Barriers and success factors to Energy Efficiency First implementation in buildings and related energy systems

Expert Online Workshop | **Thursday 15 April 2021**

Discussion group on **Power sector**

Minutes

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INTRODUCTION

The ENEFIRST project aims to support the implementation and operationalisation of the Efficiency First (E1st) principle across EU legislation with a **special focus on buildings and the related energy systems**. Previous work of the project defined the E1st principle in practical terms, collected international experience in the form of 16 case studies and analysed their transferability to the EU policy framework as well as the main barriers to a broad implementation of E1st across sectors. The project also looks at modelling approaches to assess the impacts from implementing E1st.

On the part of policy analysis, we identified priority policy approaches that can translate the E1st principle in policy areas relevant to the EU building sector (ENEFIRST (2021). The screened policy areas cover buildings, power markets, gas markets, energy efficiency, climate policy, and heating and cooling.

In a next step, we **identified barriers and success factors** specific to these priority policy approaches to further develop policy guidelines to make the E1st principle operational. The most important barriers and success factors will be structured and visualised in an implementation map to inform policy makers and other stakeholder groups.

The **objectives of this workshop** were to:

- Present policy approaches to implement E1st in buildings and related energy systems
- Receive feedback and validate the identified barriers & success factors

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- Rank the factors in terms of what recommendations / efforts should be focused on, to get E1st implemented in practice

The discussions were organised in three breakout groups: buildings, power sector and district heating. These minutes summarize the discussions of the "power sector" group.

The policy approaches considered in this group included:

- Power market rules
- Transmission and distribution utility provisions
- Transmission and distribution incentives
- Dynamic tariff design

After summarizing the discussions on each policy approach, two complementary sections deal with the cross-cutting and other issues, and with the conclusions including the results from the voting part of the session.

1 POWER MARKET RULES

Demand-side resources can be mobilized next to generation to guarantee that supply and demand in the power system are balanced at all times. However, this requires market rules that provide **access** to them to the various power markets (wholesale, balancing) and the capacity mechanisms as well, where applicable.

Business as usual	E1st scenario
Only generation units compete in the various power markets	Demand-side resources have **access** to these markets not only de jure but **de facto** as well.
Power markets are designed for large scale units only.	**Aggregation** of smaller capacities (across generation and demand as well) are **allowed**, and these aggregated resources are treated as single units at these markets.

The issues raised can be clustered into two groups:

- First, the position of aggregators (lack of recognition, consumer perception on their role, and their business case (issue of supplier compensation or prohibition of pooling).
- Second, the level playing field for all resources in the markets and the market monitoring to reveal gaming of market rules.

Table 1 below provides the full list of barriers, success or enabling factors identified before and during the workshop.

Table 1. Overview of barriers, success or enabling factors related to power market rules

Barriers to implementing E1st	Success or enabling factors to overcome the barriers
Unclear rules on supplier compensation	**use system savings to avoid reducing aggregator/DR provider revenue (i.e. applying the net benefit approach)**
Too high transaction costs for Demand-Response aggregation	**Definition of aggregators and aggregation in the regulatory framework**
Individual prequalification of demand-side resources	
	Scrapping of capacity markets
Unclear or impossible approach of aggregators to the power market	
Too large bid size in the various energy markets	**Define rules that do not discriminate power sources depending on the market, origin, technical features of the source/generator**
Pooling of all kinds of resources (demand and load) not always permitted	
Stacking of different services not allowed	
Lack of integrated market where not only System Operators (SOs) procure ancillary services but also Balance Responsible Parties balance their portfolios and SOs resell un-needed contracted resources	
Increase/Decrease Gaming may occur	**Implementing regulation to avoid strategic bidding - Independent market monitoring by NRAs (National Regulatory Authorities) to avoid gaming**
Unclear baseline calculation methodology	
Lack of adequate metering infrastructure	
Lack of general transparency between aggregators and consumers: consumers need to understand easily what an aggregator is for	Involvement of consumers; Simplification of rules so that non- energy experts can easily assess the value of participation
Integration of appliance providers (sellers) and building owners: landlord tenant split incentive	
	Setting of a national Demand Response target

Note: barriers, success or enabling factors in bold are the ones added during the workshop.

2 TRANSMISSION AND DISTRIBUTION UTILITY PROVISIONS

Provisions for network companies - both at transmission and distribution levels - that require the consideration of demand-side resources **in grid planning and operations**.

Business as usual	E1st
TSOs and DSOs planning is based on forecasted peak load and a fit-and-forget approach.	TSOs and DSOs have to assess the potential and the cost of mobilising demand-side resources and **use them as alternatives** to network investment whenever providing more net benefit.
Development plans are not public and only discussed with the NRAs.	Network planning is **public** so that the need for demand resources and their availability can be matched.

The discussions during the workshop provided new additions about barriers in this field, highlighting several information/capacity problems of DSOs:

- the lack of information of where flexibility potentials are, and
- the need to evaluate the costs and benefits of all types of resources not only traditional network elements.

There is a need for TSO-DSO cooperation: the lack of cooperation is considered to be a barrier today. The other issue identified was the potential conflict of market and network efficiency, i.e., the respective scarcities do not necessarily arise in the same time period.

Table 2 below provides the full list of barriers, success or enabling factors identified before and during the workshop.

Table 2. Overview of barriers, success or enabling factors related to transmission and distribution utility provisions

Barriers to implementing E1st	Success or enabling factors to overcome the barriers
Lack of awareness and knowledge or experts about flexibility and demand- side resources among TSO and DSO staff	Capacity building on the integration of demand-side resources in network planning and operation
Lack of knowledge where DSM potentials are largest (sectors, appliances, use cases)	Experience sharing between network operators and regulators (**and energy companies**)
Difficulties to evaluate the costs and benefits of the different alternatives to network reinforcement (e.g., network upgrade vs. flexibility or automation or...)	Guidance on CBA that can assess both demand- and supply- side options

Barriers to implementing E1st	Success or enabling factors to overcome the barriers
Priority to security of supply and doubts about the reliability of demand-side resources	Transparency requirement of grid capacity/flexibility need
Lack of DSO-TSO coordination for provision of flexibility (i.e., ancillary services)	**Development of a mechanism for DSO- TSO coordination on flexibility services**
Lack of adequate metering infrastructure	
Market efficiency may be conflicting with network efficiency	
Low maturity of residential flexibility market	Involvement of consumers
Forecasting uncertainty	

Note: barriers, success or enabling factors in bold are the ones added during the workshop.

3 TRANSMISSION AND DISTRIBUTION INCENTIVES

Financial incentives for regulated network companies (DSOs, TSOs) to consider and invest into demand resources as an alternative to building new grid capacities.

Business as usual	E1st
Network companies have an **incentive to invest** into their assets as they earn a rate of return on the investment,	The same revenue can be earned on **all types of costs** incurred (capex or opex)-
Network companies have **no incentive** to actively innovate and **align with the power system transition.**	**Performance-based incentives** could reduce the inertia of network companies and their appetite for more risky but potentially more efficient solutions.

There was no discussion on this policy approach during the workshop. One solution that has been added on the risk averse behaviour of regulatory agencies was to engage in regulatory experimenting.

Table 3 below provides the full list of barriers, success or enabling factors identified before and during the workshop.

Table 3. Overview of barriers, success or enabling factors related to transmission and distribution incentives

Barriers to implementing E1st	Success or enabling factors to overcome the barriers
Opposition of TSOs or DSOs to regulatory changes	Involving the TSOs and DSOs in the preparation of the regulatory changes
Risk averse regulators	Environmental mandate for energy regulators; Regulatory sandboxes; **All types of regulatory experimentations should be pursued, and only after draw conclusions**
Endowment of regulatory authorities	Assessing the resources needed at the regulatory bodies for the implementation of the regulatory changes

Note: barriers, success or enabling factors in bold are the ones added during the workshop.

4 DYNAMIC TARIFF DESIGN

Network and retail tariffs incentivising the **smart use of existing networks** by consumer and hence reducing the need for grid capacity extensions.

Business as usual	E1st
The energy and network tariff paid by the consumers is **independent from the market and system conditions.**	Consumers pay less in case of abundant generation and network supply and **more in scarcity periods**.
Load is considered to be **inelastic.**	Consumers **do respond to prices**.

This policy approach created the most discussion. The focus of most contributions was the consumer behaviour. The problem of risk awareness or aversion, the quest for simplicity were mentioned as key barriers to consumer acceptance of dynamic tariffs. The second main issue was the availability of flexible load and the need for an approach (both regarding potential assessment and utilisation strategy) that segments consumers into large industrial, commercial and residential groups. Different localities can have very different consumer segments and hence need a tailored-made strategy to use the available, different, flexibility potential.

Table 4 below provides the full list of barriers, success or enabling factors identified before and during the workshop.

Table 4. Overview of barriers, success or enabling factors related to dynamic tariff design

Barriers to implementing E1st	Success or enabling factors to overcome the barriers
Regulated retail pricing	
Contradictory EU legislation on network tariff design	
Reputational concern (if dynamic tariffs are viewed as unfair); **Justice implication concerns**	
Lack of adequate metering infrastructure; **costs of smart meters and the devices to manage the load (given the small spreads to earn)**	
Current lack of half-hourly settlement means little incentive to settle customers on actual profiles	
Tariffs with only one dynamic component (e.g. the energy component) and the masking effect of taxes and levies	
Still rather limited insight on what tariff designs are best for different consumer segments	
Lack of guidance on price comparison techniques for such tariffs	**Provide principles of good tariff comparison approaches**
Difficulty to provide effective price signals while keeping tariffs simple for consumers to understand and use; **Price signal has to reach customers**	Piloting dynamic tariffs / **Testing of new tariff designs**; **Simplicity in showing DR benefits (platform, bills, ...)**
Lack of information on price signal for the consumer - reaction time	Consumer awareness policies
Dynamic tariffs can add a 'hassle' burden to consumers	Coupling ToU tariff with automated devices for Demand-Response
Lack of penetration of large controllable loads, reducing value of such tariffs	**Support for uptake of EVs (Electric Vehicles) / HPs (Heat Pumps)**
Dynamic tariffs are accompanied by a price risk for consumers compared to the traditional flat rate design; **Risk averse consumers that do not want exposure to market prices**; **Fixed tariffs are some kind of insurance**	Providing clear benefits to consumers;

Note: barriers, success or enabling factors in bold are the ones added during the workshop.

RANKING

The workshop participants were invited to rank the barriers identified in the first part of the discussions, to indicate which ones they considered as most critical to address for a successful implementation of E1st. The results of the voting are presented below in Table 5.

Note: each participant had 12 points to distribute, with the possibility to add several points on the same barrier. The vote was cross-cutting, considering all policy approaches and barriers at once.

Table 5. Results of the voting, presented per policy approach

(*barriers in bold are the ones added during the workshop*)

Barriers related to 1-Power market rules	Points
Lack of adequate metering infrastructure	9
Unclear or impossible approach of aggregators to the Power Market	5
Increase/Decrease Gaming may occur	4
Lack of integrated market where not only SOs procure AS services but also BRP s balance their portfolios and SOs resell un-needed contracted resources	4
Lack of general transparency between aggregators and consumers: consumers need to understand easily what an aggregator is for	4
Stacking of different services not allowed	3
Pooling of all kinds of resources (demand and load) not always permitted	2
Too large bid size in the various energy markets	2
Unclear baseline calculation methodology	2
Define rules that do not discriminate power sources depending on the market, origin, technical features of the source/generator	2
Individual prequalification of demand-side resources	1
Too high transaction costs for Demand-Response aggregation	1
Unclear rules on supplier compensation	1
Definition of aggregators and aggregation in the regulatory framework	1
Simplification of rules so that non-energy experts can easily assess the value of participation	1
Integration of appliance providers (sellers) and building owners: landlord-tenant split incentive	1

Barriers related to 4- Dynamic tariff design	Points
Lack of information on price signal for the consumer – reaction time	4
Risk averse consumers that do not want exposure to market prices	4
Difficulty to provide effective price signals while keeping tariffs simple for consumers to understand and use	3
Still rather limited insight on what tariff designs are best for different consumer segments	3
Justice implication concerns	3
Reputational concern (if dynamic tariffs are viewed as unfair)	3
Current lack of half-hourly settlement means little incentive to settle customers on actual profiles	2
costs of smart meters and the devices to manage the load (given the small spreads to earn)	2
Lack of adequate metering infrastructure	2
Simplicity in showing DR benefits (platform, bills)	2
Providing clear benefits to consumers	2
Regulated retail pricing	1
Dynamic tariffs are accompanied by a price risk for consumers compared to the traditional flat rate design	1
Contradictory EU legislation on network design	1
Testing of new tariff designs	1
Lack of penetration of large controllable loads, reducing value of such tariffs	1

Barriers related to 2-T&D Utility provisions	Points
Lack of adequate metering infrastructure	3

Barriers related to 3-T&D incentives	Points
Risk averse regulators	3

Barriers related to 2-T&D Utility provisions	Points
Difficulties to evaluate the costs and benefits of the different alternatives to network reinforcement (e.g., network upgrade vs. flexibility or automation or...)	3
Market efficiency may be conflicting with network efficiency	3
Transparency requirement of grid capacity/flexibility need	3
Lack of DSO- TSO coordination for provision of flexibility (i.e., ancillary services)	2
Low maturity of residential flexibility market	2
Lack of awareness and knowledge or experts about flexibility and demand- side resources among TSO and DSO staff	2
Forecasting uncertainty	1
Lack of knowledge where DSM potentials are largest (sectors, appliances, use cases)	1
Priority to security of supply and doubts about the reliability of demand-side resources	1

Barriers related to 3-T&D incentives	Points
Including the development of the use of demand-side resources as part of the missions of the TSOs and DSOs	1
Opposition of TSOs or DSOs to regulatory changes	1
Environmental mandate for energy regulators	1

Clearly, the policy approach that stirred the most debate and contribution was the one about dynamic tariffs. However, barriers related to power market rules get overall more points (43, vs. 34 for the ones related to dynamic tariffs). The barriers related to T&D Utility provision get 21 points, and the ones related to T&D incentives only 6 points (which is consistent with the fact that this policy approach was not discussed by the participants).

The outstanding barrier according to the votes of the workshop participants was the lack of metering infrastructure, or more precisely the regulatory gap on how the various meters should/could operate next to each other. What happens when a consumer has multiple suppliers, EV chargers coming with their own embedded submeters. See further information here on how the UK is dealing with this issue.

Other issues ranked high were around the status of aggregators and consumers behaviour when facing price risk.