REPowerEU

Priority 3: Proposed measures to facilitate demand side response and to improve the flexibility market functioning in Estonia

Trinomics

This Project is carried out with funding by the European Union via the Technical Support Instrument and in cooperation with the Directorate General for Structural Reform Support of the European Commission

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Support to REPowerEU

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1 Background

Energy system flexibility can be defined as the capability to adjust the operations of the energy system, e.g., to balance supply and demand, stabilise the grid frequency, avoid grid congestions, etc. The need to dynamically operate energy systems has always been present, as the supply profile has to be adjusted at any moment to the variable demand profile. Historically, with low levels of variable power generation sources connected to the electricity grid, the need for flexibility in the electricity system was mostly driven by variations of demand, on timescales ranging from real-time variations to daily (day/night), weekly (working days/weekends) and seasonal (winter/summer) variations. Historically, electricity system flexibility was mainly provided by dispatchable power plants and storage (large hydro and pumped hydro) and to a limited extent by demand response of large industrial users connected to the HV grid. With the increasing penetration of intermittent RES and the gradual phase-out of large-scale dispatchable power plants, flexibility has become a much more important feature of the electricity system, and will increasingly be covered by "new" flexibility providers like power-to-gas, EV, stationary batteries, demand response.

Power system flexibility can be defined as the ability of a "power system to reliably and cost-effectively manage the variability and uncertainty [of supply and demand] across all relevant timescales"[1]. According to ENTSO-E and European DSO associations the system operators have a set of solutions in their hands to address flexibility needs, including technical solutions using grid assets, tariff solutions, market-based solutions, connection agreement solutions and rule-based solutions[2].

Demand response can participate in most of these solutions. The Electricity market Directive defines demand response 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"[3].

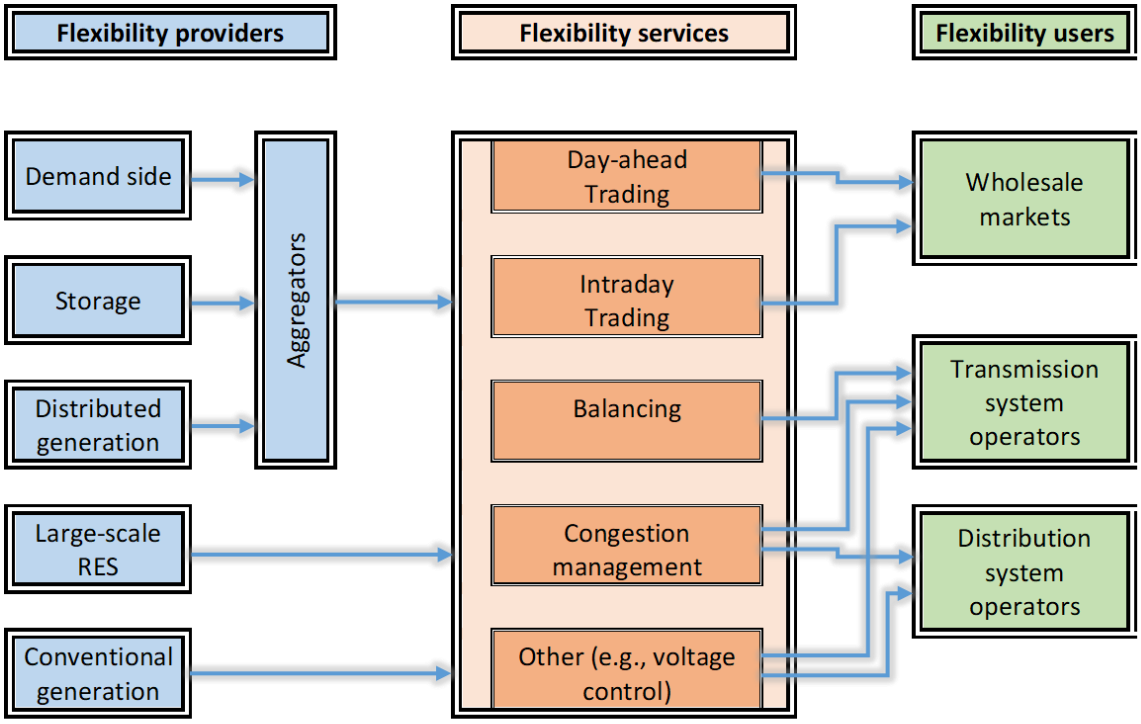
However, the rules to be developed (like possible new European network code) for demand response should not be limited to consumption only, but should equally cover storage and generation, especially if coming from distributed assets, in order to be "technology neutral and non-discriminatory"[4]. Also, with energy consumers becoming more active in the market, it would not be appropriate to distinguish their consumption from their storage (like EV) and generation (like rooftop PV) capabilities.

1 Status of Power System Transformation 2018 (windows.net)

2 TSO–DSO REPORT – An integrated Approach to Active System Management (entsoe.eu)

3 DIRECTIVE (EU) 2019/ 944 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - of 5 June 2019 - on common rules for the internal market for electricity and amending Directive 2012/ 27/ EU (europa.eu)

4 DR-FG_for_public_consultation.pdf



Flexibility solutions are in particular essential to operate electricity systems with a high share of non-dispatchable power generation capacity connected to the grid having variable outputs throughout the year. The main purpose of flexibility solutions is to contribute to:

- facilitating integration of intermittent RES in the electricity system, and
- ensuring system stability and security of supply, while
- minimising the overall system costs.

Due to the decreasing share of dispatchable conventional power plants, and the increasing share of intermittent renewable power generation, additional flexible resources (including dispatchable generation, storage, demand response) will be needed to cost-effectively meet the demand for electricity, as the variable nature of RES technologies result in limited correlation between RES electricity generation and demand for electricity. Flexibility solutions are the essential building block allowing to reconcile these two components.

The increase in RES capacities is not the sole element that drives the need for flexibility. Indeed, as more and more end-uses are electrified, the dynamics and constraints on the demand side are evolving considerably. Additional volumes of electricity demand emerging from e.g., EVs, data centres, and electrolysis all come with a degree of built-in flexibility. The flexibility of the different end-uses is constrained by quality-of-service considerations for EVs (they need to be sufficiently charged to allow their users to go to work, come back, etc.) or by the availability of infrastructure in the case of electrolysers (e.g., to store hydrogen that is produced during periods of high-RES generation).

The EU adopted in 2019 the **Clean Energy for all Europeans Package (CEP)**, which succeeded the first three EU energy packages. The CEP introduced new electricity market rules to improve the level-playing field towards all flexibility solutions, such as storage and demand side response, increase consumer participation in energy markets (through among others renewable energy and citizen energy communities). Two pieces of legislation of this fourth EU Energy Package, the **Electricity Directive 2019/944** and the **Electricity Regulation 2019/943**

directly addresses issues such as the transparent, non-discriminatory and objective procurement of flexibility by network operators (e.g., for redispatch), improved network planning by TSOs and DSOs, access to electricity wholesale markets, increasing the availability of interconnectors for trade, and others.

In addition to the above-mentioned EU Directive and Regulation, the Clean Energy Package includes two other pieces of legislation which are particularly relevant for demand-side flexibility. The **2018 Energy Efficiency Directive (EED)** complements the demand response provisions introduced in the Electricity Directive 2019/944 by addressing demand response and more specifically:

- Openness of electricity market to demand response;
- Network tariffs as incentives for demand response;
- Foster participation of demand-side resources;
- Technical modalities by TSOs and DSOs to promote access for demand-side resources.

The **2018 Renewable Energy Directive (RED II)** sets the EU framework for small-scale consumers that generate electricity (prosumers) and for renewable energy communities, that can both play an important role in providing flexibility to the electricity system, e.g., by installing and operating batteries at home or at community/district level.

2 Proposed measures to improve the flexibility market functioning

A set of actions has been identified enabling immediate improvement of access of demand side response to the electricity markets in different timeframes (from long-term to day-ahead to near-real-time) and for different needs (like balancing, congestion management). A level playing field must be guaranteed for the different flexibility providers and technologies; any discrimination based on size, type, etc. must be avoided as it leads to market distortions and/or higher overall system costs. Special attention is also needed to ensure that demand side participation is properly facilitated and remunerated; at present this is still a major issue in Estonia.

Table 1. Measures and actions proposed for the flexibility market

Action sets	Timeline	Responsible	Other key stakeholders	Cost-efficiency
3.2. Adapt flexibility market design				
3.2.1. Prohibit the penalisation of electricity consumers who are participating in the flexibility market	Short-term	Competition Authority, MKM, Elering	Key stakeholders in the electricity market council led by Elering (Elektrituru nõukoda)	High Impact
3.2.2. Rules for active demand side awarding in day-ahead, intraday and flexibility markets	Short-term	MKM, Competition Authority	NordPool, aggregators, suppliers, BRPs	High Impact
3.2.3. Develop customer-friendly short- and long-term flexibility products and reduce the market access threshold to at least 100 kW	Short-term	Elering	Elektrilevi, Competition Authority, MKM, aggregators, generators	High Impact
3.2.4. Obligation for DSOs to procure market-based flexibility and enable non-firm grid connection agreements for offtake from the grid	Short-term	Elektrilevi	Aggregators	High Impact
3.2.5. Rules for imbalance pricing methods applied by BRPs	Short-term	Competition Authority	BRPs, generators, aggregators	High Impact
3.3. Working Group on flexibility in the energy market				
3.3.1. Restart the joint working group for flexibility in the energy market	Short-term	Competition Authority	MKM, Elering, electricity market council	High Impact

Action 3.2.1. Prohibit the penalisation of electricity consumers that participate in the flexibility market

Issue: Electricity supply billing is based on day-ahead prices, even in case of fixed contracts. Until recently, 35-40% of the consumers had dynamic supply contracts and the rest had fixed supply contracts. This is changing due to the strong increase in market prices and with the introduction of a regulated fixed price scheme. However, also the volumes sold to consumers with fixed contracts, are purchased by the supplier on the spot market. The electricity supplier predicts the net consumption (i.e., net of customer's own production injection into the grid) of its customers one day ahead and buys the electricity via the day-ahead market mainly (direct power purchase agreements remain quite limited in Estonia). Once the end consumer participates in the flexibility market it takes the benefits from that transaction and creates imbalances to its electricity supplier which then needs to

pay for it to the TSO. At the present, there is no clear legal ground to remunerate the supplier and/or BRP (Balance Responsible Party) for its imbalance costs and missed revenues. Because of the existing uncertainties, suppliers have started to prohibit consumers to enter into agreements with independent aggregators.

Proposed action: The suppliers should not include clauses in their supply contracts which prevent consumers to enter into agreements with independent aggregators. Moreover, any of the clauses related to customer's behaviour should not be discriminative if the customer interacts with a party which is not part of the vertically integrated group of the supplier. This includes different contractual conditions for remuneration of suppliers/BRPs in case the consumers provide flexibility services. The responsibility to supervise this lies with the Competition Authority (henceforth *CA*). A common understanding should be reached through consultations in the electricity market council (Elektrituru Nõukoda) and electricity suppliers should be given a reasonable timeframe to comply with the new rules. A central settlement system for aggregators may be required in order to avoid discrimination. In this approach Elering as TSO (instead of BRPs) would identify flexibility providers' obligation to pay remuneration.

Action 3.2.2. Rules for active demand side awarding in day-ahead, intraday and balancing markets

Issue: The demand side has been very inelastic in the day-ahead market, i.e., the vast majority of consumption related bids are recorded at a maximum price (4000 €/MWh currently). Even though it appeared recently that in practice the consumption drops (approx. 100 MW in the specific case) if prices are very high and are properly communicated to the consumers, it only appeared after the day-ahead market closure. As such the day-ahead price still remained high. Therefore, actions are needed before day-ahead market closure. It already has been noticed, that demand side price sensitivity is being estimated more accurately. However, this is not sufficient. The reason is that consumers will not specifically get awarded if they consume less (= less comfort or less output in industrial processes). Similar concerns are in intraday and balancing markets – even though prices are normally higher in these markets, demand side is not motivated to participate if it has to pay the day-ahead price to the supplier/BRP.

Proposed action: The consumers, directly or via an aggregator, must be motivated to participate actively in the day-ahead, intraday and balancing markets. Making demand reduction offers on the day-ahead market could bring down the market price for all consumers, but should also include extra financial benefits for such active consumers. The rules should foresee that the maximum price to be compensated by the consumer/aggregator to the supplier/BRP is the price of fixed contracts (reference price). If the market price is below the reference price, then the market price would be compensated. First argument is that the difference between the market price and reference price should be sufficient to motivate active consumers. Second, this would enable equal participation of consumers with fixed priced and dynamic priced contracts. Such a solution could push the price of fixed contracts up. However, this pressure would occur only in high prices hours, and the general decrease of market prices should start to push the fixed prices down. As means for extra boosting demand side participation the funds from emergency taxation of generators' windfall profits (if this would be implemented in Estonia) and/or from cross-border congestion income collected by Elering could be used. The usage of the latter is justified by the fact that less demand in Estonia would lower the congestions on Estonian-Finnish border – which is exactly the aim of using congestion income. It should be analysed whether using congestion income in this way is cost-effective compared to building additional interconnectors. However, this would not be strictly in line with article 19 of the Regulation (EU) 2019/943 on the internal market for electricity, requiring the congestion income to be used to increasing cross-zonal capacities or reducing grid tariffs. Therefore, amendments to the regulation should be considered. The reference price can be used similarly in intraday and flexibility markets to define the maximum amount to be remunerated to the supplier/BRP. However, this may

trigger more expensive demand side flexibility. European Commission's Smart Grid Task Force Expert Group 3 is currently reviewing a variety of initiatives and practices related to flexible demand side, which can lead to demand reduction. This action can be complemented with demand side capacity procurement for different system services (e.g., like in Germany). For example, similar to peak load reserve in day-ahead market, in which case the availability fee is paid to the consumer who is obliged to reduce the consumption in case of high prices and/or insufficient power generation capacity.

Action 3.2.3. Develop customer-friendly short- and long-term flexibility products and reduce the market access threshold to at least 100 kW

Issue: The current flexibility market is immature and illiquid. The only existing flexibility product is mFRR (manual Frequency Restoration Reserve). The market is dominated by a couple of big generation side players and only one aggregator is offering some demand side flexibility. While the flexibility potential of larger demand side and generation units is still not utilised, there are assessments that by 2030 the majority of flexibility will come from residential electric heating and EVs (smart charging + vehicle-to-grid) (DNV, smartEN, 2022)[5]. At the same time, due to the planned synchronisation with Central Europe and the increasing variable power generation, there is clear a need for new products for balancing, congestion management and voltage control. Also, the current processes and tools are not fit for the new setup. Minimum threshold for balancing bids is currently 1 MW and bidding steps similarly 1 MW. Lowering the threshold could attract additional aggregators to the market.

Proposed action: Elering and Elektrilevi together with other partners are designing the concept for a regional flexibility market through several Horizon2020 projects (EU-SysFlex, INTERRFACE, OneNet). The concept is agnostic to the types and sizes of flexibility resources. Harmonised processes (prequalification, trading, activation, settlement), tools (Flexibility Register, TSO-DSO coordination platform) and flexibility products are being developed with neighbouring countries. New products should include variety of flexibility products for both capacity and energy procurement, including balancing (mFRR, aFRR, FCR), congestion management (long-term, short-term, near-real-time), voltage control. Reducing the minimum threshold for flexibility bids and bidding steps to at least 100 kW would encourage additional smaller resources to enter the market by making the aggregation of these resources less challenging. Within more and more congested grid it will be more and more complicated to find sufficient amount flexibility at the specific grid node concerned. There is now a clear need to move from the piloting and demonstration phase to the full-scale implementation phase.

Action 3.2.4. Obligation for DSOs to procure market-based flexibility and enable non-firm (flexible) grid connection agreements for off-take from the grid

Issue: Currently, there seems to be a low motivation for DSOs to address network capacity bottlenecks by implementing (temporary) flexibility solutions rather than grid reinforcements. This may be caused both by the regulatory setup which tends to award CAPEX better than OPEX and by the lack of a clear vision on the market – DSOs may question is sufficient flexibility credibly available, flexibility providers are not willing to invest because they have no guarantee if DSO procurements will be sustainable.

Proposed action: The arrangements for addressing congestion management in DSO grids may include the obligation on DSOs to procure specific flexibility products (see 2.2.3) and enable non-firm grid connection agreements for the demand side. The consumer and grid operator can agree that the whole or part of the offtake

5 SmartEN-DSF-benefits-2030-Report_DIGITAL.pdf

can be switched off in return to lower grid tariffs. The criteria and time periods for reducing or switching off the offtake should be predefined.

Action 3.2.5. Rules for imbalance pricing methods applied by BRPs

Issue: Market parties can delegate their balance responsibility to BRPs. Due to low number of BRPs in Estonian market there is a need to improve the transparency of imbalance pricing methods applied by BRPs. Distributing the imbalance costs by the BRP, especially among the wind and solar based generators and potentially among active consumers, is not always transparent for the market parties. The parties do not understand what they are paying for.

Proposed action: Such rules should include the requirements for estimating the generation and consumption schedules for those parties individually and as accurately as possible. Consumers and generators could be provided with guidelines and tools to estimate the schedules themselves. Application of high imbalance fee is justified only for those time periods when the actual generation/consumption deviates strongly from the scheduled one.

Action 3.3.1. Reactivate the joint working group for flexibility in the energy market

Issue: A working group consisting of representatives from the ministry of economic affairs, energy regulator and TSO had been established a few years ago, but it has not been active recently. It should be re-activated again and adequate resources should be allocated to facilitate its functioning.

Proposed action: The group should look into various topics related to the flexibility market. Relevant market parties (generators, suppliers, traders, aggregators, large end-users) should also be involved in the activities of the working group.

3 Proposed measures to stimulate the deployment of smart energy infrastructure

The precondition for demand side response and any other flexibility source to have access to the market is the availability of flexible devices, metering devices and data. Though smart meter roll-out is 100% in Estonia, not ever end-user can have an individual meter. Even more, there are clear needs to go beyond the main meter, i.e., to the sub-meter level. Electricity consumers should be encouraged to buy/install devices (like heat pumps, EV) which are smart enough to provide flexibility. Data produced by flexible devices and meters should be considered primarily as the property of the customer – otherwise, data lock-in at energy utilities or device manufacturers would stop market participation and novel services to emerge.

Table 2. Measures and actions proposed for smart grid infrastructure

Action sets	Timeline	Responsible	Other key stakeholders	Cost-efficiency
3.1. Stimulate development and use of smart infrastructure to provide flexibility				
3.1.1. Legal rules for uncoupling grid connection point and metering points	Short-term	MKM, Competition Authority, Elering	DSOs	High impact
3.1.2. Standardisation and verification of sub-meters	Short-term	MKM, Standardisation and auditing bodies	Meter providers, aggregators	High impact
3.1.3. Obligation for grid operators to provide sub-meters to households behind the grid connection point free of charge	From short- to medium-term	MKM, Elektrilevi	Meter providers	High impact
3.1.4. Uncoupling the smart device, data produced by that device, and service provided based on that data and device	Short-term		Providers of smart devices, aggregators	High impact
3.1.5. Obligation to distinct aggregation functionality in vertically integrated utilities	Short-term	MKM, Competition Authority	Aggregators, utilities	High impact
3.4. Public support for investments that increase availability of flexibility to the energy system				
3.4.1. Support scheme for smart devices, related software applications and connectivity	Short-term	MKM, Ministry of Finance	Providers of smart devices	High impact

Action 3.1.1. Legal rules for uncoupling grid connection point and metering points

Issue: There are many residential and commercial energy consumers who cannot choose their supplier nor pricing method. This is because they don't have their own grid connection agreement, but depend on another consumer who has a "master" connection agreement. For the same reason they cannot select their own flexibility aggregator and provide independently flexibility services. Also, they cannot enter into long-term power purchase agreements. Similarly, a single consumer cannot have a different supplier or aggregator for its specific consumption unit (e.g., EV charging point). The issue is most critical in electricity but may also concern gas and heat.

Proposed action: Adoption of legal rules to facilitate uncoupling of grid connection point and metering point. Such practice has emerged in Belgium and in Netherlands. The new rules should allow more than one metering

point behind the connection point with separate suppliers, BRPs and aggregators. This would be beneficial, for example, in case of supermarkets (individual tenants may want to select a separate energy supplier) and apartment buildings (individual flat owners may want to switch from a fixed to dynamic priced contract). Also, at homes there may be good reasons to choose a different supplier or aggregator for the EV charging point only. Further examples concern on-site PV installations to enable the procurement directly from the community who has provided the solution. Elerings' Estfeed data hub shall collect and store electricity consumption and generation data from all metering points, incl. those behind the connection point ("sub-meters"). Consent-based access to sub-meter data shall be enabled equally with connection point level data.

Action 3.1.2. Standardisation and verification of sub-meters

Issue: System operators and other stakeholders need confidence that data from sub-meters can be trusted. Otherwise, it may put in risk the operation of the system and commercial decisions of aggregators, suppliers, BRPs. Currently, basically the criterion of such trust is if the meter is installed by the system operator. In practice, the confidence should not be linked to the party who is installing and operating the meter, but rather to the technical characteristics of the meter itself and its communication channel. This approach would enable also other parties to provide the meters and metering service.

Proposed action: Certification and auditing scheme for sub-meters and their communication, using independent auditors shall be established. As the basis of such certification the technology-neutral technical standards and requirements for sub-meters and their communication shall be adopted. Certification of the sub-meter is the precondition for it to become a formal metering point.

Action 3.1.3. Obligation for grid operators to provide sub-meters to households behind the grid connection point free of charge

Issue: Every consumer/prosumer is entitled to have a sub-meter at metering point. While it can be provided by aggregator, meter manufacturer or some other party, such meter should be available for free for the households who don't have direct connection agreement with the grid operator. This would put them in equal grounds with other households who can select the supplier, benefit from smart consumption and provide flexibility services.

Proposed action: In order to treat at least all residential consumers equally, the costs of metering should be socialised for everyone. Therefore, it should be DSOs obligation to provide sub-meters to households free of charge. The sub-meters can serve only metering purpose, but can also be used as new connection points. In the latter case each residential consumer can also select the most suitable grid tariff scheme. DSO can install and operate sub-meters itself or outsource it to another party. This obligation should be valid in case of electricity, gas, heat.

Action 3.1.4. Uncoupling the smart device, data produced by that device, and service provided based on that data and device

Issue: It seems to be normal, though unfortunate practice that the manufacturers and operators of smart devices (like, EV charger, heat pump) do not make easily available all the relevant data generated by these devices to the owners and users of the devices. Also, it is not clearly set down that if an aggregator (or any other energy service provider) equips its customer with metering and communication solution then the data produced should be still controllable by the customers. It should be the customer (consumer, prosumer), not the aggregator, to decide who has access to the data. This includes historical data, i.e., after the termination of the contract with

the aggregator, the customer should still have access to the data which was generated during the contract. Likewise, the customer should not be forced to install new metering and communication solution when contracting new aggregator. Beside unclear legal requirements, also the use of proprietary solutions hinders access to data and services which is agnostic to specific devices, to metering and communication solutions, and to service providers.

Proposed action: Each consumer/prosumer should have customer-friendly access to the data produced by smart devices. The consumer/prosumer should be entitled to use the existing metering and communication solution when switching the aggregator. All the historical data measured or otherwise linked to the flexibility providing resource should remain with the consumer/prosumer when switching the aggregator.

Action 3.1.5. Obligation to distinct aggregation functionality in vertically integrated utilities

Issue: If vertically integrated utilities provide aggregation functionality, they have unfair competitive advantage compared to independent aggregators, because integrated utilities have more information about their customers through their supply business. The utilities can influence their supply customers also to use their aggregation service. Additional issue is that other branches of the group should not use for their benefits the information which was received through the aggregation service.

Proposed action: "Chinese wall" must be established in vertically integrated utilities in order to ensure level playing field for independent aggregators and aggregators belonging to an energy group. The aggregator which is part of vertically integrated energy group should not be allowed to have priority access to flexibility providing sources nor to information from these resources compared to independent aggregators. Other companies that are part of the same holding group as the aggregator shall not be allowed to access the information provided to the aggregator, except for regulated processes (e.g., for settlement).

Action 3.4.1. Support scheme for end-users installing smart devices, related software applications and connectivity

Issue: Household consumers make their purchase decisions usually based on the price. Therefore, if a consumer needs a new water boiler or wants to install a heat pump, he/she may prefer a cheaper option, which does not include smartness functionalities. In fact, this is a lost option for the consumer and for the energy system.

Proposed action: A support scheme shall incentivize end-users to invest in smart devices which are capable to automatically react on network tariff and electricity price signals and provide flexibility. The support should also target related software applications and connectivity. Support should include changing the existing dumb device or making this smart with the necessary add-on. The support should cover at least the "smartness component" which makes the device more expensive. The scheme should compensate for the extra costs related to the internet connection, mobile connection, application for monitoring and controlling the device, etc. Eventually, selling "dumb" heat pumps, EV chargers and other devices with capacity above certain kWs should be phased out.

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