption confined them to a passive role when it came to its installation because of a binding yet unclear legal framework. The lack of a policy integrating participatory or compensatory mechanisms is also to blame. Therefore, as Michaël Tatham explains,[125] certain policy characteristics can activate certain cleavages in society which then may trigger resistance to change: these acceptance problems must find a law response.

Estonia

Up until recently, Estonia belonged in the category of EU Member States who in principle don’t have any legal obstacles for implementing demand response or allowing consumers to be active in the markets but also have no positive law in place for developing demand-side management or facilitating participation in it. This is beginning to change due to the Electricity Directive finally being transposed into the Estonian Electricity Market Act[126] in March 2022 (with some amendments entering into force in May). Nevertheless, legal, technical and financial conditions for introducing flexibility services in the electricity markets still have to be developed and do not enable active participation of electricity customers as of yet.

Under section 12^1 of the Electricity Market Act, a customer may operate as an active user of network services. An active user of network services means a customer or a group of customers who consume, store or sell electricity that has been generated on real property owned by them, or who provide flexibility services or use self-generated electricity for the purpose of improving the building’s energy performance – provided such an activity is not their principal business or profession. It is also allowed to do all

[124] Bravo, S. (10.09.2020). Prosommateurs: une conséquence directe du déploiement des réseaux intelligents dans le marché de l'électricité. BSI Economics. Available: http://www.bsi-economics.org/1185-prosommateurs-une-consequence-directe-du-deploiement-des-reseaux-intelligents-dans-le-marche-de-l%EF%BF%BDelectricite
[125] Tatham, M. (29.04.2022). Public Acceptance of Renewable Energy Projects. Presentation.
[126] Electricity Market Act. RT I, 18.05.2022, 12. Riigi Teataja. Available: https://www.riigiteataja.ee/en/eli/ee/527052022002/consolide/current

these activities at once. An active user of network services can operate directly or through aggregation, and delegate, to a third party, the management, installation, operation and maintenance of any equipment as well as the processing of any data required for its operations.[127]

Under section 12^2 of the Act, an energy community is a legal person: 1) participation in which is voluntary and open and which is controlled by members who are natural or legal persons; 2) whose principal aim is, instead of a monetary profit, to provide environmental, economic or social benefits to its members or to the area in which the community operates; 3) which may provide energy services to it members; 4) whose members retain rights and obligations that they have as a household customer or as an active user of network services. An energy community that consumes electricity generated by itself is an active user of network services within the meaning of § 12^1 of the Act. The number of members in an energy community is not defined, and a member may resign from the community, giving at least six months' notice of the resignation.[128]

Where an energy community supplies electricity that it has generated itself for consumption to its members, it does this using installations erected by the community or a service provided by the area's distribution network operator. Energy communities can be established in Estonia as a company under Commercial Code or as a non-profit association under Non-Profit Associations Act. An energy community does not have to be geographically limited and could have members from outside Estonia.[129]

An energy community cannot, however, offer network service to its members.[130] According to section 64 (1^6), where, in order to consume or generate electricity, a person has, after 1 April 2022, connected their electrical installation to another such installation which is not a distribution network operator's network, the person undertakes to apply for connection to the distribution network operator's network in order to use network service. This obligation covers, for example, electricity installations set up by energy communities wishing to supply their members with their self-generated electricity. If members of the energy community already have network contracts in place before joining the community, they will remain in force during their membership of the

[127] Also look at section 58^3 of the Electricity Market Act.
[128] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. (13.09.2021). Majandus- ja Kommunikatsiooniministeerium. Page 3. Available: https://www.riigikogu.ee/tegevus/eelnoud/eelnou/40352cd6-cbef-409f-ae11-c3af8ae0c613/Elektrituruseaduse%20ja%20teiste%20seaduste%20muutmise%20seadus
[129] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. Page 8.
[130] *Ibid.*

community.[131]

Directive (EU) 2019/944 encourages the development of seasonal energy storage in order to move to a zero-carbon and zero-emission electricity sector.[132] In this regard, the Directive sets out that the development of energy storage and electric vehicle recharging points shall be market-based and competitive, allowing for new market participants, including active consumers.[133] Since network operators as natural monopolies can cross-subsidize between energy storage and electricity transmission activities and distort competition in the market for energy storage services, their ability to operate in this field shall be limited.[134] Therefore, the Electricity Market Act and the network codes are amended as to ban the DSO from owning, developing, managing or operating energy storage units and recharging points (with the exception of fully integrated network components) and must sell the ones it already owns. Moreover, the restriction on the ownership of energy storage units eliminates the risk of discrimination, ensures fair access to energy storage services for all market participants and promotes efficient and effective use of energy storage units separate from distribution or transmission system operation.[135]

In addition, the explanatory memorandum establishes the objective of developing a flexibility platform, to facilitate the procurement and offers of flexibility services, and a smart grid, to implement further distributed generation and optimise the use of energy. Smart grids shall enable consumers to access consumption data more frequently than on an hourly basis. The data exchange platform needs to be kept up to date as well.[136]

Conflicts between the roles of aggregators, wholesale suppliers and retailers

An aggregator is defined as a person who provides aggregation services to a network operator and who, at the same time, may be a seller or a balance provider. This can be interpreted as allowing for both independent and dependent aggregators in Estonian electricity markets. The amended Act lists aggregators as electricity undertakings in section 6, therefore, all of the provisions of the Act, where electricity undertakings are mentioned, both independent and dependent aggregators are also covered.[137]

Active users of network services can offer flexibility services either directly or through

[131] *Ibid.* Page 16.
[132] *Ibid.* Pages 2-3.
[133] *Ibid.* Page 21.
[134] *Ibid.* Page 39-40.
[135] *Ibid.* Page 21.
[136] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. Page 28-29.
[137] *Ibid.* Page 15.

an aggregator. Although not explicitly stated in section 12^1, according to the explanatory memorandum active users of network services (energy prosumers, including energy communities) can sell their self-generated energy on all electricity markets.[138] Hence, aggregators can participate in all markets in order to sell aggregated electricity production. According to section 21^4 of the Electricity Market Act, when procuring flexibility and ancillary services, a network operator allows the participation of an aggregator in demand response. Therefore, aggregated consumption loads can be made available on the balancing and ancillary services markets.

With regard to treating demand-side management equal to wholesale and retail supply, there are multiple provisions requiring network operators not to discriminate against flexibility services. Flexibility service is defined in the Electricity Market Act as a service that permits, in a cost-effective way, to reduce the need to increase or replace the throughput capacity of the network by expanding the electricity market, among others, to producers of electricity from renewable sources, to distributed producers, to market participants participating in demand response, to undertakings operating energy storage activities, to providers of reserve capacity required for system management and to aggregators. Therefore, it entails aggregation, demand response and energy prosumers.

Section 66^2 obliges the distribution network operator to conduct a public procurement procedure in order to find flexibility service providers to improve efficiencies in the operation and development of the distribution network. When conducting the procedure, the operator must not give preference to any undertaking associated with it. The Competition Authority must approve the conditions of the public procurement procedure; namely, the conditions have to observe the principles of equal treatment and transparency. The explanatory memorandum goes on to explain that in order for the public procurement to fulfil these conditions, all market participants have to receive relevant information regarding the market on equal terms. The relevant data comprises both the current condition of the network and the planned developments of the grid, e.g. the location of grid connection points and available capacities as well as plans for new power plants.[139]

The only instance, when a distribution network operator is not required to use the flexibility services, is if it has ascertained that using such services would be economically inefficient or lead to serious market distortions or cause congestion. A reasoned application must be filed with the Competition Authority for not using flexibility services;

[138] *Ibid*. Page 7.
[139] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. Page 12.

the Authority can decide not to grant it.

Under section 66^3 regarding ancillary services -i.e. services required to operate the network, as well as balancing and non-frequency ancillary services except for congestion management- a distribution network operator engages in cooperation with the transmission network operator in order to enable market participants connected to the network to efficiently participate in electricity markets. In particular, the TSO and the DSO shall exchange the necessary information and data regarding capacity efficiency and demand response, day-to-day network operation planning and long-term network investment planning to ensure cost-effective, secure and reliable network development and operation.[140]

The distribution network operator and the transmission network operator agree on conditions for providing balancing services based on the resources of the distribution network. Again, a network operator must conduct a public procurement procedure to find a provider of ancillary services required to ensure secure operation of the network.

With respect to the specification of non-frequency ancillary services and to technical conditions of certain products, the network operator must first conduct a public consultation, whose results are presented to the Competition Authority together with the conditions for the public procurement procedure. The Authority may decide not to approve the conditions if these do not observe the principles of equal treatment and transparency. A network operator is not required to use the non-frequency ancillary services, if it is the operator's assessment that the use of such services – provided externally – is economically inefficient. The operator files a reasoned application with the Competition Authority for not using ancillary services; the Authority may decide to not grant it.

Under section 93 (6) (22^1), the Competition Authority must watch out to ensure that no obstacles or limitations are established by market participants regarding consumption of self-generated electricity and the development of energy communities. According to section 65 (1^1), a DSO must cooperate with energy communities in the supply of self-generated electricity to members of the community. When elaborating conditions for participation in demand response, the Competition Authority makes sure that the roles and responsibilities of all electricity undertakings and consumers participating in demand response are non-discriminatory and transparent.[141]

[140] *Ibid.* Page 19.
[141] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. Page 28.

Technical modalities for allowing DR and energy prosumers to participate in the market in line with their capabilities

Under section 21^4 of the Electricity Market Act, the Competition Authority is obligated to elaborate conditions for participation in demand response, conduct public consultation with market participants and publish the conditions on its website. When elaborating the conditions, technical indicators of the electricity market, the capacity of the demand response and aggregated loads must be taken into account. These are the actually relevant technical, financial and operational criteria which will govern how demand response operators will be authorised to compete next to supply.[142]

Pursuant to the explanatory memorandum of the new Act, the technical specifications will include, inter alia, the general principle that the market model for demand-side management is compensated to cover the direct costs to the balance provider. The aggregator will pay the reference price part of this cost.[143] The Competition Authority makes sure that the roles and responsibilities of all electricity undertakings and consumers participating in demand response are non-discriminatory and transparent.[144]

Since these provisions entered into force in March 2022, the conditions for demand response have not yet been composed by the Competition Authority and therefore, demand response cannot be implemented just yet. It has not been cleared whether the procedures for authorising demand response will take place on the consumer or aggregator level. Based on the conditions for participation in demand response, network operators create the required methodologies and file these with the Competition Authority. Therefore, a baseline methodology for calculating the volume of demand side flexibility is similarly yet to be produced.

It has been already established, however, that active users of network services (section 12^1), including energy communities (section 12^2), and aggregators (section 21^4) have a balance responsibility by default. Within the scope of its balance responsibility, each of them is a balance provider (except where it has delegated its balance responsibility in accordance with Article 5 of the Electricity Regulation). If a consumer participating in demand response does not produce or consume the planned amount of electricity, the imbalance in the electricity network must be paid for by the balance provider, which according to agreement is either the aggregator itself or the consumer or another person

[142] *Ibid.* Page 14.
[143] *Ibid*.
[144] *Ibid.* Page 28.

appointed by them.[145]

As explained above, the role of an aggregator has been defined and regulated in the Electricity Market Act. Furthermore, aggregation has been legalised in all electricity markets. Aggregation may include market participants in the consumption or production capacities, i.e. an aggregator may compile either the available consumption loads of consumers or the self-generated electricity of energy prosumers.[146] According to section 84 (5), a customer and an active user of network services have a right to conclude an aggregation contract without the consent of the seller of electricity. With respect to the conclusion of an aggregation agreement, the aggregator files a notice with the TSO following the method provided by the Network Code on the Operation of the Electricity Market[147]. There is no obligation to notify the electricity supplier of an aggregation contract.

Aggregation contracts must be made in writing, in a form reproducible in writing or in electronic form. Moreover, the Act lists the different information that an aggregation contract must include. No fee may be charged for the conclusion of an aggregation contract with a household consumer or with a company that has fewer than 50 employees and whose annual turnover and balance sheet volume do not exceed 10 million euros. Section 93 (5) stipulates that where a dispute has arisen in relation to an aggregation contract, the consumer has a right to file a complaint with the Consumer Disputes Commission or another person or institution which deals with similar complaints, or with the court. Where no agreement is reached concerning matters that pertain to a closed distribution network, an energy community or an active user of network services and that fall under the Law of Obligations Act, these matters will be disposed of following the rules provided by the Code of Civil Procedure or the Consumer Protection Act.

The proposed amendments of the Network Code on the Operation of the Electricity Market include provisions on registering aggregators with the TSO and publishing their information on the TSO's website as well as conditions on concluding aggregation contracts and switching between aggregators.

Another important amendment to note is that the net capacity of production facilities is changed from 200 kW to 1 MW. In her memorandum of 06.09.2019, the Chancellor of

[145] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. Page 13.
[146] *Ibid*. Page 3.
[147] Network Code on the Operation of the Electricity Market. RT I, 07.02.2019, 1. Riigi Teataja. Available: https://www.riigiteataja.ee/en/eli/519122019007/consolide

Justice drew attention to the fact that the 200 kW production capacity limit of small producers may in some cases unreasonably hinder access to the field of activity and also hinder the development of electricity production from renewable energy sources.[148] This is because facilities with a net capacity above the one stipulated in the Electricity Market Act have to: 1) have a legal personality (as an electricity undertaking); 2) have a share capital of at least 31,950 euros; 3) present a notice of economic activities to the Register of Economic Activities; and 4) have relevant authorisation. Given the objective of increasing the share of renewable energy, it is reasonable to increase the relevant net capacity limit of the production installation to encourage more citizens to produce renewable energy independently. According to Directive (EU) 2019/944, an electricity undertaking and a producer can be both natural and legal persons, and it is important to promote fair competition and easy market access. Thus, increasing the net capacity of a generating installation to 1 MW also implements the spirit of the Directive.[149]

Moving on to whether technical modalities of the relevant markets have been adjusted to accommodate the participation of active consumers and aggregators, three markets in Estonia come under review. Most electricity trading in Estonia takes place on the NordPool power exchange, with the biggest volume of electricity traded on the day-ahead market.[150] Therefore, the technical modalities applicable for wholesale markets in Estonia are those of NordPool Elspot (day-ahead) and Elbas (intraday) markets. The balancing and ancillary services are procured by the TSO after the intra-day market closes and separate rules exist for trading in these.

Regarding the day-ahead market, orders (i.e. offers for sale of electricity and bids for purchase of electricity) can be submitted from 10:00 CET until 12:00 CET.[151] The trading hours are the coming 24 hours starting from 00:00 CET.[152] Therefore, auctions take place every day which is positive for flexibility services and participation of active consumers. The minimum duration of the call is 1 hour.

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[148] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. Pages 9-10.
[149] *Ibid.*
[150] Euroopa elektrituru ülesehitus Eesti näitel, regulatsiooni paindlikkus ja võimalused turukorralduslikeks muudatusteks. (2022). Konkurentsiamet. Page 6. Available: https://www.konkurentsiamet.ee/sites/default/files/Elekter_seisukohad/euroopa_elektriturg_29.03.2022_.pdf
[151] The market set-up in the Baltics - explanation with examples. Nord Pool AS. Page 4. Available: https://www.nordpoolgroup.com/globalassets/download-center/day-ahead/the-market-setup-in-the-baltics.pdf
[152] Product Specifications. Nordic/ Baltic Market Areas. Nord Pool AS. Section 2.1. Page 4. Available: https://www.nordpoolgroup.com/499262/globalassets/download-center/rules-and-regulations/product-specifications--nordic-and-baltic-market-areas-11.05.22.pdf

On the day-ahead market, Nord Pool features flexible orders, in which participants must specify an energy volume that they would be willing to purchase or sell in one or a series of consecutive delivery periods (i.e. in one or more hours).[153] In other words, it is a block order with a maximum duration of 23 consecutive hours. The starting hour of a flexible order is not defined by the user but will be determined by the algorithm in a way that provides the best social welfare; flexible hours aren't necessarily matched, i.e. they can be discarded if there is no demand for it on the market[154]. Energy-intensive companies can, for example, submit flexible sales orders to reduce their consumption and sell power back to the day-ahead market.[155] This is essentially demand response.

Regarding the continuous trading on the intra-day market, the trading hours are a series of delivery hours for the following day, which are listed and opened for trading the same day as the day-ahead prices are set, normally at 14:00 CET (cross-border connections are opened at 15:00 CET[156]). In Estonia, trading is closed 30 minutes before delivery commences.[157] Nord Pool may, from time to time and in its sole discretion, supplement the continuous trading of products with intraday auctions.[158] Orders can be submitted to an intraday auction on and from the intraday auction gate opening and up to and until the intraday auction gate closure.[159] The minimum duration of the call seems to be 15 minutes as such a product exists.[160]

The minimum bid size in both Nord Pool day-ahead and intra-day markets is 0,1 MW.[161]

Up until now balancing and ancillary services have been purchased based on bilateral agreements. Based on those agreements the TSO can balance the grid by activating

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[153] Day-ahead Market Regulations. Nordic/Baltic Market and CE Market. Nord Pool AS. Section 3.4.1. Page 5. Available: https://www.nordpoolgroup.com/499347/globalassets/download-center/rules-and-regulations/day-ahead-market-regulations_sdac-11.05.22-.pdf

[154] Day-ahead Market Regulations. Nordic/Baltic Market and CE Market. Nord Pool AS. Section 3.4.2. Page 5.

[155] Flexi orders. Order types. Day-ahead trading. Nord Pool. Available: https://www.nordpoolgroup.com/en/trading/Day-ahead-trading/Order-types/Flexi-order/

[156] Capacities. Intraday Trading. Nord Pool AS. Available: https://www.nordpoolgroup.com/en/trading/intraday-trading/capacities/

[157] Product Specifications. Nordic/ Baltic Market Areas. Nord Pool AS. Section 3.1. Page 5.

[158] Intraday Market Regulations. Nord Pool AS. Sections 1.1-1.2. Page 2. Available: https://www.nordpoolgroup.com/49e715/globalassets/download-center/rules-and-regulations/intraday-market-regulations_valid-from-1-july-2020.pdf

[159] Intraday Market Regulations. Nord Pool AS. Section 5.2.6. Page 5.

[160] Order types. Intraday trading. Nord Pool AS. Available: https://www.nordpoolgroup.com/en/trading/intraday-trading/order-types/

[161] Product Specifications. Nordic/ Baltic Market Areas. Nord Pool AS. Sections 2.1 and 3.1. Pages 4-5.

emergency and regulation reserves (both up- and down-regulation). In Estonia, these are only manually activated frequency restoration reserves (mFRR). Since 01.01.2018, coordinated balancing has been implemented in the electricity systems of Estonia, Latvia and Lithuania. The three Baltic states are viewed as one balance area and Elering, the Estonian TSO, is responsible for balancing the area with the target of minimal imbalance in the Baltics.[162] The eventual goal is to create a joint Nordic and Baltic balancing energy market if feasible.[163]

Market participants can make offers of regulation reserves to their national system operator who forwards the offer into the joint Baltic list of offers. In addition, the offers are communicated to the Finnish system operator who in parallel forwards offers from Finland to the Baltic list. The procedure and conditions for making offers of regulation reserves are further specified in the bilateral agreements.[164]

Currently, market participants can make or amend offers of balancing energy from 16:30 the preceding day[165] and up until 45 minutes before the start of an operating hour. The full activation time of the regulation reserve is 15 minutes from the order of activation and the duration of the call is up to an hour (but not longer than the end of the operating hour). No minimum duration between the end of deactivation period and the following activation is determined.[166] The minimum bid size of balancing services is 1 MW.[167]

The regulation in force regarding balancing and ancillary services markets is most likely

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[162] Bilansi juhtimine ja reguleerimisteenuse pakkumine. Elektrituru käsiraamat. Elering. Available: https://elering.ee/elektrituru-kasiraamat/4-bilansihaldus/43-bilansivastutuse-protsess/432-bilansi-juhtimine-ja

[163] FEASIBILITY STUDY REGARDING COOPERATION BETWEEN THE NORDIC AND THE BALTIC POWER SYSTEMS WITHIN THE NORDIC ENTSO-E PILOT PROJECT ON ELECTRICITY BALANCING. Available: https://elering.ee/sites/default/files/attachments/Feasibility_Study_Regarding_Cooperation_between_the_Nordic_and_the_Baltic_Power_Systems_within_the_Nordic_ENTSO-E_Pilot_Project_on_Electricity_Balancing_1.pdf

[164] Reguleerimisreservide varud ja nende kasutamine bilansi tagamiseks. Elektrituru käsiraamat. Elering. Available: https://elering.ee/elektrituru-kasiraamat/4-bilansihaldus/43-bilansivastutuse-protsess/432-bilansi-juhtimine-ja-0

[165] FEASIBILITY STUDY REGARDING COOPERATION BETWEEN THE NORDIC AND THE BALTIC POWER SYSTEMS WITHIN THE NORDIC ENTSO-E PILOT PROJECT ON ELECTRICITY BALANCING. Page 21.

[166] Reguleerimisreservide varud ja nende kasutamine bilansi tagamiseks. Elektrituru käsiraamat. Elering.

[167] Baltikumi ühine reguleerimisturg ning koordineeritud bilansijuhtimine. Elektrituru käsiraamat. Elering. Available: https://elering.ee/elektrituru-kasiraamat/4-bilansihaldus/45-baltikumi-uhine-reguleerimisturg-ning-koordineeritud

awaiting changes now that the Electricity Market Act was amended to incorporate more flexibility services in the Estonian electricity system. Moreover, with the implementation of the European manual frequency restoration reserve platform, MARI, certain technical modalities and governance principles will be harmonised across European TSOs. Among other criteria, Estonia must adapt its mFRR product to a full activation time of 12.5 minutes and minimum delivery period duration of 5 minutes.[168]

Data exchange and privacy

Rules on data exchange have been established both in section 42^1 of the Act and in the Network Code on the Operation of the Electricity Market. Currently, proceedings are ongoing for amending the Network Code to include provisions on aggregation. Besides other topics, it will specify the information required from and available to aggregators on the data exchange platform.[169] The following overview presents the regulation in force with added planned changes without necessarily differentiating between the two.

According to section 42^1 (1) of the Electricity Market Act, a data exchange platform (DEP) is a digital environment for data exchange in the electricity market for the purpose of switching open suppliers or aggregators, transmitting and receiving metering data, performing the obligations imposed on market participants by the law and ensuring the rights granted to them. Under section 5, market participants are electricity undertakings, consumers, energy communities, balance providers and the power exchange operator. Market participants can both file and obtain information on the data exchange platform (for free). The TSO publishes on its website technical instructions for using and joining the data exchange platform. The data transmitted to the data exchange platform are preserved for twelve years and are then deleted.

Electricity undertakings must submit: information regarding themselves and the metering points they are linked to; metering or consumption data by metering point; information regarding the existing network, electricity and aggregation contracts; and, the open supplier and aggregator of the metering point.

Currently, network operators are obliged to relay metering data concerning active energy consumption for each metering point to the DEP. The proposal seeks to discharge

[168] Pakalén, P. (2019). Design Principles of the Future Balancing Philosophy in the Finnish Power System. Master thesis. Aalto University, School of Electrical Engineering. Page 38. Available: https://aaltodoc.aalto.fi/bitstream/handle/123456789/40841/master_Pakal%C3%A9n_Petteri_2019.pdf?sequence=1&isAllowed=y

[169] Majandus- ja taristuministri määruse „Majandus- ja taristuministri 5. veebruari 2019. a määruse nr 10 „Elektrituru toimimise võrgueeskiri“ muutmine“ eelnõu seletuskiri. (19.04.2022). Page 1. Available: https://eelnoud.valitsus.ee/main#8K0CkKPT

this obligation also on line possessors, aggregators, operators of a closed distribution network, recharging point operators and producers. The aggregator and the TSO will agree in the contract for the use of DEP which kind of data the aggregator has to submit, otherwise this will be determined based on the guidelines on the use of the platform.[170] Once a month, the network operator submits to the DEP data related to network service provided to market participants, such as different charges, costs and discounts.

Section 8 of the Network Code on the Operation of the Electricity Market establishes who can obtain which kind of data on the data exchange platform. Transmission of personalised data via the data exchange platform to a seller, aggregator or energy service provider with whom a natural person customer has not concluded a contract requires the consent of that customer.

On the whole, the right to information is concerned with persons and valid contracts (open supply, aggregation, network service) linked to metering points. The parties to the contracts, i.e. the consumers and accordingly aggregators, suppliers or other electricity undertakings, can also access the technical particulars of the metering points and the metering data. The consumers can, in addition, obtain information about which market participants can or have requested to access their data. Consumers and producers with an aggregation contract have access to the quantities of electricity metered and activated in demand response.

Consumers have the right to obtain from the DEP, free of charge, in a digital form data concerning any metering points linked to them and govern access to their data.

Under section 65 of the Network Code, the network operator publishes on its website information regarding the network services and their prices and regarding the method which consumers can use to access their consumption data. If a consumer requests to access its consumption data, the network operator shall communicate it to them.

Lastly, transmission network operators and distribution network operators must coordinate their actions and exchange requisite data in order to ensure secure operation of the network when using flexibility and ancillary services (sections 66^2 and 66^3). In particular, they shall exchange the necessary information and data regarding capacity efficiency and demand response, day-to-day network operation planning and long-term network investment planning to ensure cost-effective, secure and reliable network development and operation.[171]

[170] Majandus- ja taristuministri määruse „Majandus- ja taristuministri 5. veebruari 2019. a määruse nr 10 „Elektrituru toimimise võrgueeskiri“ muutmine“ eelnõu seletuskiri. Page 4.
[171] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. Page 19.

The potential in Estonia

Prior to the new legal amendments, consumers in Estonia had already been given the opportunity to monitor information on their energy consumption through the data exchange platform in real time. Despite this, they have not become active participants in the energy transition.[172] Regarding the new regulation of flexibility services, the legislators consider the impact of it and the relevant target group small; the market share of flexibility services isn't expected to be significant.[173]

When it comes to demand response, the explanatory memorandum states that potential of managed capacity is largest in households, ranging from 55 to 230 MW, followed by the business and public service sector in the range of 93 to 112 MW, and the industrial sector with almost 65 MW. Thus, theoretically it would be possible to manage consumption capacity of 200-400 MW in Estonia.[174] These numbers are based on a 2014 Estonian report on demand-side management possibilities in Estonia. The report goes on to predict that assuming there are 300 MW of managed capacities, the average price of up-regulation is 61 €/MWh, and flexibility services are offered on the market for 1 to 3 hours every day, the market of demand response would constitute 6,7 to 20 million euros a year.[175]

The challenges of demand response in households are the need to aggregate a large amount of appliances and the varying availability of capacity depending on seasonal consumption. This could be solved by developing mobile applications which inform consumers of their real-time consumption and the electricity prices, by motivating apartment associations and private residences to install building automation solutions (e.g. smart grids), and by supporting the establishment of virtual power plants and independent aggregators.[176]

The buildings in the business and public sectors are of different ages; the older ones might need significant investments to implement building automation while the newer ones just need relevant applications or platforms to start participating in demand response. The upside of business and public sectors is that the managed capacity does not depend on seasonal consumption patterns and is always available.[177]

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[172] *Ibid*. Page 2.
[173] *Ibid.* Page 40.
[174] *Ibid*. Page 38.
[175] Rosin et al. (2014). Page 55.
[176] Rosin et al. (2014). Page 54.
[177] *Ibid.*

The advantages of the industrial sector lay in the existence of big machines which decreases the need to aggregate loads, and the high level of automatisation. The variable factor here isn't seasonal consumption differences but the differing pattern of production orders.[178]

Pöyry Management Consulting has predicted that the national benefits of demand response in Estonia are modest in the short term but will increase in the run-up to 2025 when Estonia plans to desynchronise from the IPS/UPS electricity system for which it must hold additional reserves.[179] To achieve the necessary level of reserve provision from demand response by 2025, it shall be implemented several years in advance for it to reach its full potential.[180] The DSO could benefit from demand response right away, but the value of this benefit is relatively low.[181] The 2015 Pöyry report predicts lesser market value for demand response in Estonia (1 mln €/year in 2025 and 3 mln €/year in 2030)[182] than the 2014 Estonian report (6,7 to 20 million €/year)[183].

Nevertheless, TSO and DSO both expect to have some demand for flexibility provided by demand response in order to successfully operate their transmission and distribution networks. The DSO is expecting overloaded substations while the TSO needs flexibility services for manual frequency restoration reserves as long as Estonia is still synchronised with the Russian system and automatic frequency control is managed by the Russian TSO.[184]

The Pöyry report found that the main barriers for aggregators were business model uncertainties and data availability as well as uncertainties regarding balance responsibility and penalties for imbalances.[185] Hopefully, the amended Electricity Market Act removes these obstacles. There are a few aggregators already active in Estonia, such as Energia Juhtimiskeskus[186] and Fusebox[187] which features clients such as grocery store chain Rimi Baltic and cement production facility Kunda Nordic Tsement.

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[178] *Ibid*.
[179] Carter et al. (2015). Demand-side response as source for flexibility. (2015). Elering. Pöyry. Ricardo. Eleringi toimetised nr 3/2015 (11); page 1-2. Available: https://elering.ee/sites/default/files/attachments/Demand_Side_Response_as_source_for_flexibility_1.pdf
[180] *Ibid*. Page 4.
[181] *Ibid.* Page 3.
[182] Carter et al. (2015). Page 1-2.
[183] Rosin et al. (2014). Page 55.
[184] Carter et al. (2015). Page 31.
[185] *Ibid*. Page 34.
[186] Energia Juhtimiskeskus. Homepage. Available: https://tarkvork.ee/
[187] Fusebox. Homepage. Available: https://fusebox.energy/

In its press release of 9th December 2021, the Estonian Competition Authority calls upon electricity retailers to offer demand response programmes to their customers in order to sell demand flexibility on the day-ahead market. The Authority has set its focus in 2022 on demand-side management and integration of aggregators on all electricity markets. The goal is to facilitate a larger amount of demand response on the market as soon as possible to bring down current high electricity prices. The Authority has already observed that Estonian consumers decrease their consumption during high prices and are therefore flexible and open to demand-side management.[188]

New technological solutions for the production, consumption, distribution and storage of electricity enable households to reduce their electricity costs. According to 2017 data, 2.9% of households had difficulties with household heating, and 6.9% of households had defaults in paying electricity bills. The data suggest that energy poverty is mostly a problem among tenants of social housing in Estonia. Since individual solutions such as buying an electricity generator alone might be too expensive for many consumers to become active participants in the energy transition, the amended Electricity Market Act provides an opportunity to alleviate the problem by creating an energy community. Collective activity enables the consumers to divide time, effort and costs. The easiest option is to form an energy community which deals with finding an electricity supplier at the lowest price; this way the community members benefit from cheaper prices without making any prior investments, such as purchasing a power plant.[189]

The more energy communities are created, the lower the need for energy imports, which may increase if the use of oil shale is reduced. For example, in 2020, local electricity production increased by an estimated 250 MW (Estonia's peak consumption is approx. 1700 MW). With the introduction of community regulation, we can expect an increase in the capacity of local electricity production to the extent of approx. 100 MW in the coming years.[190] Nevertheless, the legislators expect community activities to form an insignificant part of the energy economy.[191]

The dominant DSO in Estonia -who operates around 90% of the distribution- announced in January 2022 that it refuses to issue access to producers wishing to supply production

[188] Tarbimise juhtimine aitab elektrituru hindu alla tuua, kuid on hetkel suuresti kasutamata potentsiaal. (09.12.2021). Konkurentsiamet. Available: https://www.konkurentsiamet.ee/et/uudised/tarbimise-juhtimine-aitab-elektrituru-hindu-alla-tuua-kuid-hetkel-suuresti-kasutamata
[189] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. Page 34.
[190] Elektrituruseaduse ja riigivaraseaduse muutmise seaduse seletuskiri. Page 35.
[191] *Ibid*. Page 37.

to the grid at Hiiumaa (second largest island and a separate county in Estonia) due to network restrictions. The Competition Authority ruled this decision out and confirmed the legal obligation of the DSO to grant access regardless of network restrictions. The Authority said that due to the growth of distributed generation network operators must plan the network and its management differently from previous years.[192]

In addition to specific network reinforcements, the flexible management of the network must be developed, the use of which should enable the incorporation of more local distributed generation. At the same time, investments in the development of the network must be socio-economically justified. In this regard, the Authority advises the DSO to acquire local flexible network management products in an accelerated manner, develop the remote control of production facilities, create opportunities for the creation of energy communities to use distributed generation firstly to cover the local community's consumption, and start with the preparation of a 10-year network development plan based on the Electricity Market Act, which will take also take into account the use of flexibility services.[193]

Norway

To start off, there is no explicit legislation on demand response or aggregation in Norway. However, the provision of flexibility services is technically possible on the mFRR market. Currently, only balance responsible parties (BRP) or persons cooperating with a BRP can become market participants there. The minimum bid size in the mFRR market is 5 MW in price area NO1, and 10 MW in the rest of Norway.[194]

On the whole-sale level, Norway is part of the day-ahead and intraday markets of Nord Pool. The minimum bid size in both Nord Pool day-ahead and intra-day markets is 0,1 MW.[195] Nevertheless, it is rather likely that demand response is blocked from participating in these markets.

The regulatory situation regarding energy prosumers is quite different. In Norway

[192] Elektrilevi on kohustatud Hiiumaal liitumispakkumisi väljastama. (16.06.2022). Konkurentsiamet. Available: https://www.konkurentsiamet.ee/et/uudised/elektrilevi-kohustatud-hiiumaal-liitumispakkumisi-valjastama
[193] *Ibid.*
[194] Distributed balancing of the power grid. Results from the eFleks pilot in the mFRR-market 2019/2020. (February 2021). Statnett. Page 5. Available: https://www.statnett.no/contentassets/5f177747331347f1b5da7c87f9cf0733/2021.02.24-results-from-the-efleks-pilot-in-the-mfrr-market--.pdf
[195] Product Specifications. Nordic/ Baltic Market Areas. Nord Pool AS. Sections 2.1 and 3.1. Pages 4-5.

electricity generation is almost totally based on renewable energy sources. The electricity prices for end-users are relatively low compared to other European countries. Therefore, there is no immediate need to "green" the energy any further or to generate energy for a lower cost. This explains why most Norwegian energy consumers do not feel a strong urge to start producing electricity themselves and become prosumers. However, people are becoming more aware of the opportunity and increasing electricity price s may motivate the Norwegian people to generate energy themselves. Moreover, the relevant legislation already exists, as will be shown below.

Most of the registered prosumers make use of solar panels, and some use hydropower. The topology of Norway makes it possible for people to develop small hydropower plants [196], and they can use these to generate power mainly for their own consumption.

In 2016, the Norwegian government adopted a White Paper on Energy Policy.[197] The document refers to prosumers but solely in relation to the use of smart metering. The document also talks about Distribution System Operators' (DSOs) regulation and grid tariff regulation. In 2017, Norway also revised its regulation in order to provide a legal basis for the regime applicable to prosumers. The new regulation is contained in the Regulations governing financial and technical reporting, income caps for network operations and transmission tariffs (the Regulations on network tariffs),[198] which have been amended by NVE (the Norwegian water resources and energy directorate), which is the Norwegian energy regulatory authority.[199] Before 2017, an exemption regime applied. The exemption from certain network tariffs was initially made through a decision made by NVE which is now codified by the legislation. The Norwegian legislation regarding presumption is now based on a production threshold approach, while the general rules about governing energy production, transport and consumption continue to apply when the threshold is met.

The definition of prosumers

Prosumers are defined as energy consumers who generate their own electricity and, within a certain threshold, feed-in, and sell the surplus of production that they are not using themselves. Prosumers are defined as a separate category of customers.[200]

[196] The most telling example being Småkraft, the largest operator of small-scale hydroelectric power plants in Norway.
[197] Energimelding (Meld. St. 25 (2015–16).
[198] The Regulations on network tariffs (forskrift om kontroll av nettvirksomheten).
[199] NVE has delegated the competence.
[200] Banet, C. (2018). Prosumer Legislation in Norway: A First Step for Empowering Small Energy Consumers. In M. Roggenkamp & C. Banet (Eds.), *European Energy Law Report XII*. Intersentia. Available: https://doi.org/10.1017/9781780688091.010

The definition of prosumer is placed in section 1-3 of the Regulations on network tariffs in Norwegian legislation.[201] Section 1-3 defines prosumers, called plus-customers ("plusskunder"). The prosumer-definition establishes three main criteria which are the following:

- 'End-User with Consumption and Production Behind the Point of Connection'
- 'Where the Electricity Fed into the Grid (Input Power) at the Connection Point at No Time Exceeds 100 kW'
- 'A Prosumer Cannot Possess an Installation Which Requires a Licence Behind the Connection Point or Any Licence for Sale of Electricity Behind the Connection Point'

The Norwegian regulation on prosumers is an enabling framework, primarily focusing on small-scale energy consumers. The regulation does not differ between the different sources of energy. The prosumer-definition is technology neutral. The prosumer-status gives rights and obligations for the prosumer and the grid company.

Connecting the prosumers to the grid

Rules regarding connection to and reinforcement of the grid

The Norwegian grid is split into three levels: the national, regional and distribution grids. The national grid corresponds to the transmission grid. The regional and distribution grids are both encompassed by the concept of distribution grid under the EU Electricity Directive.[202] The regional grid connects the transmission and distribution grids. The Norwegian distribution grid corresponds to local power grids. Prosumers may be connected to regional or distribution grids, but the distribution grid is most likely.

Chapter 3 of the Energy Act defines the regime for access to the grid. According to section 3-3 a, distribution companies must provide physical delivery of electricity to consumers in the geographic area covered by its local area licence. Section 3-4 of the Act states that all entities with a licence according to section 3-1 and 3-2 of the Act shall connect new electricity generation installations, and new installations, for electricity consumption. The further relationship between the grid operator and the consumer is regulated by a contract.

[201] Forskrift om økonomisk og teknisk rapportering, inntektsramme for nettvirksomheten og tariffer, FOR-1999-03-11-302.
[202] Article 2 (5), Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity.

Although the provisions do not just regard prosumers, sections 3-3 and 3-4 are equally important to them. Prosumers, because they are also consumers, rely on the delivery of electricity (see section 3-3) when they are not able to produce enough electricity themselves.

The use of the grid, network tariffs and treatment of prosumers

In general, prosumers must pay the tariff for feeding into the grid. The provision is an exemption from some network charges for consumers who feed their surplus electricity.

Network Costs: The Exemption Regime for Prosumers

The grid transport tariffs are fixed by the network operator as set out in the criteria defined by the law and supplemented by NVE. The tariffs has to be set in a way that is non-discriminatory, but it can differ based on network related criteri (that are objective and verifiable). Also, all grid uses should pay a price that is equal to the short term marginal cost caused by the use of the grid.

Prosumers are now exempted from paying other tariff elements for feeding electricity to the grid. The regulation regarding this is section 16-2 (paragraph 3) of the regulations on network tariffs. The regime is the main economic incentive for energy consumers to become prosumers, even though it wont save them huge sums.

Contractual Conditions for Feeding into the Grid and Billing Prosumers

The Norwegian legislation does not define contractual conditions for feeding electricity to the grid. Therefore, the prosumers will have to conclude a specific prosumer agreement with the grid company for the purpose of feeding electricity to the grid (referred to as a plus-customer agreement). This agreement is subject to contractual freedom. The conditions for setting tariffs are however covered by the regulations on network tariffs. The prosumer agreement between the prosumer and the grid company is subject to contractual freedom. However, conditions for setting tariffs in general are covered by the Regulations on network tariffs. The general conditions regarding billing apply.

Financial incentives in favour of prosumption

The most prominent motivation for becoming prosumers is not always the financial benefits, but often it is more about a personal lifestyle-choice. However, there are economical rewards for producing and consuming your own electricity and selling

surplus electricity. The most prominent financial incentive in favour of prosumption is the revenues from selling the surplus electricity.

Revenues from selling the surplus electricity

Regarding the surplus electricity generated by prosumers, the prosumers have to re-negotiate their agreement with the supplier of electricity. The prosumers will have to sell surplus electricity to a supplier of electricity. The prosumers do not have to contact the supplier of electricity or negotiate the selling terms. There can not be more than one supplier of electricity per connection pont. The prosumer offers the surplus electricity to the supplier which the prosumer already has their supply agreement with. The suppliers are offered to buy the prosumers surplus electricity at spot price. The price offered by the supplier is deducted for the electricity bill of the energy customer (turned prosumer).

Support schemes

There are financial scheme measures that favour self-consumption and prosumption under the competence of the organisation Enova (a public enterprise). Enova provides a system of direct grant for installation of home-appliances. The majority of prosumers have gotten such a grant.

Comparison of the national regulations

Already in 2017, Zancanella et al examined in their research that France is one of the most advanced EU Member States in demand response regulation. Estonia at that time had zero regulation on aggregators and demand-side management, although no explicit bans on it either. Nevertheless, whereas France and Estonia have by now transposed the Electricity Directive into their national legislations, Norway has not and isn't expected to do it in the near future either. Currently, the three examined states position in the following way.

There is regulation in both France and Estonia regarding demand response and aggregation. Both States have authorised independent aggregators as market participants, hold active consumers and aggregators responsible for their imbalances, and have a dispute resolution mechanism in place. Since Estonia only adopted the relevant legislation in March 2022, the Competition Authority is yet to produce conditions for participation in demand response. France, however, already has such rules. At the same time, Norway has no demand response or aggregation legislation, including the examined processes, in place. Aggregation has only been tested out in

Norway as a pilot project by Statnett (the national energy supplier).[203]

The new amendments allow aggregators and active consumers to participate in all electricity markets in Estonia. In France the same applies mostly, however, aggregated generation cannot participate in DSR - RR markets and neither aggregators or independent DR participants can take part in the markets for other ancillary services and distribution network services.[204] As for Norway, again relevant legislation is lacking.

Moving on to technical modalities, Estonia is in a relatively good position since the Nord Pool markets allow for 0,1 MW minimum bids in the wholesale markets and the ancillary services market in Estonia accepts 1 MW bids. The duration of the call is one hour on the day-ahead market, starting from 15 minutes in the intraday market, and up to an hour on ancillary services market. Auctions on these markets take place either continuously throughout the day or once a day on the day-ahead market. Furthermore, Estonia has increased the production volume for mandatory registering as an electricity undertaking to 1 MW instead of the previous 200 kW. This enables more energy prosumers to enter the market, since there will be less financial, technical and administrative burden on the small producers when they don't have to register themselves.

Since Norway is part of the Nord Pool market, and the same day-ahead and intraday market rules apply in the Nordic and Baltic states, almost all the same conditions regarding wholesale markets apply in Norway as in Estonia. As fot the conditions of the mFRR market, the minimum bid size is currently 5 MW in price area NO1, and 10 MW in the rest of Norway. The duration of the call is 1 hour.[205]

When it comes to France, the required size of a bid depends on the product. It can be at least 1 MW for FCR, aFRR, DSR - RR, but must be at least 10 MW for mFRR and RR. The duration of the call has also been shortened to 13 minutes for fast offer, 30 minutes for complementary offer and less than 2 hours for consumers. France also adjusted the frequency of auctions so that demand response volumes can be submitted by the providers starting the day before from 09:30 until the next day at 22:00.

Lastly, the consumers' personal data is protected in all three states. While Estonia is in

[203] Distributed balancing of the power grid. Results from the eFleks pilot in the mFRR-market 2019/2020. (February 2021). Statnett. Page 5.
[204] Explicit Demand Response in Europe. Mapping the Markets 2017. Smart Energy Demand Coalition. Pages 83-84. Available: https://www.smarten.eu/wp-content/uploads/2017/04/SEDC-Explicit-Demand-Response-in-Europe-Mapping-the-Markets-2017.pdf
[205] Distributed balancing of the power grid. Results from the eFleks pilot in the mFRR-market 2019/2020. (February 2021). Statnett. Page 10.

the process of adopting rules on data exchange with the addition of new market participants, the regulation already exists in France. Norway does not regulate this kind of data exchange, since independent aggregators aren't allowed and demand response hasn't been regulated either. Consumers have access to their consumption data in all three states and participants of demand response (both aggregators and consumers) in France and Estonia can access the data on volumes activated in DR.

Summary

By now, there is a sufficient amount of binding EU legislation enabling the incorporation of energy prosumers and demand response in the national regulations of the Member States. Nevertheless, the Member States are just now transposing the Recast Electricity Regulation and Electricity Directive into their domestic laws for which reason demand-side management and the empowering of consumers has been delayed. Because Norway has not accepted the Clean Energy Package, the relevant EU legislation is not mandatory for them to implement. As for the EU Member States, regardless of the binding rules, they have some discretion in designing the conditions for aggregation, energy prosumers and flexibility services. This results in an array of different regulations in Europe, with some more open to new competitors while others not.

Looking into how France, Estonia and Norway (a non-EU state) have regulated these fields showcases that European jurisdictions are still in very different stages of introducing active consumers and independent aggregators to the electricity markets. While France has been leading the game for years by now with actual energy communities and consumers concluding aggregation contracts with their energy suppliers, Estonia has just made these options legally available and is awaiting the emergence of new market participants. Even though Norway produces a lot of energy, there doesn't seem to be a lot of interest in the prosumer-movement. There is not a lot of legislation regarding this, and the existing legislation is not very developed compared to other European countries. The most likely reasons for this are the already low electricity prices and the overwhelming dominance of renewable energy in Norway. Therefore, there is no strong need for greenification and little motivation for consumers becoming prosumers.

When it comes to the reviewed legal challenges, the ones still prevalent when it comes to prosumers are enabling consumers to become prosumers without triggering the European Union competition law and without sacrificing the consumers' right to property. The problem regarding the EU competition law and its state aid regulation has been mostly eliminated though when it comes to prosumers. The issues that States may have to face in the future might be mostly related to protecting the consumers' personal data when they become prosumers, but also when they choose not to become one. Regarding demand response, the first obstacle is still non-sufficient regulation, as Norway has none and Estonia is still in the process of adopting further rules. Before there are binding rules for network operators to accept flexibility services, whether independent or aggregated, the new market participants won't be allowed entrance on

the market or will be rendered unsuccessful competitors. Furthermore, independent aggregation must be authorised, since retailers still don't have sufficient interest in becoming aggregators. On the other hand, all markets are moving towards facilitating smaller bids with shorter duration and other more flexible conditions. This is partly triggered by pan-European network codes and regional cooperation projects which aim to harmonise the European electricity markets. Moreover, consumers' rights as energy prosumers have been codified and therefore expanded which also means that consumers are a step closer to playing a part in the energy transition. On the whole, it seems that things are getting better in time and a lot has changed since the analysis by Zancanella et al in 2017.

With the threat of climate change becoming more real every year, so increases the urgency for an energy transition. Involving consumers in the transition and initiating a bottom-up movement in facilitating clean, yet unstable, renewable energy on the market and managing the grid through energy efficiency and demand-side management instead of network expansion is of utmost importance. For consumers to be proactive in the energy transition, governments must create conditions for participation in the electricity markets which at the same time are in accordance with the capabilities of small actors and allow them a fair chance to compete next to the established and experienced market participants. Therefore, the authors of this paper believe that the obstacles remaining in unleashing the full potential of energy prosumers and demand response in Europe are the inactivity of states in making the necessary regulatory changes and the lack of information available to consumers about their rights and possibilities.

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