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LEGAL ASPECTS OF FURTHER STRENGTHENING THE COMPETITION IN RETAIL ENERGY MARKETS

Master thesis

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LIST OF ABBREVIATIONS

Market participants and market roles	
BRP	Balance responsible party
DSO	Distribution system operator
TSO	Transmission system operator
Legal acts and proposals for legal acts	
Directive 2009/72	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 and repealing Directive 2003/54/EC
Directive 2012/27	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
Directive 2019/944	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 (recast)
DR NC	Network Code on Demand Response
Regulation 2019/942	Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators (recast)
Regulation 2019/943	Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast)
Institutions and organizations	
ACER	European Union Agency for the Cooperation of Energy Regulators
CEER	Council of European Energy Regulators
CERRE	Centre on Regulation in Europe
IRENA	International Renewable Energy Agency
Other terms	
CER	Consumer Energy Resources
DSF	Demand side flexibility
EEA	European Economic Area
EV	Electric vehicle
EU	European Union
MW	Megawatt
NECP	National Climate and Energy Plan
NRA	National Regulatory Authority
P2P	Peer-to-peer
RES	Renewable energy sources

INTRODUCTION

The relevance of the master thesis.

Over the past few decades, the European Union has been steadily reforming the electricity market, moving from a model of vertically integrated monopolies to a competitive, liberalized structure. Liberalization has been accompanied by the phased introduction of requirements for unbundling, non-discriminatory access to networks, the development of wholesale and retail markets, and the enshrinement of a set of final customers' rights[1]. As a result, European energy law no longer considers electricity exclusively as a utility service and is increasingly based on market logic, competition, and economic signals.

In this context, the role of the consumer is also changing. From the initial model of a "protected" user, for whom EU law primarily ensured a basic level of protection (quality of service, transparency of tariffs, the ability to change suppliers), legislation is gradually shifting towards the concept of active participation by the final customer in the energy system. Consumers are now able not only to choose their supplier, but also to generate and store electricity, manage their demand, form energy communities, and enter organized markets for flexibility and system services, either directly or through an aggregator[2].

Alongside market liberalization, the paradigm of consumption and demand in the energy system is changing. Traditionally, stable energy sources (such as thermal, nuclear and hydroelectric power plants) generated electricity depending on demand. Now, however, the key task is to integrate stochastic renewable energy sources, including solar and wind, into the energy system. This integration requires flexibility on the demand side and the active participation of final customers in consumption shifting. The integration of renewable energy sources (RES) is one of the objectives of the EU energy market reform[3].

In this context, the demand response mechanism is of particular importance, allowing final customers to change their electricity consumption in response to price signals and provide flexibility services to system operators. The European Commission is currently reviewing the proposal for the Network Code on Demand Response (DR NC), which is designed to ensure interaction between consumers and system operators[4].

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[1] "Internal energy market," European Parliament, accessed 10 November 2025, https://www.europarl.europa.eu/factsheets/en/sheet/45/internal-energy-market.

[2] "Communication from the Commission: Clean Energy For All Europeans, COM(2016) 860 final". EUR-Lex. Accessed 23 November 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52016DC0860.

[3] "Electricity market design," European Commission, accessed 10 November 2025, https://energy.ec.europa.eu/topics/markets-and-consumers/electricity-market-design_en.

[4] "New network code on demand response will further advance the energy transition," ACER, accessed 10 November 2025, https://www.acer.europa.eu/news/new-network-code-demand-response-will-further-advance-energy-transition.

Therefore, the research on the barriers and opportunities for consumer participation in the emerging flexibility services market, in particular its legal aspects, is relevant and currently necessary.

Scientific research problem.

First, there is no comprehensive description of the evolution and current problems of the legal status of active customers (final customers who sell self-generated electricity and participate in flexibility schemes), as well as the demand response mechanism (change of electricity load by final customers in response to market signals); these concepts are of key importance for ensuring the proactive consumer participation in the electricity market. Second, there is no comprehensive description and assessment of existing barriers to such participation, as well as methods for overcoming these barriers. Therefore, there is a necessity to answer to the following questions:

- How has the scientific discourse on the legal status of active consumers and the demand response mechanism evolved and at what stage is it currently?
- What barriers exist for consumer participation in demand response?
- What methods are proposed to overcome these barriers and are they effective?

The level of the analysis of the research problem.

Within the scope of this research, it is necessary to examine the legal status of active consumers and the mechanism of demand response both before and after the adoption of the Clean Energy Package. Also it is necessary to analyze the barriers for consumer participation in demand response and methods to overcome them.

Scientific research on active customers status and demand response mechanism has been conducted by Ans Kolk, K.J. Cseres, Saskia Lavrijssen, Saulė Milčiuvienė, Gerald Schweiger, Nina Voulis, Goran Strbac, Johanna L. Mathieu, Jan Stede, Fouad El Gohary, Matteo Ranaboldo, Cátia Silva and others. However, most of articles related to the concepts of active customer and demand response are of socio-behavioral, economic and technic nature.

Noting the contribution of scholars to scientific discourse, it is worth mentioning Ans Kolk, K.J. Cseres, and Saskia Lavrijssen, who researched active consumers when this concept was emerging. Kolk formulated the connection between market liberalization, sustainable development, and strength consumer position. Later, Cseres and Lavrijssen described separate elements of the legal status of the active consumer in their works.

Johanna L. Mathieu et al. and Jan Stede et al. contributed to the development of the demand response concept and, in particular, to the description of barriers to participation in this mechanism. Thus, Mathieu et al. justify the necessity of changing the definition of demand response, taking into account the distributed generation paradigm. Stede et al. investigated the

implementation of demand response in Germany. In addition to them, Moura and Brito, Vrhovčak & Malbašić, Christina Leinauer et al. and others also wrote about the barriers to participation in demand response. In particular, Leinauer et al. conducted a comprehensive study of barriers to participation in demand response by industrial companies, which, however, may also be applicable to the retail market.

Among the organizations, it is worth noting ACER and its Market Monitoring Reports, which have made a significant contribution to describing the barriers to the development of demand response and methods for overcoming them.

Scientific novelty.

Studies on the concepts of active customers and demand response are fragmented. The first part of this research provides a comprehensive retrospective description, outlining the development of these concepts over time, as well as a description of the current state of scientific discourse on these issues. At the time of writing this research, the author did not find such comprehensive retrospective studies.

Studies on barriers for customer participation in demand response are also fragmented. Usually, they describe only one category of barriers (regulatory, economic, technical, and behavioral). In addition, not all studies describing barriers offer methods for overcoming them. Thus, the importance and novelty of the second part of this research lies in the systematization of the barriers described in the literature and methods for overcoming them.

In addition, based on the conducted research, problems with the implementation of the provisions of Directive (EU) 2019/944 in terms of active consumers and demand response in the national legislation of Member States have been identified, and recommendations for eliminating these problems are provided. The potential ineffectiveness associated with the future harmonization of the baselining methodology[5] provided for in the draft DR NC has also been identified, and recommendations are given to address this issue.

The aim of research – to identify existing barriers for participation of active customers in demand response, methods for their overcoming, systematize them, to identify possible inefficiencies in described methods and provide for relevant proposals to overcome such inefficiencies.

[5] Based on articles 2(2), 2(3) of the draft DR NC, the baselining methodology could be explained as the formula for the calculation of the electrical quantities that would have been withdrawn or injected if there had been no activation of any balancing or local services, or no activation of demand response in any other wholesale market.

"Annex 1 – Amended Demand Response Network Code of the Recommendation No. 01/2025 of the European Union Agency for the Cooperation of Energy Regulators of 7 March 2025 on reasoned proposal for the establishment of the Network Code on Demand Response according to Article 59(1)(e) of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast)," ACER, accessed 20 November 2025, https://www.acer.europa.eu/documents/search?search_api_fulltext=ACER+Recommendation+01-2025.

The objectives of research.

To achieve the aim of the research it is necessary to:

1) provide a comprehensive description of scientific discourse on the legal status of active customers and demand response mechanism;
2) identify barriers for consumer participation in demand response and mechanisms to overcome such barriers; and
3) assess, whether these methods are efficient; if they are inefficient – propose ways for their improvement.

The practical significance of research.

This research will be useful for further scientific legal researches in fields of energy law and competition law, as it systematize existing studies dedicated to active customers and demand response, as well as describes barriers for participation of active customers in demand response mechanism. The research may be a base for further scientific discussions on development of policies and approaches to regulation of related institutes.

It will also be useful for EU legislators, since it provides for recommendations how to overcome incomplete and delayed transposition of the provisions of Directive 2019/944 into national legislation by Member States, as well as potential ineffectiveness in the harmonization of the baselining methodology, as provided for in the draft DR NC.

Defense statements.

1. There is a persistent problem with the timely implementation of the provisions of Directive 2019/944 in terms of active consumers and demand response in the EU Member States. To overcome this problem, ACER and ENTSO-E shall provide assistance for Member States, and the European Commission shall ensure the oversight of such implementation.

2. ENTSO-E and the EU DSO entity, after assessing the potential for harmonization of the baselining methodology, shall be required to develop proposals for such harmonization.

Research methodology.

The following methods were applied in the research:

1. Legal interpretation method was utilized to identify the correct meaning of legal provisions, which a prerequisite for further conclusion on efficiency, sufficiency etc.

2. Descriptive method was used to systematically present the rights and obligations of active customers, demand response mechanism and consumer participation barriers as they set in the legislation, discussed in relevant scientific articles and policy papers.

3. Historical method was utilized to describe evolution of the "active customer" and "demand response" concepts as a dynamic process in three distinct chronological stages: the

formation of concepts prior to the Clean Energy Package, their legislative formalization in 2019, and the subsequent development in the post-adoption period.

4. Analytical method enabled categorization of identified barriers into four categories (regulatory, economic, technical, and behavioral), which was a prerequisite to research on methods to overcome these barriers.

5. Systematic method was applied for identification of common features of the fragmented barriers to consumer participation found in various sources and for combination them with described methods for overcoming these barriers. This method also allowed identifying repetitive ACER's recommendation to on full and correct implementation of the EU acquis and making conclusion on its inefficiency.

Structure of research.

The research is divided into two parts.

First part of the master thesis provides for retrospective overview of the development of the concepts of active customer and demand response. This part provides for description and analysis of:

- scientific discourse before the adoption of the Clean Energy Package;
- relevant provisions of the Clean Energy Package;
- scientific discourse after the adoption of the Clean Energy Package.

Second part of the master thesis provides for description, systematization and analysis of existing barriers for active engagement of active customers in electricity markets, as well as for methods to overcome identified barriers. Also, this part describes identified issues related to inappropriate implementation of provisions of the Directive 2019/944 into national legislation of EU Member States and absence of obligation for ENTSO-E and EU DSO entity to develop proposals for harmonization of baselining methodology, as well as justification for provided conclusions and recommendations.

Within the parts, the description is divided into scientific articles and analytical documents. This division is necessary to show the differences in the development of discourse among scholars and practitioners (mostly employed or engaged by organizations such as ACER).

1. RETROSPECTIVE STUDY ON CONCEPTS OF ACTIVE CUSTOMER AND DEMAND RESPONSE

1.1. Active customer

1.1.1. Concept formation: discourse before adoption of the Clean Energy Package

Scientific articles

The first steps towards the formation of the concept of an active customer in European scientific literature date back to the early 2010s. In this period, researchers' attention shifted from consumer protection in liberalized market to the idea of active customer participation in the energy transition. However, discussions on the legal status of such market participants were quite rare. The authors focused primarily on economic, social, and technical aspects, while legal issues were mentioned mainly in the context of barriers or shortcomings in existing regulations.

One of the first academic researches describing the need for this shift in approach was Ans Kolk's article "The Role of Consumers in EU Energy Policy" (2012). The author notes that '*[w]ith the restructuring of energy markets, the role of consumers as energy 'users' is receiving increasing attention*'[6]. Kolk highlights the gap between the growing interest in consumer engagement and the lack of practical mechanisms: *'... despite large interest in consumers and emerging insights from surveys concerning the problems they face on the EU energy market, the how and what of involving consumers [...] remains largely unclear'*[7]. Kolk concludes that the future of the European electricity market depends on the creation of laws and policies under which *'consumers can easily become active players on the energy market, and are empowered to countervail companies, which normally have much more market power and are in a better position'*[8].

Thus, Kolk was one of the first in academic discourse to formulate the connection between market liberalization, sustainable development goals and the need for institutional strengthening of the consumer's position.

Later on in 2018, when the concept of the active customer had already been well developed in policy papers (more on that later in this section), the topic also got some attention in academic literature. For example, Katalin Cseres's article "The Active Energy Consumer in EU Law" (2018) states that European legislation already contained some elements of consumer

[6] Ans Kolk, "The role of consumers in EU energy policy," *Carbon Management* 3, 2 (2012): 175, https://doi.org/10.4155/cmt.12.10.

[7] *Ibid.*

[8] *Ibid.*, 181.

participation in the market (the right to information, change of supplier, access to data), but the enablement of the active consumer still required the implementation of facilitative rules[9].

According to Cseres, these rules were not implemented in the European Commission's proposal for a Clean Energy Package, which she described as follows:

> This new market design is based on the active participation of consumers. Instead of being dependent on a top-down energy model, consumers can now actively manage their own consumption and even (co-) produce their own energy. Accordingly, active consumers are crucial to realise energy efficiency, sustainability and thus manage the energy transition in a cost-effective way. **However, the present legal framework does not yet enable this active consumer role**[10].

Cseres argued that merely revising legislation may not be sufficient: *'[t]here need to be broader social and economic approaches that incentivise and support a more active role for consumers in energy markets'*[11].

Thus, Cseres not only describes the status of the active consumer, but also emphasizes that their participation in the electricity market is not legally ensured.

Saskia Lavrijssen's article "Power to the Energy Consumers" (2017) provides an analysis of the European Commission's proposal for the Clean Energy Package. The author points out that the development of storage technologies and demand-side management[12] is leading to structural changes in the energy system and increasing the importance of decentralization of market participants:

> *Due to the introduction of demand-side management and storage facilities* (e.g., in batteries), the system becomes more flexible and more supply-driven than demand-driven. *Energy consumers increasingly become 'prosumers'; they not only withdraw energy* from the transmission network, *but also produce energy themselves and supply it into the network flexibly*[13].

The author then briefly describes the provisions of the fourth energy package legislative proposal aimed at strengthening consumer empowerment: new and revised rights, including the

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[9] KJ Cseres, "The Active Energy Consumer in EU Law," *European Journal of Risk Regulation* 9, 2 (2018): 240, https://doi.org/10.1017/err.2018.7.

[10] *Ibid.*, 228.

[11] *Ibid.*, 243-244.

[12] According to article 2(29) of the Directive 2009/72, 'energy efficiency/demand-side management' means a global or integrated approach aimed at influencing the amount and timing of electricity consumption in order to reduce primary energy consumption and peak loads by giving precedence to investments in energy efficiency measures, or other measures, such as interruptible supply contracts, over investments to increase generation capacity, if the former are the most effective and economical option, taking into account the positive environmental impact of reduced energy consumption and the security of supply and distribution cost aspects related to it.

[13] Saskia Lavrijssen, "Power to the Energy Consumers," *SSRN Electronic Journal* (2017): 4, https://doi.org/10.2139/ssrn.2956342.

ability to enter into contracts with aggregators[14], sell self-generated energy, access dynamic contracts, have the right to a smart meter, etc. Lavrijssen emphasizes how important it is to provide consumers with the possibility to participate fully in the market:

> By becoming an active consumer, the consumer can benefit financially from lower energy costs, from offering flexibility services themselves and from better access to renewable energy sources. As the consumer, individually or collectively via an aggregator or local energy community, may deliver flexibility for balancing energy demand and supply in an optimal way, his behaviour may contribute to a more efficient network use and reduce the need for large and expensive investments for network capacity upgrading[15].

A significant part of the work is devoted to a critical assessment of the implementation of the active consumer concept using behavioral economics. Lavrijssen shows that legislators assume a rational consumer model, but empirical studies demonstrate the opposite – consumers often remain passive and make non-optimal choices. The author explains this with several factors: present-biased preferences, status quo bias, loss aversion, bounded rationality, and cognitive limitations in assessing tariffs[16].

Thus, Lavrijssen emphasizes that the potential for active consumer participation enshrined in the proposal may be limited by actual consumer behavior. However, the author does not discuss the role and functions of the active consumer in the analyzed work.

Results of the conducted analysis of the scientific literature, including the described above article, indicate that prior to the adoption of the Clean Energy Package, scientific articles devoted to the active customer mainly concerned not legal aspects, but the socio-behavioral and economic prerequisites for participation of such consumers.

The social and behavioral aspects were addressed, among others, in the works of Gangale et al. [17] and Wildt et al.[18]; the economic and market aspects were addressed in Moura and Brito[19] and Zepter et al.[20]

[14] Based on article 2(18) of the Directive 2019/944, aggregator may be defined as a natural or legal person who combines multiple customer loads or generated electricity for sale, purchase or auction in any electricity market.

[15] *Ibid.*, 14.

[16] *Ibid.*, 15-16.

[17] Flavia Gangale, Anna Mengolini and Ijeoma Onyeji, "Consumer engagement: An insight from smart grid projects in Europe," *Energy Policy* 60 (2013): 621–28. https://doi.org/10.1016/j.enpol.2013.05.031.

[18] T. E. de Wildt et al. "Conflicting values in the smart electricity grid a comprehensive overview," *Renewable and Sustainable Energy Reviews* 111 (2019): 184–96. https://doi.org/10.1016/j.rser.2019.05.005.

[19] Ricardo Moura and Miguel Centeno Brito. "Prosumer aggregation policies, country experience and business models," *Energy Policy* 132 (2019): 820–30. https://doi.org/10.1016/j.enpol.2019.06.053.

[20] Jan Martin Zepter et al. "Prosumer integration in wholesale electricity markets: Synergies of peer-to-peer trade and residential storage," *Energy and Buildings* 184 (2019): 163–76. https://doi.org/10.1016/j.enbuild.2018.12.003.

Based on conducted research of the scientific literature prior to the adoption of the Clean Energy Package, the definition of an active customer and its functions in the market could not be found.

Analytical documents and policy papers

Prior to the adoption of Directive (EU) 2019/944, the concept of an active customer was mainly developed in analytical documents and policy papers developed by European institutions and international organizations. These documents do not use a common, standardized terminology (for example, the terms "prosumer" and "active consumer" are used interchangeably). However, these documents laid the foundation for the subsequent legal establishment of the status of active customer.

One of the first documents to define an active customer is the CEER Position Paper on Well-Functioning Retail Energy Markets (2015). In this paper, a prosumer is described as *'[a] consumer who is equipped with self-generation and/or batteries (i.e., producer + consumer = prosumer)'*[21]. This definition indicates that the concept of an active customer (prosumer) was just emerging at the time. A prosumer is defined by the possession of certain equipment, but the legal status of such a participant and their functions in the market are not specified in the document.

The European Commission's "Study on Residential Prosumers in the European Energy Union" (2017) notes that at the time, there was no definition of "prosumer" in EU legislation. The authors note that the term "prosumer" is used to define energy consumers who also produce their own energy from a range of different onsite generators, mainly from renewable energy sources[22]. Hence, the document does not propose a new legal definition, but reflects the established understanding of the concept of prosumer as a form of decentralized participation of households in the energy system.

A comprehensive definition of an active customer is proposed in the ClientEarth report "Prosumer Rights: Options for an EU Legal Framework post-2020" (2016):

> 'Active customer' means "a customer who performs any of the functions of generation, storage and/or supply of energy from renewable sources, or energy efficiency/demand-side management, either individually or through a community energy undertaking over which they exercise control jointly with other active customers, provided that for household customers they are, on an annual average, net consumers, and provided that for non-household customers the activity is

[21] CEER. *Position paper on well-functioning retail energy markets.* Brussels, 2015: 27. https://www.ceer.eu/publication/ceer-position-paper-on-well-functioning-retail-energy-markets/.

[22] European Commission, GfK Belgium consortium. *Study on "Residential Prosumers in the European Energy Union"*. 2017: 31 https://commission.europa.eu/document/download/72507ae6-d754-4425-9a38-794532cd50bd_en?filename=study-residential-prosumers-energy-union_en.pdf.

insignificant in proportion to the customer's primary economic activities."[23] (*original punctuation preserved*)

Thus, this document formulates a comprehensive definition of an active customer, including a list of possible functions – generation, storage, and supply of energy, as well as demand-side management. The authors assume that active customers will carry out their activities on an individual basis or through collective forms of participation. The document emphasizes that such activities should not be the main activity for either households or non-household customers. Thus, the document anticipates the subsequent logic of legal regulation in Directive 2019/944.

It is worth noting that the European institutions used the term "prosumer" in their documents without providing a full, meaningful definition. Such a definition was provided by ClientEarth in their report.

Let us move on to analyzing the status of the active customer, their role and functions in the market, as set out in analytical materials prior to adoption of the Clean Energy Package.

The above-mentioned ClientEarth report "Prosumer Rights: Options for an EU Legal Framework post-2020" (2016) proposes a detailed model of what European regulation should look like to ensure the real participation of active customers in the electricity market.

The authors note that although EU legislation in force at the time *'protects the rights of energy consumers, including rules for 'empowerment' (e.g. the right to choose and switch suppliers and the right to receive information and advice) [...] existing rules are not aimed to facilitate active participation in the energy market'*[24].

Based on this, ClientEarth formulates a key idea: the right to be a prosumer shall be guaranteed at the level of the reformed Directive on the internal electricity market. The report proposes to *'directly confer a right on all household customers and small enterprises to become a prosumer – that is, the right to be active in the energy market'*[25]. This general right should be supplemented by the following specific rights:

- Preservation of consumer rights for active customers, as for "passive" consumers;
- The right to non-discriminatory access to markets, including priority connection of RES installations to the grid, participation in demand-side response, simplification of administrative procedures, licensing and registration for new entrants (community suppliers, aggregators) and to obtain the status of BRP;

[23] ClientEarth. *Prosumer Rights: Options for an EU legal framework post-2020*. 2016: 17. https://www.greenpeace.org/eu-unit/issues/climate-energy/1381/prosumer-rights-options-for-an-eu-legal-framework-post-2020/.

[24] *Ibid.*, 7.

[25] *Ibid.*

- The right to participate in the market individually or through an agent/representative, at their discretion;
- The right to fair and transparent tariffs;
- Guarantees of regulatory stability and investment protection;
- The right to access complete and understandable information[26].

The authors of the report suggest that EU member states should be required to analyze the potential of prosumer models for combating energy poverty and develop appropriate support measures, including involving such households in collective renewable energy projects and eliminating split incentives[27] in apartment buildings[28].

Finally, ClientEarth emphasizes the need to strengthen oversight and enforcement: active customers should be able to resolve their disputes both in and out of court. The authors also consider it necessary for EU member states' National Energy and Climate Plans (NECPs) to include measures to develop prosumer participation, with an emphasis on fair market access and the removal of administrative barriers[29].

The CEER's "Handbook for National Energy Regulators" (2017) is particularly important for understanding the development of the active customer concept prior to the adoption of the Clean Energy Package. Although its main purpose is to provide national regulators with a set of metrics for assessing the functioning of retail markets, the document allows us to reconstruct how CEER seen the role of consumers in the market in 2017 and what it considered necessary for their active participation.

On the one hand, in a number of metrics, CEER views consumers in their traditional role – as passive participants whose "engagement" is realized through their choice of supplier. An example of this is metric 20, which states that *'This metric is used to measure the active engagement of consumers in the energy retail market. The supplier switching rate is one of these measures. It is directly linked with the level of competition[...]'*[30]. Here, 'active engagement' is essentially understood as a standard form of consumer behavior in a liberalized market – switching suppliers. This logic is consistent with the concept of consumer empowerment enshrined in

[26] *Ibid.*, 7-8.

[27] "Split incentives" refer to any situation where the benefits of a transaction do not accrue to the actor who pays for the transaction. In the context of energy efficiency in buildings, split incentives are linked with cost recovery issues related to energy efficiency upgrade investments due to the failure of distributing effectively financial obligations and rewards of these investments between concerned actors. Based on:

"The ENPOR split incentive tool." Institute for European Energy and Climate Policy. Accessed 22 November 2025. https://ieecp.org/2024/11/08/the-enpor-split-incentive-tool/.

[28] ClientEarth, *supra note*, 23: 8-9.

[29] *Ibid.*, 9.

[30] CEER. *2017 Handbook for National Energy Regulators: How to assess retail market functioning*. Brussels, 2017: 34. https://www.ceer.eu/publication/ceer-2017-handbook-for-national-energy-regulators-how-to-assess-retail-market-functioning/.

previous EU acts and reflects the perception of the consumer primarily as an object of protection and a bearer of a limited set of opportunities for market participation.

On the other hand, already in 2017, CEER metrics use an approach that goes beyond classic empowerment and actually assumes the participation of active customers in the market through demand response and flexibility[31] mechanisms. This can be seen, in particular, in metric 6, which is dedicated to the availability of time-of-use measurements, where CEER states that *'availability of smart metering equipment and systems which allow time-of-use meter readings is a pre-requisite for consumers to be able to choose implicit demand response and flexibility schemes'*[32]. Moreover, CEER emphasizes that the lack of access to hourly meter readings limits competition and innovation in the market:

> If the customer cannot access time-of-use meter readings then this might distort competition on the retail market for new suppliers, aggregators and third parties with innovative contracts, as well as restrict market choice for customers. Lack of time-of-use-metering, such as hourly readings, hinders innovation and development on the market as a whole[33].

Thus, analysis of these metrics shows that even before the 'active customer' concept was enshrined in the Directive 2019/944, CEER assumed the need to ensure the technical prerequisites for consumer participation in demand response and flexibility, and not just for their role as ordinary end users.

With this state of scientific discourse and policy-makers' approaches, we have come to the adoption of the Clean Energy Package.

1.1.2. Clean Energy Package provisions

When describing the changes made to the EU regulatory framework by the Clean Energy Package, it is necessary to start with the European Commission's communication "Clean Energy For All Europeans"[34].

The Commission reported that the reforms are aimed at providing consumers with mechanisms to control their energy consumption, expanding their access to information, and creating opportunities to participate in market relations, rather than just using energy as a service. Thus, the European Commission wrote:

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[31] According to article 2(79) of the Regulation 2019/943, 'flexibility' means the ability of an electricity system to adjust to the variability of generation and consumption patterns and to grid availability, across relevant market timeframes.

[32] CEER, *supra note*, 30: 16.

[33] *Ibid.*, 17.

[34] "Communication from the Commission: Clean Energy For All Europeans, COM(2016) 860 final". EUR-Lex. Accessed 23 November 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52016DC0860.

> The regulatory changes introduced by the current package and the shift from centralised conventional generation to decentralised, smart and interconnected markets will also make it easier for consumers to generate their own energy, store it, share it, consume it or sell it back to the market – directly or as energy cooperatives. Consumers will be able to offer demand response directly or through energy aggregators. New smart technologies will make it possible for consumers – if they chose to do so – to control and actively manage their energy consumption while improving their comfort. These changes will make it easier for households and businesses to become more involved in the energy system and respond to price signals[35].

Let us move on to analyzing the proposal for a directive on internal electricity market[36]. It provides for the following definition of an active customer:

> 'active customer' means a customer or a group of jointly acting customers who consume, store or sell electricity generated on their premises, including through aggregators, or participate in demand response or energy efficiency schemes provided that these activities do not constitute their primary commercial or professional activity[37].

Thus, the functions of an active customer include the consumption, storage, and sale of self-generated electricity, as well as participation in demand response or energy efficiency schemes.

The proposal's article on active customers establishes an obligation for EU Member States to ensure that such customers enjoy the above-mentioned rights and are subject to cost-reflective, transparent, and non-discriminatory network charges, accounting separately for the electricity fed into the grid and the electricity consumed from the grid[38]. In addition, this document proposed to establish that energy installations required for the activities of active customers may be managed by a third party for installation, operation, including metering and maintenance[39]. Also, EU Member States, when introducing smart meters, had to ensure that these meters provided metering of electricity fed into the grid by consumers[40].

The adopted version of Directive 2019/944 differs from the proposal. Thus, it is more detailed. The definition has not undergone any fundamental changes, but it has been refined. In 2024, amendments were made to the definition of an active customer in connection with the

[35] *Ibid.*

[36] "Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity (recast), COM/2016/0864 final/2 - 2016/0380 (COD)". EUR-Lex. Accessed 23 November 2025, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52016PC0864R(01).

[37] *Ibid.*, article 2(6).

[38] *Ibid.*, article 15(1).

[39] *Ibid.*, article 15(2).

[40] *Ibid.*, article 20(d).

introduction of the concept of energy sharing[41]. Thus, the current version of the definition of an active customer is as follows:

> 'active customer' means a final customer, or a group of jointly acting final customers, who consumes or stores electricity generated within its premises located within confined boundaries or self-generated or shared electricity within other premises, or who sells self-generated electricity or participates in flexibility or energy efficiency schemes, provided that those activities do not constitute its primary commercial or professional activity[42].

Compared to the proposal, the initially adopted version of Directive 2019/944 supplemented the elements of the legal status of active customers. Thus, EU member states had to ensure that active customers:

- entitled to operate either directly or through aggregation;
- entitled to sell self-generated electricity, including through power purchase agreements;
- entitled to participate in flexibility schemes and energy efficiency schemes;
- entitled to delegate to a third party the management of the installations required for their activities, including installation, operation, data handling and maintenance, without that third party being considered to be an active customer;
- subject to cost-reflective, transparent and non-discriminatory network charges that account separately for the electricity fed into the grid and the electricity consumed from the grid [...];
- financially responsible for the imbalances they cause in the electricity system; to that extent they shall be balance responsible parties or shall delegate their balancing responsibility[43].

The directive also requires member states to ensure an additional set of rights for customers that own an energy storage facility:

- have the right to a grid connection within a reasonable time after the request, provided that all necessary conditions, such as balancing responsibility and adequate metering, are fulfilled;
- are not subject to any double charges, including network charges, for stored electricity remaining within their premises or when providing flexibility services to system operators;
- are not subject to disproportionate licensing requirements or fees;

[41] According to article 2(10a) of the Directive 2019/944, 'energy sharing' means the self-consumption by active customers of renewable energy either:
(a) generated or stored offsite or on sites between them by a facility they own, lease or rent in whole or in part; or
(b) the right to which has been transferred to them by another active customer for a price or free of charge.
The concept of energy sharing will not be analyzed within this research.

[42] Directive 2019/944 (as amended by Directive (EU) 2024/1711 of the European Parliament and of the Council of 13 June 2024 amending Directives (EU) 2018/2001 and (EU) 2019/944 as regards improving the Union's electricity market design), article 2(8). EUR-Lex. Accessed 13 November 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32024L1711.

[43] *Ibid.*, article 15(2).

- are allowed to provide several services simultaneously, if technically feasible[44].

The active customer rights described above remain in effect as of the date of completion of this research.

1.1.3. Concept development: discourse after adoption of the Clean Energy Package

Scientific articles

After the concept of active customers and their rights were enshrined in Directive 2019/944, there has been no discussion in scientific literature about changing the definition or set of rights. However, the existing concept is being used as a starting point for further research.

It is worth noting the contribution of Lithuanian scientists to the study of the active customer concept. For example, Milčiuvienė et al. in their work "The Role of Renewable Energy Prosumers in Implementing Energy Justice Theory" (2019)[45] apply the active customer concept to solve another problem – achieving energy justice[46]. The authors emphasize that active customers can contribute to increasing the affordability of electricity through self-generation and the sale of surpluses to the grid, which increases the volume of cheap electricity on the market and reduces dependence on imported energy resources. Thus, the promotion of prosumers' activity potentially leads to lower market prices and a reduced financial burden on final customers, including a reduction in the risks of price volatility. However, authors emphasize that these benefits can only be achieved if the concept of active customers is properly implemented in national legislation. Without the establishment of fair and effective economic incentive mechanisms, participation in self-generation will remain accessible only to wealthier households, which will lead to increased inequality and limit the effect on the public good. Therefore, supportive measures, including affordable financing for RES installations and the creation of favorable conditions for their market participation (including grid connections), are key legal factors determining the real contribution of active customers to achieving the goals of energy justice and energy affordability[47].

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[44] *Ibid.*, article 15(5).

[45] Saulė Milčiuvienė et al., "The Role of Renewable Energy Prosumers in Implementing Energy Justice Theory", *Sustainability* 11, 19 (2019), https://doi.org/10.3390/su11195286.

[46] In order to explain an energy justice theory, it worth to provide authors' vision. As they conclude, *'energy justice theory strives to balance the interests of different groups, setting the following aims of legal regulation:*

(i) everyone should have access to basic energy services,

(ii) responsible use of energy resources should be ensured, and

(iii) the activity of business and governmental institutions should be fair'.

Ibid., 16.

[47] *Ibid.*, 12-14.

It is worth noting that although the article was published after the adoption of the Clean Energy Package, it still uses the concept of prosumer and essentially continues the discourse that existed prior to the adoption of Directive 2019/944, which may reflect a certain inertia in scientific discourse.

The article by Schweiger et al. "Active consumer participation in smart energy systems" (2020) describes key factors for business models of market participants who want to work in the field of demand side management and involve active customers in smart energy systems. Authors show that consumers are becoming active participants and sources of flexibility – reducing consumption, participating in load management, and generating energy data that has market value. Business models should be focused on mass user segments (households, commercial customers, prosumers), while taking into account different degrees of involvement: most are willing to participate passively, and only a small number are willing to actively manage energy load. The authors examine the psychological and behavioral mechanisms that determine participation: motivation (financial incentives, environmental values, comfort), ability (technological and cognitive barriers), and opportunities (environmental conditions, digital infrastructure). To ensure sustainable participation in demand side management, solution developers must design services that take these factors into account – reducing user resources requirements, applying behavioral models and automation[48].

Thus, the article focuses on the economic aspects of the activities of the relevant entities and does not address legal issues.

Analytical documents and policy papers

ACER consistently covers active customer issues in its Market Monitoring Reports.

In its 2023 report, ACER provided detailed statistics on the implementation by EU Member States of the definition of an active customer and its functions into national legislation. According to the report, even at the end of 2022, Member States were still experiencing problems with implementing the concept of an active customer into their legislation. Thus, nine EU Member States had not defined active customer in their legislation as of 31 December 2022[49]. It should be noted that the definition of an active customer and the elements of their legal status had to be implemented in the national legislation of EU Member States by 31 December 2020[50].

[48] Gerald Schweiger et al., "Active consumer participation in smart energy systems," *Energy and Buildings* 227 (2020): 1-18, https://doi.org/10.1016/j.enbuild.2020.110359.

[49] ACER. *Demand response and other distributed energy resources: what barriers are holding them back? 2023 Market Monitoring Report*. Ljubljana, 2023: 22. https://www.acer.europa.eu/sites/default/files/documents/Publications/ACER_MMR_2023_Barriers_to_demand_response.pdf.

[50] Directive 2019/944, article 71(1). EUR-Lex. Accessed 15 November 2025, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019L0944.

Further, in the context of active customers, ACER draws attention to network tariffs. The authors of the report note that network tariffs are currently a determining factor in end users' ability to acquire active customer status. With incentivizing and non-discriminatory tariff signals, households and businesses have an economic incentive to invest in self-generation, electricity storage, and participate in flexibility mechanisms, including providing demand response in the interests of the system. ACER points out that tariff regulation directly influences the extent to which active customers can perform their functions in the market[51].

ACER's Monitoring Report "Unlocking flexibility: No-regret actions to remove barriers to demand response" (2025) once again returns to the implementation by EU Member States of the definition and functions of active customer in national legislation. Thus, in Action 1, ACER draws attention to the fact that *'multiple Member States still need to fully implement these roles and responsibilities into national legislation'*[52].

In this regard, ACER proposes a set of measures: Member States shall ensure the adoption of primary legislation consistent with the obligations of the Directive 2019/944 and the future DR NC (see chapter 1.2.3 of this research), while national regulators and system operators shall develop secondary legislation that will define the distribution of responsibilities, procedures, and rules for interaction between new participants. In addition, regulatory authorities shall monitor the proper implementation of already adopted provisions and prepare for the introduction of additional regulation, in particular with regard to independent aggregators[53]. Thus, ACER directly points to a regulatory gap that persists in a number of EU Member States and prevents active customers from performing market functions enshrined in EU *acquis*.

An analysis of scientific literature and policies after the adoption of the Clean Energy Package allows us to draw several general conclusions. Thus, in academic discourse, the concept of an active customer, after its definition and status were enshrined in EU acquis, is used as a starting point for solving new issues, but not as an object for legal analysis.

In scientific literature, the legal nature of the active customer and its legal status as a participant in the electricity market have been researched only slightly. It has been developed much more deeply in the policies and analytical documents of European institutions (primarily ACER), but even here it is only part of a broader framework for the development of system flexibility.

[51] ACER, *supra note*, 49: 97-98.

[52] ACER. *Unlocking flexibility: No-regret actions to remove barriers to demand response: 2025 Monitoring Report*. Ljubljana, 2025: 9. https://www.acer.europa.eu/sites/default/files/documents/Publications/2025-ACER-Unlocking-flexibility-demand-response-barriers.pdf.

[53] *Ibid*., p. 10.

1.2. Demand response

1.2.1. Concept formation: discourse before adoption of the Clean Energy Package

Scientific articles

As in the case of active customers, prior to the adoption of the Clean Energy Package, scientific literature paid only limited attention to the concept of demand response, its features, and the necessity of its incorporation into European or national legislation. Articles were focused mostly on the technical, economic, social, and other aspects of demand response.

Goran Strbac's article "*Demand Side Management: Benefits and Challenges"* (2008) is one of the first scientific studies to describe the technical concept of demand management. With regard to the market design aspects, Strbac emphasizes that in an unbundled and competitive electricity market (after its deregulation), the benefits of implementing demand-side management are distributed among different participants in the system: generators, network companies, and suppliers. However, none of them individually receives sufficient benefits to invest in flexibility technologies. Therefore, market incentives fail to work[54].

For demand-side management to effectively function and deliver systemic benefits, governments must establish a regulatory model that:

- recognizes demand management as a market service;
- distributes benefits and responsibilities among all participants;
- provides economic incentives for consumers and intermediaries.

If regulation remains unchanged – focused on traditional centralized models – it will itself become a barrier[55].

In the article "Demand Response Potential: Available when Needed?" (2018) by Theresa Müller and Dominik Möst, authors emphasize that the development of demand response requires proper regulatory framework that takes into account the cross-sectoral nature of flexibility: the potential contribution of demand response to the electricity sector is determined by legal regulation in related industries – heating, cooling, and manufacturing. Consequently, legislators cannot limit themselves to the electricity market alone: regulatory decisions in separate sectors must be coordinated, otherwise the predictability of flexibility and the effectiveness of legal measures will be undermined[56].

[54] Goran Strbac, "Demand side management: Benefits and challenges," *Energy Policy* 36, 12 (2008): 4425-4426, https://doi.org/10.1016/j.enpol.2008.09.030.

[55] *Ibid.*

[56] Theresa Müller and Dominik Möst, "Demand Response Potential: Available when Needed?," *Energy Policy* 115 (2018): 191-192, https://doi.org/10.1016/j.enpol.2017.12.025.

In addition, authors state that preference for a particular technology (e.g., subsidies not based on network benefits) can create regulatory distortions that prevent optimal choices between flexibility, generation and storage. Thus, the main legal conclusion of the article is the necessity of technologically neutral and coordinated regulation that allows demand response mechanism to fully perform its role for the networks[57].

In particular, scientists drew attention to the issues of stimulating the energy transition and developing demand response through tax methods. An example of such work is the article by Nina Voulis et al. "Rethinking European energy taxation to incentivize consumer demand response participation" (2019). Authors emphasize that tax policy is part of energy market regulation and should therefore ensure the fulfilment of the EU's regulatory objectives to stimulate demand flexibility.

The authors argue that *'European and Member States' policy makers should consider energy taxes as policy instruments to encourage both energy conservation and demand flexibility, i.e. demand response participation'*[58]. At the same time, despite the strategy to support demand response proclaimed at the EU level, *'existing European legislation [on] energy taxation [...] and its implementation by European Member States do not include any incentives for demand response participation'*[59]. The authors also note that tax regulation should be seen as part of a broader regulatory transformation aimed at modernizing the electricity market and encouraging active customers participation[60].

In summary, the following remarks should be made.

We should agree with Müller and Most, as well as with Voulis et al. that electricity market issues should be considered comprehensively: since electricity is only one type of energy, regulation of the energy sector should be integral, ensuring consistency between all energy types.

Strbac's position regarding low economic incentives for customer participation in demand response also seems reasonable. This is consistent with the findings of Nilsson et al., discussed in more detail in section 2.1.

Analytical documents and policy papers

One of the first analytical documents on demand response in Europe was the Smart Energy Demand Coalition's report "Mapping Demand Response in Europe Today" (2015). The document describes the demand response regulation that existed at that time in Directive 2009/72,

[57] *Ibid.*

[58] Nina Voulis et al., "Rethinking European energy taxation to incentivise consumer demand response participation," *Energy Policy* 124 (2019): 166, https://doi.org/10.1016/j.enpol.2018.09.018.

[59] *Ibid.*

[60] *Ibid.*

which defined energy efficiency/demand-side management, as well as in the Directive 2012/27 and Network Codes.

More importantly, the document describes ways to further development of the regulatory field. The authors identify four key areas, each of which is aimed at removing existing regulatory barriers and ensuring demand response:

- Enable Consumer Participation;
- Create Viable Products;
- Develop Measurement and Verification Requirements;
- Ensure Fair Payment and Penalties[61].

With regard to consumer participation enablement, SEDC emphasizes that the legal framework should guarantee conditions for non-discriminatory participation of new entities – especially independent aggregators – competing with incumbent companies on equal terms. This requires a standardized legal mechanism governing the interaction between aggregators and suppliers/BRPs, including:

- procedures for calculating delivered energy volumes;
- compensation formulas that reflect actual energy costs;
- mandatory rules for data exchange without disclosing commercially sensitive information[62].

With regard to creation of viable products, the authors point out that the regulation of market products should ensure technologically neutral access for consumers to flexibility and system services markets. It is the regulator and system operator who shall create rules of participation that exclude generation privileges and ensure equal competition among demand resources. At the same time, the document emphasizes that there are no uniform standards for all EU Member States, and the regulatory design of demand response programs shall be consistent with national market characteristics, while remaining focused on expanding demand participation and meeting system needs[63].

With regard to development of measurement and verification requirements, the document suggests that regulatory requirements for measurement and verification in demand response should ensure transparency, non-discrimination, and protection against abuse. Basic methodologies for determining reduced consumption shall be publicly available and sufficiently accurate, but standardization is only permitted to the extent that it takes into account the diversity of activation

[61] Smart Energy Demand Coalition. *Mapping Demand Response in Europe Today*. Brussels, 2015: 28. https://smarten.eu/reports/mapping-demand-response-in-europe-today-2015/.

[62] *Ibid.*, 29-30.

[63] *Ibid.*, 30-31.

types and consumption objects. The document emphasizes that it is the national regulator or system operator that shall set such standards, based on existing balancing market practices[64].

With regard to ensuring of fair payment and penalties, the authors states that the legal regulation of demand response settlements shall be based on the principles of transparency, non-discrimination, and equivalent remuneration. Remuneration terms, including the calculation of the volume and cost of services provided, should ensure equal competition with generation: demand resources shall receive equitable remuneration for services of comparable system utility. The SEDC pointed out that historical guarantees for generators can artificially lower market prices and thus force out new players, in particular aggregators. According to the authors, the preferred model for settlements with flexibility service providers is Pay-as-Cleared, as it ensures maximum competition and efficient pricing[65].

Finally, the document highlights the necessity of fair and differentiated application of sanctions: both generation and demand resources should be held accountable for service underdelivery, but the calculation of sanctions shall take into account the difference in risks and the nature of services in order to avoid regulatory discrimination and not prevent consumers from participating in flexibility markets[66].

Thus, the analyzed report is one of the first comprehensive analytical works that not only systematically records the legal basis of demand response at that time, but also formulates proposals for the further development of regulation.

It is worth paying attention to the EPFL Energy Center's report "Demand-Side Flexibility for Energy Transitions: Policy Recommendations for Developing Demand Response" (2016). Authors provide analogous recommendations for improving the regulatory framework as in the report analyzed above.

The report emphasizes the need to reconsider the distribution of roles and responsibilities among key actors in the electricity market (TSOs, DSOs, BRPs) in the context of the energy transition and the growth of active participation of customers. The document assumes that the development of demand flexibility will lead to the emergence of new players, primarily aggregators and digital energy service providers, whose activities will put pressure on the dominant position of traditional utility companies. Accordingly, in order to prevent conflicts of interest and protect competition, it is necessary to create regulatory conditions in which DSOs and other entities can adapt their business models without resorting to defensive strategies against new

[64] *Ibid.,* 33-34.
[65] *Ibid.,* 34-35.
[66] *Ibid.*

entrants, but rather cooperate with them. The authors also emphasize that responsibility for imbalances shall be placed on those producers who create such imbalances[67].

According to the report, the development of demand response requires a review of price regulation: maintaining regulated tariffs to protect household consumers leads to a loss of price signals and, as a result, blocks their participation in demand flexibility. Deregulation of retail prices is seen as a legal tool to increase competition in the market and unlock the potential of smart metering, enabling a transition to dynamic and individualized tariff offers. The authors also draw attention to the need to remove barriers to market entry for aggregators[68].

The report highlights that current models of the network regulation in the EU often create distorted incentives that hinder the development of demand response: cost-plus regulation rewards capital investment but does not encourage digital solutions and load flexibility. To eliminate such structural discrimination, tariff and investment regulation needs to be revised, and subsidies that contradict decarbonization goals (e.g., support for coal generation) need to be abolished, as they push demand response out of the market. For the uniform implementation of demand response at the EU level, it is proposed to develop and update network codes that are directly applicable and establish mandatory rules for market access and consumer participation in system balancing[69].

CEER provided recommendations to EU Member States on assessing the degree of implementation of the demand response mechanism in their national legislation. In particular, "Handbook for National Energy Regulators: How to assess retail market functioning" (2017) mentions metrics such as 'Availability of value added services for implicit demand response and self-generation' (Metric 10) and 'Availability of explicit demand response offers' (Metric 13).

One of the purposes of Metric 10 is formulated as follows:

> The availability of demand response offers and flexibility services can indicate an innovative, competitive and diversified market. It can offer consumers the opportunity to lower energy costs by adapting to time varying prices that reflect price formation on well-functioning wholesale market e.g. settlement against hourly prices[70].

This shows that even before the Clean Energy Package, European institutions understood the importance of demand response mechanisms for the energy system.

When analyzing publications outside of EU, attention should be paid to the IRENA's report "Demand-side flexibility for power sector transformation" (2019). IRENA emphasizes that

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[67] Anjali Nursimulu, EPFL Energy Center and International Risk Governance Center, "Demand-Side Flexibility for Energy Transitions: Policy Recommendations for Developing Demand Response," *SSRN Electronic Journal* (2016): 19, https://doi.org/10.2139/ssrn.2831868.

[68] *Ibid*., 20-21.

[69] *Ibid*., 21-22.

[70] CEER, *supra note*, 30: 24.

achieving energy transition goals requires improvements in market design to stimulate demand flexibility. The report highlights key areas for reforms:

- introduction of time-of-use tariffs as a tool for transmitting accurate price signals;
- development of system services markets where demand can earn revenues from provision of ancillary services[71];
- integration of distributed resources, including active customers, to participate in wholesale and balancing market segments; and
- increasing the time granularity of the market for more accurate accounting of flexibility[72].

All these elements are aimed at creating market conditions for demand response, ensuring its contribution to the stability of the energy system.

In summary, it is worth highlighting the report "Demand-Side Flexibility for Energy Transitions: Policy Recommendations for Developing Demand Response." Its authors point to the need to unify the regulation of demand response in the EU (as discussed in Part 2); their recommendation to develop and update network codes to unify demand response in the EU anticipated the development of Network Code on Demand Response (DR NC).

Such was the discourse in scientific articles and analytical reports at the time of the adoption of the Clean Energy Package.

1.2.2. Clean Energy Package provisions

The idea of reacting of demand in legislation existed even before the Clean Energy Package. For example, the third energy package included a mechanism for energy efficiency/demand-side management. Its definition was enshrined in Directive 2009/72 and was as follows:

> 'energy efficiency/demand-side management' means a global or integrated approach aimed at influencing the amount and timing of electricity consumption in order to reduce primary energy consumption and peak loads by giving precedence to investments in energy efficiency measures, or other measures, such as interruptible supply contracts, over investments to increase generation capacity, if the former are the most effective and economical option, taking into account the positive environmental impact of reduced energy consumption and the security of supply and distribution cost aspects related to it[73];

[71] According to article 2(48) of the Directive 2019/944, 'ancillary service' means a service necessary for the operation of a transmission or distribution system, including balancing and non-frequency ancillary services, but not including congestion management.

[72] IRENA. *Demand side flexibility for power sector transformation*. Abu Dhabi, 2019: 35. https://www.irena.org/publications/2019/Dec/Demand-side-flexibility-for-power-sector-transformation.

[73] Directive 2009/72/EC, article 2(29). EUR-Lex. Accessed 16 November 2025. https://eur-lex.europa.eu/eli/dir/2009/72/oj/eng.

This definition has similar features to the concept of demand response that exists today in Directive 2019/944. Both definitions provide for the possibility of influencing the volume and profile of electricity consumption by end users. In both cases, load change is seen as a tool for reducing peak demand and ensuring the reliability of the power system.

However, there are significant differences between the definitions. Directive 2009/72 interprets demand-side management primarily as an element of energy system planning and development, as well as ensuring security of supply. Demand-side management, like energy efficiency measures, serves as an alternative to investments in new generation. Interruptible contracts reflected an early form of consumer participation in reducing demand during peak hours, but such reduction was not recognized as a service that could be provided on the market.

On the contrary, Directive 2019/944 establishes the market nature of demand response. Price signals that stimulate payments, participation in organized markets and aggregation are becoming important elements. Here, the final customer is legally recognized as an active market participant who can not only reduce but also increase the load by selling their flexibility as a service.

Continuing the logic of developing demand-side management as an alternative to building new generation capacity, Article 8 of Directive 2009/72 places energy efficiency/demand-side management on a par with the introduction of new generation. This provision expressly stipulates that, in the interests of ensuring security of supply, Member States may organize tenders for the construction of new capacity or for the implementation of demand-side management measures. Thus, measures to reduce or shift consumption are considered a functional equivalent to investments in generation – a tool capable of achieving the goal of energy security, but in a different way[74].

In addition to the measures described above, Article 25(7) of the Directive 2009/72 establishes the obligation for distribution system operators to take demand-side management into account when planning network infrastructure. Demand-side management and distributed generation shall be assessed as potential means of preventing or postponing network investments, which once again demonstrates the perception of demand-side management as an approach to infrastructure development rather than a form of consumer participation in the market[75].

When describing demand response regulation prior to the Clean Energy Package, attention should also be paid to Directive 2012/27. This directive uses the concept of demand response. The directive established the obligation of EU Member States to ensure the participation

[74] *Ibid*., article 8(1).
[75] *Ibid*., article 25(7).

of demand flexibility alongside supply in wholesale and retail electricity markets, as well as to promote its participation in balancing, reserve, and other system services markets. To this end, EU Member States shall develop technical conditions for demand response participation based on the requirements of the relevant markets and the actual capabilities of consumers and aggregators[76].

Thus, Directive 2012/27 reflects an important change: demand response is now considered a market mechanism for which EU Member States shall ensure appropriate regulatory conditions in the electricity market.

Now let us move on to the main act of the Clean Energy Package – Directive 2019/944.

In the explanatory memorandum to the proposal for Directive 2019/944[77], the European Commission emphasized the necessity of a structural update of the market design, as the existing rules were oriented towards centralized generation and *'limited participation of consumers'*. In the context of the growing share of RES, legal framework shall ensure consumer involvement in market processes, including the provision of demand flexibility.

In this regard, the proposal envisaged the creation of short-term markets (intraday and balancing) as a key instrument for the integration of RES. The European Commission explicitly stated that such markets shall be open not only to generators, but also to participants capable of providing back-up solutions, namely: demand response, energy storage operators, and flexible distributed generation[78]. Thus, demand response is considered a market function.

Particular emphasis is placed on provision of cross-border flexibility. The Commission notes that the lack of integrated short-term markets leads to inefficiency and increases the cost of the energy transition. Accordingly, the proposal aims to remove regulatory barriers to cross-border demand response and prevent the fragmentation of the single European market, which could create new market barriers and undermine competition[79].

Proposal laid down the following definition of demand response:

> 'demand response' means the change of electricity load by final customers from their normal or current consumption patterns in response to market signals, including time-variable electricity prices or incentive payments, or in response to acceptance of the final customer's bid, alone or through aggregation, to sell demand reduction or increase at a price in organised markets [...][80].

With minor linguistic amendments, this definition was included in the adopted text of the directive.

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[76] Directive 2012/27, article 15(8). EUR-Lex. Accessed 17 November 2025. https://eur-lex.europa.eu/eli/dir/2012/27/oj/eng.

[77] EUR-Lex, *supra note*, 36.

[78] *Ibid.*, Explanatory Memorandum.

[79] *Ibid.*, Explanatory Memorandum.

[80] *Ibid.*, article 2(16).

Article 17 of the proposal for Directive 2019/944 sets out requirements for EU Member States to implement the demand response mechanism in their national legislation. Thus, it was proposed that Member States shall be required to ensure that end consumers and aggregators can participate on an equal terms with generation in trading segments of the market as well as in the procurement of ancillary services by network operators[81].

A key element of regulation was the obligation to create a regulatory environment that encourages the activities of aggregators. EU Member States shall establish a minimum set of legal guarantees for aggregators:

> (a) the right for each aggregator to enter the market without consent from other market participants;
> (b) transparent rules clearly assigning roles and responsibilities to all market participants;
> (c) transparent rules and procedures for data exchange between market participants that ensure easy access to data on equal and non-discriminatory terms while fully protecting commercial data;
> (d) aggregators shall not be required to pay compensation to suppliers or generators;
> (e) a conflict resolution mechanism between market participants[82].

The adopted version of the directive provides for an additional guarantee. Thus, EU Member States shall ensure that *'final customers who have a contract with independent aggregators not to be subject to undue payments, penalties or other undue contractual restrictions by their suppliers'*[83].

In addition, EU Member States shall ensure access to demand response for all organized markets. To this end, national regulators and system operators shall develop clear technical conditions for participation based on the characteristics of the specific market and the technical capabilities of demand response, and such rules shall explicitly include a mechanism for the participation of aggregators[84].

In the context of demand response, the proposal also regulated the activities of DSOs and TSOs.

For DSOs, EU Member States shall ensure the possibility of purchasing flexibility services, including demand response, distributed generation, and energy storage, when such resources can replace costly network expansions and improve network efficiency. DSOs shall be

[81] *Ibid.*, articles 15(1), 15(2).
[82] *Ibid*., article 15(3).
[83] Directive (EU) 2019/944 (as amended by Directive (EU) 2024/1711 of the European Parliament and of the Council of 13 June 2024 amending Directives (EU) 2018/2001 and (EU) 2019/944 as regards improving the Union's electricity market design), article 17(3)(e). EUR-Lex. Accessed 18 November 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32024L1711.
[84] EUR-Lex, *supra note*, 36: article 15(5).

responsible for developing standardized market products that ensure the full participation of all market participants. In their network development plans, DSOs shall demonstrate that they are using demand response as an alternative to network expansion[85].

TSOs, in turn, shall ensure the availability of ancillary services, including demand response services, as a means of achieving reliable and efficient operation of the electricity transmission system. In addition, TSOs, together with regulators, shall develop technical conditions for demand response resources to access the balancing market, where their services shall be purchased on non-discriminatory terms, with the participation of all market participants[86].

The above-described functions of system operators with regard to demand response were included in the adopted version of the directive with minor linguistic and technical legal amendments.

The analyzed provisions of Directive 2019/944 have not changed since its adoption and, as of the date of completion of this research, remain in their original form.

The provisions of the Directive 2019/944 are further developed in Regulation 2019/943.

The proposal for the regulation on internal electricity market[87] establishes general principles for the functioning of electricity markets, a number of which relate to demand response:

- measures that distort price formation or create disincentives for the development of flexible demand are unacceptable;
- consumers and small businesses shall be able to participate in the market by combining offers from several demand facilities;
- market rules shall provide investment incentives for demand response alongside generation, storage, and energy efficiency, guarantee equal conditions of participation for all types of resources, and ensure effective dispatching covering not only generation but also demand response[88].

However, when dispatching generation facilities and demand response, deviations from market and non-discriminatory rules are allowed in order to give priority to renewable energy sources and new technologies[89]. Non-market methods are also allowed for redispatching[90] if all

[85] *Ibid*., articles 32(1), 32(2).

[86] *Ibid*., articles 40(1)(d), 40(4)(b).

[87] "Proposal for a Regulation of the European Parliament and of the Council on the internal market for electricity (recast) COM/2016/0861 final - 2016/0379 (COD)". EUR-Lex. Accessed 18 November 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52016PC0861.

[88] *Ibid*., paragraphs (b), (d), (f), (i), (l) of article 3(1).

[89] *Ibid*., article 7(3).

[90] According to article 2(26) of the Regulation 2019/943, 'redispatching' means a measure, including curtailment, that is activated by one or more transmission system operators or distribution system operators by altering the generation, load pattern, or both, in order to change physical flows in the electricity system and relieve a physical congestion or otherwise ensure system security.

market methods have been used or are ineffective. In such cases, demand facilities shall receive adequate financial compensation[91].

Market operators were required to ensure that the size of products in day-ahead and intraday markets are sufficiently small (1 MW or less) so that demand-side response shall be ensured[92]. The European Commission was tasked (delegated powers) with developing network codes, particularly in the area of demand response, including aggregation, energy storage, and demand curtailment rules[93].

All these provisions, with linguistic and technical-legal amendments, were included in the adopted text of the regulation and remain in force without any fundamental changes as of the date of completion of this research.

1.2.3. Concept development: discourse after adoption of the Clean Energy Package

Scientific articles

Unlike active customers, following the adoption of the Clean Energy Package, there has been discussion in scientific literature regarding changes to the definition and mechanism of demand response.

When describing issues related to changing the definition, it is worth taking a closer look at the article by Johanna L. Mathieu et al. "A New Definition of Demand Response in the Distributed Energy Resource Era" (2024). It is a comprehensive study of the concept of demand response. The authors propose significant changes to the very concept of demand response, as well as its regulation, in order to fully implement the mechanism in the distributed generation paradigm.

In their work, the authors compared the definition of demand response in the US, Australia, the EU, and its Member States and proposed their own definition:

> Demand response is the actions of customer-sited energy resources downstream of metering points to voluntarily, actively, and temporarily adjust their electricity production and/or consumption in response to signals (e.g., commands, prices, measurements)[94].

Comparing this definition with that enshrined in Directive 2019/944, it should be noted that the definition proposed by scholars seems to be more appropriate from a theoretical point of

[91] EUR-Lex, *supra note*, 87: articles 12(2), 12(6).
[92] *Ibid*., article 11(2).
[93] *Ibid*., article 55(1)(n).
[94] Johanna L. Mathieu et al., "A New Definition of Demand Response in the Distributed Energy Resource Era," *IEEE* (2024): 4, https://doi.org/10.48550/arXiv.2410.18768.

view. However, the legally established definition, referring to specific demand response mechanisms (*'[...] 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 organized market [...] whether alone or through aggregation'*[95]) logically integrates demand response into the existing legal framework and provides EU Member States with guidance on how to implement this mechanism in their national legislation. This will contribute to legal certainty and ensure the possibility of real engagement of all market participants interested in demand response.

According to the authors, their proposed definition provides a new way of describing demand response services, market mechanisms, and technological requirements in the era of distributed energy resources. In constructing the definition, the authors excluded any target settings ("for what" demand response is used) and focused only on "what" demand response is in essence. According to their plan, this construction allows for covering a wide range of existing and future practices: from traditional load shedding/shifting and participation through aggregators in capacity, energy, and system services markets to local services in distribution networks, building load coordination, controlled EV charging, and flexible connection schemes (non-firm agreements)[96].

At the same time, the authors outline what is not considered as a demand response. The definition excludes: energy efficiency (as a permanent, rather than temporary, reduction in consumption), any forced or involuntary actions on the part of the grid company or system operator (underfrequency load shedding, forced voltage reduction, etc.), as well as responses from not customer-sited assets (grid devices, utility-owned storage). The cut-off criteria are the absence of voluntary/active customer participation and the fact that the resource is not located on the consumer side[97].

The authors then describe how their proposed definition allows for a new description of demand response services, monetization mechanisms and the necessary implementation mechanisms. They identify four types of demand response services: traditional, system, local network, and behind-the-meter, and emphasize that previous definitions mainly covered only traditional programs[98].

[95] Directive 2019/944 (as amended by Directive (EU) 2024/1711 of the European Parliament and of the Council of 13 June 2024 amending Directives (EU) 2018/2001 and (EU) 2019/944 as regards improving the Union's electricity market design), article 2(20). EUR-Lex. Accessed 19 November 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32024L1711.

[96] Mathieu, *supra note*, 94: 4.

[97] *Ibid*. 4-5.

[98] *Ibid*., 5.

Traditional demand response is a tool for one-time discrete events, such as contingencies and predictable peak load periods, focused on large industrial and commercial consumers, dynamic pricing, and demand bidding[99].

In the system services section, the authors show that consumer energy resources can participate in energy, capacity and system services markets alongside supply, but in many jurisdictions this is not yet fully permitted; at the same time, it is exactly small consumer energy resources that, due to their continuously-responsiveness, are considered to be the main resource for balancing in the future[100].

Local grid services are described as the use of consumer energy resources to manage power flows in distribution networks, where the buyer is typically a DSO/utility, and the services themselves serve as an alternative to grid upgrades[101].

Behind-the-meter services are described as bill reduction and local constraint management: retail price arbitrage, peak network charge reduction, and physical constraint management, which therefore provides a triple economic effect[102].

It is worth to comment the services proposed by the authors. With regard to local services, it should be noted that the authors anticipated their appearance in the DR NC. Regulation of such services is considered necessary, as they are essential for the stability of distribution networks, which are a natural monopoly, and also ensure security of supply.

However, regulation of behind-the-meter services is not considered necessary for the following reasons. First, these services have no impact on transmission and/or distribution systems, which, again, are natural monopolies and therefore subject to regulatory intervention. Second, reducing electricity bills is a matter of financial settlements between the supplier and the consumer, and in a liberalized market, intervention in tariffs is undesirable.

The authors then identify four dominant options for implementing demand response – direct procurement, aggregation, P2P trading, and unilateral pricing – and emphasize that existing definitions mainly cover only unilateral pricing and, to some extent, direct procurement. The authors describe approaches to implementing the above options. They oppose regulatory mechanisms (administratively set tariffs and market rules that often give distorted signals) to competitive mechanisms (auctions and market-based demand response procurement schemes that provide individual signals and more efficient resource allocation)[103].

[99] *Ibid.*
[100] *Ibid.*
[101] *Ibid.*
[102] *Ibid.*
[103] *Ibid.*

At the end of the article, the authors emphasize the need for further research of the demand response mechanism. With regard to research in the field of legal regulation, the authors point to the necessity of *'removing distortive regulatory interventions, creating novel markets to unlock untapped demand response value (e.g., local network services), and removing restrictive market access requirements in existing markets. The latter requires defining roles and responsibilities, including removing regulatory and legal barriers to allow consumer energy resources to offer demand response, directly or through aggregators, in all electricity markets'*[104].

Although other articles directly or indirectly related to demand response made a smaller contribution to the scientific discourse, are nevertheless worth mentioning.

The article by Stede et al. "The role of aggregators in facilitating industrial demand response: Evidence from Germany" (2020) analyzes how industrial demand response is organized in the German legal and market model and what role aggregators actually play in this mechanism. In general, the article analyzes the technical and economic aspects of demand response, but some parts of it will also be useful for legal analysis.

The authors of the article identify six functional roles of aggregators:

> Aggregators (1) identify flexibility potentials, and (2) help industrial companies realise them on their premises. Moreover, they (3) automate the activation of flexibility potentials, and (4) sell flexibility in electricity markets. Finally, demand response aggregators may provide (5) hedging solutions to stabilise revenues from providing flexibility and (6) bundle several services across electricity and other (energy) markets[105].

To facilitate demand response, the authors propose the following policy changes:

- lowering size thresholds for participation in balancing markets [...] which reflect the physical properties of demand response units;
- providing a suitable intraday auction platform for industrial loads[106].

Fouad El Gohary's article "The price signal paradigm – On the evolution and limitations of demand-side flexibility in the EU" (2024) is also worth mentioning. The article analyzes demand-side flexibility as an instrument of energy transition in the EU. The author notes that the real effectiveness of demand-side flexibility as a policy tool remains limited. In his opinion, the development of demand-side flexibility in the EU has reached an impasse due to the dominance

[104] *Ibid.*, 10.

[105] Jan Stede et al., "The role of aggregators in facilitating industrial demand response: Evidence from Germany," *Energy Policy* 147 (2020): 9, https://doi.org/10.1016/j.enpol.2020.111893.

[106] *Ibid.*

of the “price signal paradigm”, where flexibility is confined to the task of users responding to price[107].

The author criticizes this approach, arguing that consumers do not always act as rational economic agents. He warns that the lack of alternative approaches to demand flexibility could limit the integration of renewable energy sources, increase network congestion and significantly increase the cost of transforming the electricity sector, making a review of the price signal paradigm a “vital” issue for the energy transition. The author suggests seeking reforms within the market model, but with system operators, suppliers and national regulators taking on a greater share of responsibility for developing flexibility[108].

Based on empirical research, many scientists argue that most consumers are not rational and prefer their own comfort to economically advantageous solutions. Therefore, we should agree with the author that the main role in consumer engagement in demand response shall lie not with the consumer themselves, but with system operators and regulators, since flexibility services are primarily essential for networks and energy transition purposes, and only secondarily serve as a source of income for consumers.

The article by Ranaboldo et al. “A comprehensive overview of industrial demand response status in Europe” (2024) provides an overview of the status of industrial demand response in Europe, in which technical, market, and organizational aspects are considered together with the regulatory framework. The authors point out that the regulation of flexibility markets in EEC countries includes set of provision starting from pre-qualification procedures by the system operator (application, proof of technical capabilities, telemetry, and communication) to requirements for measuring and verifying the effect. The authors draw attention to the fact that the parameters of products in balancing markets are of key importance for demand response regulation: the time of full activation, the time window during which flexibility shall be available, and the minimum capacity, which is often set at a level that is unattainable for many consumers (e.g., 1 MW). The examples of Spain, Germany, and Norway show a lack of product standardization in balancing markets, which limits industry access to demand response[109].

Worth mentioning is the comparative legal study by Cátia Silva et al. “Demand Response Implementation: Overview of Europe and United States Status” (2023). Authors show that in the EU, despite the existence of framework obligations (including Directive 2012/27 and subsequent energy legislation), demand response has long remained either not allowed or “blocked” by unclear

[107] Fouad El Gohary, "The price signal paradigm – On the evolution and limitations of demand-side flexibility in the EU," *Energy Policy* 192 (2024): 1, https://doi.org/10.1016/j.enpol.2024.114239.

[108] *Ibid*., p. 7-8.

[109] M. Ranaboldo et al., "A comprehensive overview of industrial demand response status in Europe," *Renewable and Sustainable Energy Reviews* 203 (2024): 8, https://doi.org/10.1016/j.rser.2024.114797.

rules, high participation thresholds, and a lack of adapted market products[110], while in the US, regulators' decisions to allow participants of different sizes to enter wholesale markets played a key role in successful implementation of demand response[111]. The article formulates the main directions of reform: standardization of regulation, protection of investments, and alignment of regulation with the Net Zero Emissions logic[112].

When describing the scientific discourse, it should be mentioned that there are a number of studies examining the socio-behavioral aspects of demand response. These include articles by Adrian Tantau et al. "Acceptance of Demand Response and Aggregators as a Solution to Optimize the Relation between Energy Producers and Consumers in order to Increase the Amount of Renewable Energy in the Grid" (2021)[113], Selin Yilmaz et al. "Prioritize your heat pump or electric vehicle? Analysing design preferences for Direct Load Control programmes in Swiss households" (2021)[114] and Tadeusz Skoczkowski et al. "Participation in demand side response. Are individual energy users interested in this?" (2024)[115].

There are also a number of studies analyzing regulatory, economic, technical, and other barriers and blockers of demand response, which are described in more detail in Part 2 of this research.

In summary, the following key statements should be commented.

The definition of demand response proposed by Mathieu et al. may be more refined than the definition in Directive 2019/944, however, it is not integrated into the existing legal framework of the electricity market.

El Gohary's assertion that the development of demand response has reached an impasse due to the dominance of the price signal paradigm corresponds with the opinion of Nilsson et al. and Strbac on the irrationality of household consumers and therefore appears to be justified. The irrationality of consumer behavior as a barrier for demand response is described in more detail in Part 2.

[110] Cátia Silva, Pedro Faria and Zita Vale, "Demand Response Implementation: Overview of Europe and United States Status," *Energies* 16, 4043 (2023): 6-7, https://doi.org/10.3390/en16104043.

[111] *Ibid*., p. 9-10, 16.

[112] *Ibid*., p. 16.

[113] Adrian Tantau et al., "Acceptance of Demand Response and Aggregators as a Solution to Optimize the Relation between Energy Producers and Consumers in order to Increase the Amount of Renewable Energy in the Grid," *Energies* 14, 3441 (2021), https://doi.org/10.3390/en14123441.

[114] Selin Yilmaz, Peter Cuony and Cedric Chanez, "Prioritize your heat pump or electric vehicle? Analysing design preferences for Direct Load Control programmes in Swiss households," *Energy Research & Social Science* 82 (2021), https://doi.org/10.1016/j.erss.2021.102319.

[115] Tadeusz Skoczkowski et al., "Participation in Demand Side Response. Are individual energy users interested in this?," *Renewable Energy* (2024), https://doi.org/10.1016/j.renene.2024.121104.

Ranaboldo et al. emphasize the necessity of standardizing flexibility products, which we also consider a necessary measure. The challenges of standardizing flexibility products are described in section 2.2.

Analytical documents and policy papers

It is worth paying attention to the Policy Report "Explicit Demand Response for small end-users and independent aggregators" (2022) in which the authors analyze the implementation of demand response in EU Member States and summarize this practice. At the pan-European level, the authors note a discrepancy between the obligations of EU Member States enshrined in Directive 2019/944 and the actual deployment of demand response. As of the end of 2021, demand response through aggregation for small consumers (primarily households) have been 'legally allowed and technically possible' in most EU Member States (22). As a key conclusion, the authors emphasize that 'availability of the option to engage in DR is largely regulatory'. It is separately emphasized that for small final customers, demand response is possible almost exclusively in an aggregated form, since only the aggregate load reaches the thresholds for participation in the markets[116].

The authors identify the following factors that influence the participation of small final customers in demand response:

- size of dispatchable loads;
- the roll-out of smart meters;
- potential for savings in the electricity bill;
- need for flexibility;
- openness to use demand response as a flexibility source;
- level of awareness and education on the side of end-users[117].

It is worth paying attention to the CERRE analytical report "Flexibility in the Energy Sector" (2025). Describing the relevant EU legislation on flexibility in the electricity market, the authors of the report characterize it as 'comprehensive and adequate' and provide the following recommendations for its implementation in EU Member States.

CERRE proposes to establish at the regulatory level an integrated, whole-system approach to flexibility planning, whereby coordination between electricity, gas and heat becomes a mandatory part of national and European planning procedures. The authors link this task to the EU's current strategy for energy system integration, the updated electricity market reform rules,

[116] Iolanda Saviuc et al., *Explicit Demand Response for small end-users and independent aggregators – Status, context, enablers and barriers* (Luxumbourg: Publications Office of the European Union, 2022): 4. https://publications.jrc.ec.europa.eu/repository/handle/JRC129745.

[117] *Ibid.*

and the new obligation for Member States to assess flexibility needs with the participation of all DSOs and TSOs, on the basis of which ACER shall form a pan-European assessment[118].

We should agree with CERRE on the need for a "whole-system" approach. All energy sectors (electricity, gases, heat, oil and coal extraction etc.) are closely linked and constantly interdependent. This was clearly demonstrated by the crisis of 2022, when sharply rising gas prices in Europe led to higher electricity and heating prices, even though gas is not the only fuel used to generate electricity.

The authors point out that in order to develop flexibility, including demand response, it is necessary to establish regulations whereby price signals at the generation, retail market, and network charges levels are 'sufficiently sharp' and consistent. Remuneration for flexibility services (including energy storage) shall be formed through a combination of energy markets and longer-term flexible capacity mechanisms, and the price structure shall reflect the balance of supply and demand at different time horizons, including the shortest ones. This logic applies to both supply pricing models and demand response incentive schemes, as the strength and predictability of the price signal determines whether consumers (or their intermediaries) are actually willing to change their consumption[119].

The authors separately draw attention to the necessity of accelerating demand response. CERRE indicates that, despite the right of consumers to participate in all market segments and receive remuneration for the flexibility they provide, which was enshrined in the Clean Energy Package, the actual implementation of these norms in member states is lagging behind: small-scale resources face barriers to entry, and mechanisms for participation in congestion management at the transmission and distribution levels are often not implemented in practice. In this context, the DR NC which is currently being developed is seen as a key tool for converting legislative requirements into detailed market and technical regulation[120].

CERRE emphasizes that even the optimal legal regime and correctly adjusted price signals will not provide the required level of flexibility without digital infrastructure, and therefore digitalization is a necessary condition for the scalability of demand response and other forms of flexibility. This requires regulatory measures to stimulate the digitalisation of networks, meters and consumer devices, ensuring the use of smart meters for system flexibility and removing legal uncertainty around data sharing, privacy and cybersecurity[121].

[118] CERRE. *Flexibility in the Energy Sector*. Brussels, 2025: 65-66. https://cerre.eu/publications/flexibility-in-the-energy-sector/.
[119] *Ibid.*, 66.
[120] *Ibid.*, p. 66-67.
[121] *Ibid.*, p. 67.

Finally, with regard to hydrogen, CERRE proposes an "adaptive regulation" approach: to establish the role of hydrogen as a flexibility resource, while continuing to develop the hydrogen market for other decarbonization purposes[122].

It is also worth mentioning a number of ACER reports describing barriers to the development of demand response. These barriers will be analyzed in detail in the Part 2 of this research.

When describing legislative proposals, special attention should be paid to the proposed Network Code on Demand Response (DR NC), which has been repeatedly mentioned in recent years in scientific literature and analytical reports. The DR NC proposal was developed in 2024 by the EU DSO Entity and ENTSO-E, and in 2025 it was amended by ACER. The ACER's version of the proposal will be further analyzed.

One of the objectives of the DR NC as set out in the proposal[123], is *'setting out clear and objective principles for the development of rules regarding demand response, energy storage, distributed generation and demand curtailment, including rules on aggregation'*[124].

Before moving on to describing the novelties in legal regulation, it should be noted that the proposal to the DR NC introduces a number of definitions that are important for the development of demand response concept:

> 'local market' means the entirety of institutional, commercial and operational arrangements that establish market-based procurement of local services[125];
>
> 'local service' means energy or capacity provided by a service provider to a TSO or DSO to solve intra-zonal physical congestion or voltage issues they have identified in their systems[126];
>
> 'local product' means a product defined by the procuring system operator for the market-based procurement of a local service[127];

Further on in the proposal to the DR NC, requirements for products and their providers are defined.

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[122] *Ibid*., p. 68.

[123] "Annex 1 – Amended Demand Response Network Code of the Recommendation No. 01/2025 of the European Union Agency for the Cooperation of Energy Regulators of 7 March 2025 on reasoned proposal for the establishment of the Network Code on Demand Response according to Article 59(1)(e) of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast)." ACER. Accessed 20 November 2025. https://www.acer.europa.eu/documents/search?search_api_fulltext=ACER+Recommendation+01-2025

[124] *Ibid*., article 3(1)(a).

[125] *Ibid*., article 2(5).

[126] *Ibid*., article 2(6).

[127] *Ibid*., article 2(8).

As for product requirements, first, EU Member States shall include in their national terms and conditions a Table of Equivalences, which compares the requirements for all balancing and local products by attributes and establishes simplified prequalification procedures for already registered service providing units / service providing groups[128].

Secondly, to determine the equivalence of products in the abovementioned Table of Equivalences, shall be established product attributes, including: availability window, preparation period, ramping period, full activation time, validity period, location, direction of activation, and others. The national terms and conditions shall include all congestion management and voltage control products. When forming these products, existing exchange/balancing products shall be used as a basis[129]. The products themselves shall be standardized[130] and meet the needs of operators[131].

With regard to the qualification of a participant as a provider of demand response and other local services, the DR NC establishes a set of basic requirements. Thus, the provider shall meet financial requirements and have information and communication technology infrastructure capable of receiving and processing signals from the system operator, as well as ensuring the exchange of measurement data for calculating the volume of services and financial settlements[132].

System users shall be able to switch their power-generating module or demand unit between service providers[133].

To ensure demand response as described in the DR NC, a common flexibility information system shall be in place in each EU Member State[134].

The procurement of local services shall be carried out on a market-based approach[135].

Coordination and interoperability between local, day-ahead, intraday, and balancing markets shall be ensured[136].

When developing a distribution system development plan, DSOs shall consider the use of local services as an alternative to network expansion or as a means of addressing physical congestion in the system[137].

Summarizing written in analytical documents, the following points should be noted.

[128] *Ibid*., article 16.
[129] *Ibid*., article 38(1).
[130] *Ibid*., article 38(2).
[131] *Ibid*., article 38(4).
[132] *Ibid*., article 17(1).
[133] *Ibid*., article 23(1).
[134] *Ibid*., article 25(1).
[135] *Ibid*., articles 32(1), 35(1).
[136] *Ibid*., article 34.
[137] *Ibid*., article 44(1).

The report “Explicit Demand Response for small end-users and independent aggregators” highlights problems with the implementation of demand response in EU Member States. This problem is indeed apparent and is given considerable attention in Part 2.

CERR emphasizes the need for a systematic approach to the implementation of demand response, as already mentioned in subsection 1.2.1, with which we agree.

This is the state of scientific discourse, analytical materials, and policy proposals at the time of drafting of this research.

To summarize the section, it should be noted that two opinions are expressed simultaneously in scientific literature: researchers of market design and legal regulation believe that all obstacles to stimulating demand response among household customers, the first of which is regulated tariffs, should be removed. Other researchers, who focus on consumer protection and consumer behavior, claims that most consumers are satisfied with the status quo. There is no discussion between these two groups.

In our opinion, regulatory barriers to demand response should be removed so that interested consumers can use this mechanism. However, the question of how strong shall be the incentives to participate in this mechanism needs further researches.

It is also worth noting that the changes described in scientific articles and analytical documents are mostly implemented by policymakers in network codes, including through the development of DR NC.

1.3. Conclusions from Part 1

1. Scientific articles and analytical documents published after the adoption of the Clean Energy Package note a persistent gap between the regulatory model enshrined in the EU acquis and national legislation. As of the end of 2022, a number of EU Member States have still not implemented key elements of active customer status. In addition to the legal enshrinement of the status, the tariff regulation model is a key enabler for end customers to become active market participants. With regard to demand response, the availability of the option to participate in this mechanism largely depends on regulatory issues. Thus, market access requirements and product parameters (minimum capacity, activation windows, measurement and verification requirements) play a key role; such requirements in some cases are excessive or insufficiently adapted to the specificities of consumer installations. These barriers are described in detail in the second part.

2. Scientific discussion highlights the contradictions of the price signal-based approach. On the one hand, the Clean Energy Package is based on the assumption of a rational final customer who responds to price signals. On the other hand, studies (in particular, the works of Lavrijssen and El Gohary) show that many consumers remain passive for a number of reasons

and make non-optimal decisions. Although El Gohary writes about the necessity for system operators and regulators to take on more responsibility for developing flexibility, there is generally no discussion in the literature about how to incentivize consumers to respond more actively to price signals, or whether incentives other than price are necessary in principle. Such a discussion would be useful for policymakers in further developing legislation.

3. It is worth noting that researchers characterize draft DR NC as a key tool for supplementing and detailing existing demand response regulations in EU law. DR NC is seen as a crucial act for the practical implementation of consumers' right to participate in electricity markets, as enshrined in Directive 2019/944. The role of the DR NC in overcoming barriers to such participation is described in detail in Part 2.

2. IDENTIFICATION OF BARRIERS TO CONSUMER PARTICIPATION IN DEMAND RESPONSE AND ANALYSIS OF WAYS TO OVERCOME THEM

2.1 Identification of barriers

Categorization

In this research, the barriers identified during the analysis were grouped according to their nature. Thus, the author identifies four main categories of barriers: regulatory[138], economic, technical and behavioral.

Regulatory barriers include cases where the obstacle arises primarily from the content or absence of legal norms (e.g., definition and legal status of active customers and aggregators, rules for access to customer data, etc.).

Economic barriers include cases where the obstacle is related to high costs (e.g., high capital expenditures).

Technical barriers are those related to infrastructure capabilities (e.g., limited technical ability to reduce peak demand among small consumers).

Behavioral barriers are those related to the human decision-making patterns and personal qualities of individuals as market participants (e.g., knowledge, trust, willingness to change consumer behavior, etc.).

It should be noted that a number of barriers are mixed in nature and cannot be classified into only one category. In such cases, the barrier is classified into two (and in one case, three) categories simultaneously. For example, restrictive product design (including minimum bid size) is classified as a regulatory and technical barrier. Thus, the minimum bid size is necessary because small generation or storage facilities will not have the necessary impact on physical processes in networks, and this size is enshrined in acts regulating the provision of ancillary and balancing services.

The numbering of barriers within a single source is sequential, despite categorization. This is necessary to emphasize the number of barriers described in each specific source.

Scientific articles

The analysis of the described barriers should begin with scientific literature. It should be noted that literature prior to 2017, when drafts of Directive 2019/944 and other documents comprising the Clean Energy Package were published, was not included in the analysis as it was no longer relevant.

[138] This research did not examine issues of tax regulation.

KJ Cseres's article "The Active Energy Consumer in EU Law" (2018)[139] mentions such behavioral barrier as the complexity of information about tariffs and participation in demand response. Thus, consumers are faced with an excessive and amount of complex information about tariffs and products, which makes it difficult for them to decide whether to participate in demand response. It should also be noted that the development of digital services and dynamic pricing not only expands consumer opportunities, but also creates a barrier for those who do not have sufficient digital literacy to participate in the digital transactions required for demand response[140].

Behavioral barriers are also mentioned in the article by Anders Nilsson et al. "Household responsiveness to residential demand response strategies: Results and policy implications from a Swedish field study" (2018). The article is interesting because the author postulates that the assumption of a rational consumer is unrealistic: household consumption behavior is rarely rational and is prioritized below other tasks[141]. As for barriers, it was identified a mixed, economic and behavioural barrier: weak financial incentives. Thus, potential savings on electricity bills are too small to motivate households to change their behavior.[142]

The analysis will be continued with another article that focuses primarily on behavioral barriers: Gareth Thomas et al. "Deliberating the social acceptability of energy storage in the UK" (2019). Thus, authors describes such behavioral barriers as:

1. Low awareness of energy system flexibility issues[143];
2. Distrust of large energy companies, which carries over to projects related to energy flexibility and storage[144].

From article "Prosumer aggregation policies, country experience and business models" by Moura and Brito (2019), it is possible to identify the following barriers:

A. Regulatory
    1. Direct prohibitions and restrictions on prosumer aggregation
       In some jurisdictions, legislation either explicitly prohibits aggregation or implicitly blocks it by requiring that a single generation unit be constructed on a single site and be linked to a single meter[145] .

[139] Cseres, *supra note*, 9: 227–244.
[140] *Ibid*., 243.
[141] Anders Nilsson et al., "Household responsiveness to residential demand response strategies: Results and policy implications from a Swedish field study," *Energy Policy* 122 (2018): 275, https://doi.org/10.1016/j.enpol.2018.07.044.
[142] *Ibid*.
[143] Gareth Thomas, Christina Demski and Nick Pidgeon, "Deliberating the social acceptability of energy storage in the UK," *Energy Policy* 133 (2019): 8-9, https://doi.org/10.1016/j.enpol.2019.110908.
[144] *Ibid*.
[145] Moura, supra note, 19: 823.

2. Lack of and difficulty in accessing network data on connection points
   For virtual metering and local network tariff calculation to work correctly, detailed data on consumption and generation points and their location in the network is required; such data is either unavailable or difficult to access, complicating the connection and metering processes[146].

B. Economic

3. Virtual metering is not cost-effective for suppliers with low margins
   Introduction of virtual metering leads to significant additional costs (billing software, new equipment, transaction and reconciliation costs), combined with small retail margins, reduces the incentives for suppliers to support such models[147].
4. Erosion of network operators' revenues due to self-consumption
   The widespread adoption of self-consumption reduces the amount of energy passing through the grid and subject to network tariffs, undermining the financial resilience of DSOs and creating a risk of underfunding for the development and operation of network infrastructure[148].

C. Technical

5. Insufficient equipment with metering and IT systems
   Existing meters and software do not provide the required level of measurement, verification, and data transmission (including for short billing intervals and comparison of consumption/generation in virtual metering)[149] .
6. Increased usage of distribution networks due to the growing number of active participants
   The expansion of the number of small generators and prosumers increases the complexity of network management and leads to increased usage of the grid infrastructure, for which existing networks and their digital systems are not yet fully prepared[150].
   It should be noted that this is precisely the problem that is being solved by the deployment of demand-side flexibility.

[146] *Ibid*., 828.
[147] *Ibid.*
[148] *Ibid.*
[149] *Ibid.*
[150] *Ibid.*

D. Regulatory and technical

7. Lack of specific regulation and IT-facilities for P2P trading and aggregation
   The activities of P2P platforms and aggregators are limited by both the lack of a clear legal framework and the underdevelopment of digital infrastructure in distribution networks[151].

An extensive number of barriers can be identified from the article by Stede et al. "The role of aggregators in facilitating industrial demand response: Evidence from Germany" (2020):

A. Regulatory

1. Lack of rules and market structures for demand response.
   In many market segments, there are no rules explicitly allowing demand-side resources to participate in the provision of services[152].
2. Lack of uniform demand response products in the EU.
   The lack of uniform product requirements in different EU Member States creates a barrier to scalable business models and cross-border participation in demand response[153].
3. Uncertainty regarding the rules of responsibility for imbalances for the aggregator.
   With separate roles for 'retailers' and balance responsible parties, it is unclear how aggregators are integrated into the imbalance responsibility system, which requires explicit regulatory clarification of their role[154].

B. Regulatory and economic

4. Network tariff design. Yearly peak demand-related charges (fixed charges) effectively penalize deviations from a flat demand profile and thus reduce the potential revenues from flexibility, making demand response less profitable[155].

C. Regulatory and technical

5. High minimum bid size.
   The minimum bid sizes set for participation in balancing markets limit the accessibility of these markets for final customers[156].

D. Technical and economic:

6. The need for expensive IT infrastructure to participate in demand response[157].

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[151] *Ibid*., 826.
[152] Stede, *supra note*, 105: 3.
[153] *Ibid*.
[154] *Ibid*.
[155] *Ibid*.
[156] *Ibid*.
[157] *Ibid*.

7. The complexity of calculating the baseline.
   To calculate the volume and cost of demand response services, it is necessary to reliably determine the baseline consumption profile, but forecasting such a baseline is a significant problem and creates complexities in the use (decrease) of load as an equivalent of generation[158] .
8. High transaction costs for collecting, processing and maintaining the information necessary for demand response (history of consumption, financial settlements and other information)[159].

The article by Parrish et al. "A systematic review of motivations, enablers and barriers for consumer engagement with residential demand response" (2020) mentions the following behavioral barriers.

1. Consumer mistrust:
   1.1. due to a lack of information and a lack of understanding of demand response.
   Mistrust arises even before joining the program and is related to the fact that users do not understand what demand response is, how it works, and who benefits from it[160].
   1.2. due to concerns about confidentiality and the motivation of energy companies.
   Users are afraid of a loss of privacy and perceive the goals of companies in demand response as suspicious, which further undermines trust[161].
   1.3. due to experiences of outages and lack of transparency after connection.
   Even after enrollment in demand response, trust can be undermined by installation delays, technical problems and a lack of transparency regarding dynamic rates and automation schedules[162].
   1.4. mistrust of other participants in collective/P2P schemes[163].
2. Financial risk of dynamic pricing.
   The real or perceived financial risk impact (because of high and unpredictable prices) of time-varying pricing (especially real-time and critical peak pricing) deters some consumers from participating[164].

[158] *Ibid.*
[159] *Ibid.*
[160] Bryony Parrish et al., "A systematic review of motivations, enablers and barriers for consumer engagement with residential demand response," *Energy Policy* 138 (2020): 5, https://doi.org/10.1016/j.enpol.2019.111221.
[161] *Ibid.*
[162] *Ibid.*, 6.
[163] *Ibid.*
[164] *Ibid.*

3. Fear of losing control with automation and direct load control. Automatic control and direct remote load control are perceived as a risk of losing control over household appliances and consumption[165].
4. Perception of demand response as complex and "burdensome" to daily routines, difficulty responding to price signals. Many consumers believe that changing their usual consumption patterns is inconvenient, requires effort, and disrupts their daily routine, especially with less predictable price schedules. In addition, the need to adjust the use of appliances to specific days or hours is perceived as too difficult a task[166].

In the article of Vrhovčak and Malbašić "Unlocking the Value of Aggregated Demand Response: A Survey of European Electricity Markets" (2023), an extensive number of problems was observed.

A. Regulatory
   1. Lack of harmonized legislation on demand response in the EU[167].
   2. The complexity and heterogeneity of electricity market designs in different EU Member States[168].
   3. Limited access to data and challenges related to data privacy[169].
   4. Regulatory uncertainty due to constant changes of rules[170].

B. Technical
   5. Lack of interoperability of demand response technologies. Heterogeneous technical solutions are poorly compatible with each other, which complicates the scaling and connection of resources into unified schemes[171].

C. Regulatory and economic
   6. Inconsistent and unequal incentives for demand response among different EU Member States[172].
   7. Dominance of large energy companies. In some countries, a small number of large utilities control the market and make

[165] *Ibid.*
[166] *Ibid.*
[167] Maja Božičević Vrhovčak and Bruno Malbašić, "Unlocking the Value of Aggregated Demand Response: A Survey of European Electricity Markets," *Energies* 16, 17 (2023): 10, https://doi.org/10.3390/en16176386.
[168] *Ibid.*
[169] *Ibid.*
[170] *Ibid.*, 10–11.
[171] *Ibid.*, 10.
[172] *Ibid.*

it difficult for new aggregators and demand response providers to enter to the market[173].

D. Technical and economic

8. The stochastic nature of aggregated demand response and the complexity of forecasting.

   Aggregators depend on the behavior of final customers, and their resources cannot be planned as firm as traditional generation[174] .

Let us continue the analysis with an article by Johanna L. Mathieu et al. "A New Definition of Demand Response in the Distributed Energy Resource Era" (2024). It describes the following barriers.

A. Regulatory

1. Absence or imperfection of the legal framework for aggregators and active customers (definitions, rights, obligations)

   According to the authors, this creates *an 'entry barrier for new market participants, which in turn may limit competitive pressure and innovation'*[175]. The authors also emphasize the necessity for aggregators to have access to consumer data[176].

2. Slow implementation of real-time pricing.

   According to the authors, the existing retail rate structure does not provide for demand response price signals[177].

B. Technical

3. Communication delays, weak protocol interoperability, and the need to ensure cybersecurity limit demand response scaling[178].

C. Behavioral

4. Low consumer interest and trust in demand response due to poor understanding of how the energy system works and mistrust of utility companies and new technologies[179].

D. Regulatory and technical

5. Restrictive market access requirements

   In particular, the authors point out that existing minimum bid size requirements

[173] *Ibid.*
[174] *Ibid.*, 11.
[175] Mathieu, *supra note*, 94: 9.
[176] *Ibid.*
[177] *Ibid.*
[178] *Ibid.*, 8.
[179] *Ibid.*, 10.

and long market lead times restrict access of consumer energy resources to the market[180].

E. Regulatory, technical and economic

6. The complexity of CER orchestration and high transaction/control costs. Thus, the authors note:

> barriers to adoption include CER orchestration complexity and difficulty justifying the costs of enabling CER orchestration [70]. Specifically, increasingly complex DR applications and algorithms may be difficult for DR operators to implement or regulators to oversee. The cost of establishing control of CERs and verifying results may be prohibitive compared to the availability of other resources[181] .

F. Technical and economic

7. High cost of IT solutions for demand response[182];
8. Insufficient deployment of smart meters[183];
9. Difficulty in accurately assessing the baseline[184].

G. Technical and behavioral

10. Risk of network constraints being violated

With insufficient information about the state of networks, demand response can lead to a decrease in system reliability, which will result in a loss of users' trust[185].

At the end of the literature review, it is worth noting the comprehensive study by Christina Leinauer et al. "Obstacles to demand response: Why industrial companies do not adapt their power consumption to volatile power generation" (2022). This article has a slightly different subject than the present research: Christina Leinauer et al. focused on industrial companies, while this research is mainly devoted to household and small non-household[186] customers. Nevertheless, some barriers to industrial demand response may also be relevant to household/small non-household consumers (including those that can be adapted for such consumers), as well as to new participants such as independent aggregators or smart grid operators.

It should be noted that the authors of this article used a different categorization than this study and identified seven categories of barriers. The barriers described were distributed according to the categorization of this study.

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[180] *Ibid*., 9.
[181] *Ibid*., 8.
[182] *Ibid*.
[183] *Ibid*., 9.
[184] *Ibid*., 8.
[185] *Ibid*., 9.
[186] In this study, small non-household customers refer to microenterprises and small enterprises as they are defined in article 2(6), 2(7) of the Directive 2019/944.

Among these barriers, the following are worth noting.

A. Regulatory
    1. Complex regulatory framework[187];
    2. Inconsistency of legal regulation between EU Member States[188];
    3. Gaps in legal regulation of access to data necessary for demand response and personal data protection[189];
    4. Uncertainty about future regulation[190].

B. Economic
    5. The need for capital-intensive investments in flexibility and limited access to capital (especially for small and medium-sized enterprises)[191];
    6. Unpredictability of prices and associated risks[192].

C. Technical
    7. Limited technical potential to reduce peak consumption by residential and small non-residential consumers[193];
    8. High requirements for IT systems[194];
    9. Lack of standardization and interoperability of IT systems[195].

D. Behavioral
    10. Low acceptance of demand response as a new technology[196];
    11. Skepticism towards fully automated interfaces (necessity of human control)[197];
    12. Perceived inconvenience of demand response provision due to bounded rationality and habits[198];
    13. Lack of knowledge about the operation of the energy system, flexibility and the possibility of participating in the provision of such services[199].

E. Regulatory and economic
    14. Insufficient public funding for demand response[200].

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[187] Christina Leinauer et al., "Obstacles to demand response: Why industrial companies do not adapt their power consumption to volatile power generation," *Energy Policy* 165 (2022): 5-6, https://doi.org/10.1016/j.enpol.2022.112876.
[188] *Ibid.*
[189] *Ibid.*
[190] *Ibid.*, 9–10.
[191] *Ibid.*, 4–5.
[192] *Ibid.*, 9-10.
[193] *Ibid.*, 7–8.
[194] *Ibid.*
[195] *Ibid.*
[196] *Ibid.*, 8–9.
[197] *Ibid.*
[198] *Ibid.*
[199] *Ibid.*, 10.
[200] *Ibid.*, 6.

F. Regulatory and technical

15. Product design complicates access to participation in demand response. In particular, the authors draw attention to the high minimum bid size, the notification time and the required (fast) response time[201].

G. Technical and economic

16. Lack of standardized baseline calculation methodology[202].

H. Economic and behavioral

17. Weak financial incentives to participate in demand response[203];
18. Risk of financial liability for failure to provide reserved flexibility[204].

To summarize, it is necessary to provide commentary on the authors' main assertions.

Cseres's assertion that information about participation in demand response is difficult for the average consumer to understand seems reasonable. The solution to this problem may lie in the automatization of the management of electrical installations used in demand response; however, consumers have concerns about automatic control, as Thomas et al. and Parrish et al. have pointed out.

The assertion by Nilsson et al. that most consumers are irrational (as also noted by El Gohary, see subsection 1.2.3) and that economic incentives (i.e., the size of the benefit received) may be insufficient to motivate consumers to participate in demand response (also noted by Strbac, see subsection 1.2.1), which is, in our opinion, a valid point.

Stede et al., as well as Vrhovčak and Malbašić, drew attention to the necessity to standardize approaches to demand response in the EU. Stede's arguments that this creates a barrier to scalable business models and cross-border participation in demand response appear to be justified.

Mathieu points to the imperfection of the legal framework for the participation of active consumers in DR, which, given what is described in section 1.1, is also considered reasonable.

Analytical documents and policy papers

Let us move on to analyzing the barriers described in analytical documents.

The CEER's "Handbook for National Energy Regulators" (2017) provides EU Member States with metrics for assessing the functioning of retail energy markets. Based in such metrics, we can conclude about existence of the following regulatory barriers:

[201] *Ibid.*, 5–6.
[202] *Ibid.*, 9–10.
[203] *Ibid.*, 4-5.
[204] *Ibid.*

1. lack of access to consumer data[205];
2. use of advance payments for electricity consumption. Thus, in order to ensure the normal functioning of demand response, a correct calculation after the end of the consumption period is necessary[206].

ACER's report "Demand response and other distributed energy resources: what barriers are holding them back? 2023 Market Monitoring Report" plays a crucial role among analytical documents describing barriers. ACER conducted a comprehensive study across all EU Member States and identified the following barriers for demand response.

A. Regulatory
   1. Absence or incompleteness of roles and responsibilities of active customers, aggregators, citizen energy communities in the national legislation of EU Member States[207];
   2. Not all markets and system services (i.e., balancing and congestion management services) are open to distributed energy resources[208];
   3. Not every EU Member State has at least one aggregation model provided for in its legislation[209];
   4. Limited access of aggregators and other new actors to consumer data[210];
   5. Unbundling violations (regarding prohibition of network operators from owning charging infrastructure and storage facilities)[211];
   6. Complex and lengthy pre-qualification procedures[212];
   7. Some local or specific balancing products do not comply with the EU target model[213];
   8. Not all EU Member States have implemented market-based redispatching and congestion management services[214];
   9. There are constraining or unachievable requirements in the product design for distributed energy resources to participate in capacity mechanisms[215];

[205] CEER, *supra note*, 30: 16.
[206] *Ibid*., 21.
[207] ACER, *supra note*, 49: 108.
[208] *Ibid*.
[209] *Ibid*., 109.
[210] *Ibid*.
[211] *Ibid*.
[212] *Ibid*., 111–112.
[213] *Ibid*., 112.
[214] *Ibid*., 113.
[215] *Ibid*., 114.

10. The design of interruptibility schemes and ancillary services limits the participation of small loads and fragments markets[216].

B. Regulatory and economic

11. High concentration in retail markets hinders the entry of new players[217];
12. Regulated prices are widely used, which do not send signals to demand response[218];
13. Unjustified network tariff discounts/rebates for certain consumers distort price signals for DR[219];
14. Applying network charges based on net energy withdrawal distorts price signals for DR, since it is not cost-reflective[220].

C. Regulatory and technical

15. Low time granularity and large product sizes in markets limit the participation of distributed energy resources[221].

D. Technical and economic

16. Insufficient roll-out of smart meters[222].

Attention should also be paid to the World Bank report "Harnessing the Potential of Flexible Demand Response in Emerging Markets: Lessons Learned and International Best Practices – Technical Report" (2024).

A. Behavioral

1. Customer fatigue that may be caused by constant manual actions and price tracking, reduced response[223];
2. Concerns about access to consumer data due to hacking and network attacks[224].

B. Economic and behavioral

3. System operators' hesitancy about the reliability of demand response. In this regard, the authors wrote: *'Customers may often withdraw their offers in real time without penalties other than the prevailing electricity cost; if removed*

[216] *Ibid.*
[217] *Ibid.*, 114–115.
[218] *Ibid.*, 115.
[219] *Ibid.*, 116.
[220] *Ibid.*, 117.
[221] *Ibid.*, 109.
[222] *Ibid.*
[223] Gabriela Elizondo-Azuela, Kabir Malik and Luiz T. A. Maurer, *Harnessing the Potential of Flexible Demand Response in Emerging Markets: Lessons Learned and International Best Practices – Technical Report*, (Washington, D.C.: World Bank Group, 2024), 35, https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099112724131541740.
[224] *Ibid.*

in real time, those load reductions will not be available for the system operators to control (or dispatch) '[225].

Based on ACER's Monitoring Report "Unlocking flexibility: No-regret actions to remove barriers to demand response" (2025), the following barriers can be identified.

A. Regulatory

1. Not all EU Member States have yet implemented a regulatory framework for active customers, market participants engaged in aggregation, and citizen energy communities[226]:
   1.1. The lack of a definition of storage makes it impossible for electric vehicles to participate in electricity markets[227];
   1.2. Aggregators' responsibility for imbalances[228];
2. In many EU Member States, time-differentiated contracts are absent or not widely used, so consumers do not receive price signals and do not change their consumption patterns[229];
3. Net metering in grid tariffs distorts the cost of grid usage and undermines the motivation to develop DR[230];
4. If balancing resources are procured on a non-market basis, this *'perpetuates unfair or no compensation but also restricts the ability of demand response and distributed energy resources to contribute effectively to balancing services'*[231].
5. In some countries, the requirements for unbundling system (regarding ownership of EV charging stations and storage facilities) are not being met[232];
6. Symmetrical balancing capacity products (i.e., upward and downward balancing capacity) hinder the participation of variable renewable energy resources, demand response, and energy storage since they are better suited for one type[233];
7. Complex and lengthy administrative procedures complicate the entry of small participants into the market[234].

[225] *Ibid*., 35-36.
[226] ACER, *supra note*, 52: 9.
[227] *Ibid*., p. 11.
[228] *Ibid*., p. 13.
[229] *Ibid*., p. 18.
[230] *Ibid*., p. 21.
[231] *Ibid*., p. 25.
[232] *Ibid*., p. 9.
[233] *Ibid*., p. 28.
[234] *Ibid*., p. 30.

B. Behavioral

8. Consumers have little understanding of their role in demand response and the financial benefits; even where campaigns and tools exist, engagement remains low[235].

C. Regulatory and economic

9. Non-justified specific tariff regimes for individual consumers can distort efficiency and reduce incentives for flexibility[236].
10. System operators are incentivized to invest in network expansion rather than using demand response[237].

D. Regulatory and technical

11. Large minimum volumes, long-term contracts, long prequalification, strict telemetry requirements, and prequalification testing create a disproportionate barrier for small and aggregated resources[238].

E. Technical and economic

12. While the DR NC is not yet adopted, there are no rules for calculating the baseline[239];
13. Low level of smart meter deployment (in some countries)[240].

Summarizing the barriers described in the analytical documents, it is worth noting the following.

In its 2023 and 2025 monitoring reports, ACER points to violations by system operators of unbundling requirements for energy storage facilities. It is necessary to emphasize the particular importance of unbundling for the development of local flexibility services. Without unbundling, system operators will use the energy storage facilities they own rather than integrating customers' RES into the systems by purchasing flexibility services from them. Thus, the violation of unbundling requirements is seen as a significant barrier to the development of the local flexibility services market.

The barriers identified in this section are summarized in Table 1.

The barriers were aggregated based on their essence. At the same time, the category of particular barrier could have changed, since authors of different studies may highlight different aspects of the same barrier, which could influence their initial categorization. The descriptions of barriers were also aggregated.

[235] *Ibid.*, p. 23.
[236] *Ibid.*, p. 21.
[237] *Ibid.*, p. 31.
[238] *Ibid.*, p. 27.
[239] *Ibid.*, p. 13.
[240] *Ibid.*, p. 15.

Table 1. Barriers to consumer participation in demand response

Barrier	**Brief description**
I. Main barriers	
A. Regulatory barriers	
1. Incomplete legal framework for active customers, aggregators, and energy communities	Roles, responsibilities and rights are not clearly defined; delayed or partial transposition of directives.
2. Regulatory complexity, fragmentation, and uncertainty	Multi-level, fragmented and constantly changing legal framework (including at the national level).
3. Limited access to data	New actors (aggregators, etc.) are not recognized as full-fledged beneficiaries of access to data on historical consumption of customers and their connection points; there are no transparent exchange procedures or clear delineation of rights/responsibilities regarding data.
4. Violations of unbundling requirements regarding ownership of storage facilities	The possibility for TSOs/DSOs to own charging infrastructure and storage contrary to the requirements of the Clean Energy Package creates conflicts of interest and displaces independent flexibility providers.
5. Lengthy and complex administrative procedures for small/new players	Market entry is accompanied by significant administrative and procedural costs that are disproportionate to the scale of the activity.
B. Economic barriers	
6. Virtual metering is not cost-effective for suppliers with low margins	In a context of thin retail margins, the introduction of virtual metering leads to significant additional costs, which reduces suppliers' incentives to support such models.
7. Erosion of network operators' revenues due to self-consumption	The widespread use of self-production, and thus a reduction in the volume of electricity transported/distributed, may lead to a decrease in TSOs/DSOs revenues while the need to maintain and modernize networks remains.
C. Technical barriers	
8. Limited technical potential for reducing peak demand among small consumers	In the absence of significant controllable loads (heat pumps, EVs, storage), the technical potential of household/small non-household participation in demand response is limited.
D. Behavioral	
9. Complexity of information and low digital literacy	Excessive and complex information about tariffs and products, as well as insufficient digital skills, prevent consumers from understanding the technology and deciding to participate in demand response.
10. Low awareness of demand response, flexibility, and storage, poor understanding of one's own role and the benefits of demand response	Consumers do not sufficiently understand the objectives, mechanisms and potential benefits of demand response programs and flexibility technologies.

11. Distrust of energy companies, demand response programs, and other participants	Negative experiences with utility companies can lead to skepticism about companies' motives and the fairness of schemes (including P2P).
12. Perception of demand response as inconvenient and "burdensome" to everyday life	Changing habitual consumption patterns is perceived as inconvenient, requiring significant effort and control.
13. Fear of losing control with automation and direct load control, concerns about privacy and cybersecurity	Automatic or remote load control may be perceived as unacceptable interference in the private life.
II. Hybrid barriers	
E. Regulatory and economic	
14. Network tariff design does not create incentives for flexibility	Fixed prices, lack of dynamic pricing and the use of net metering to calculate network fees dampen price signals and do not create conditions for investment in distributed generation.
15. High market concentration	Large, long-established companies dominate the markets, making it difficult for new entrants to enter and remain in the market.
16. Unjustified benefits and discounts in network tariffs	Special regimes in network tariffs without proper justification distort price signals and may reduce the incentivizing effect of tariffs on demand response.
17. Insufficient public funding for demand response	Public funding is insufficient for the implementation of demand response.
18. System operators are incentivized to expand networks instead of using demand response	The regulatory framework makes capital investments in network infrastructure more attractive than purchasing flexibility services.
19. Advance payments and lack of correct ex-post settlement	Advance payments can be a barrier to demand response if no recalculation is made at the end of the settlement period.
20. Non-market procurement practices (balancing, redispatching, congestion management)	Regulated prices for ancillary services or their mandatory provision in the absence of remuneration restrict competition and prevent investment in flexible resources.
F. Regulatory and technical	
21. Restrictive product and procedure design (bid size, granularity, lead times, prequalification)	Products and procedures are initially oriented towards large-scale generation: high minimum bid volumes, large time granularity, long lead times and strict telemetry requirements.
22. Direct/indirect bans on prosumer aggregation and P2P	Requirements for on-site placement of generation facilities or their linkage to a single meter limit aggregation.
23. Insufficient standardization and interoperability of IT systems for demand response	Heterogeneous protocols and standards of interoperability hinder integration, increase costs and slow down the scaling of demand response.
G. Technical and economic	
24. High cost of deploying and maintaining IT solutions and infrastructure for demand response	Complex and, accordingly, expensive IT solutions are required for demand response; at the same time, access to capital for new market participants may be complicated.

24.1 In particular, insufficient rollout of smart meters	The lack of extensive roll-out of smart meters or their limited functionality complicates demand response scaling.
25. Complexity and lack of a standardized baseline calculation methodology	The baseline for retail customers is stochastic, and this makes it challenging to develop a methodology for determining this baseline and, accordingly, the volume of services provided, which affects further financial settlements between the consumer and the system operator.
H. Economic and behavioral	
26. Weak financial incentives and behavioral inertia	Even if there are savings, they are small compared to the perceived discomfort and cognitive costs; therefore, consumers prefer the status quo.
27. Financial risk and price unpredictability	Volatile dynamic tariffs are perceived as a risk of getting a "higher-than-expected" bill; in addition, the fear of penalties and contractual liability under demand response contracts discourages participation.
28. Hesitancy of system operators regarding the reliability of DR	If consumers can terminate their participation in demand response at any time and not further provide flexibility services, system operators may consider demand response less reliable than generation and limit its role in planning.
I. Technical and behavioral	
29. Network interruptions due to demand response lead to a loss of consumer trust	Using demand response without accurate information about the state of the networks can cause local congestions and reliability issues, which reduces consumers' trust to demand response.
30. Customer fatigue and the complexity of manual involvement	The necessity to constantly monitor signals and manually manage the load leads to fatigue, and refusal to participate in demand response.
J. Regulatory, technical and economic	
31. Complexity of CER orchestration and high transaction/control costs	Complex CER management algorithms are difficult to implement and control; regulatory oversight and verification of results are expensive to set up.

2.2. Identification of methods to overcome identified barriers

This section provides for analysis of methods to overcome the identified barriers, which are described in scientific articles and analytical materials.

The analysis is limited to regulatory ways of overcoming of identified barriers. This is due to the limited scope of this research and its legal essence. Specific technical, economic and psychological knowledge is required to analyze all methods of overcoming the identified barriers.

Regulatory barriers

1. Incomplete legal framework for active customers, aggregators, and energy communities

Relevant recommendations exist both in scientific literature and analytical materials, they are quite expected: full and correct implementation of EU *acquis*[241] and harmonization of national legislation in different sectors[242].

It should also be noted that the improvement of the legal framework for demand response is clearly facilitated by the DR NC, the draft of which ACER has submitted to the European Commission.

2. Regulatory complexity, fragmentation and uncertainty

ACER makes a very obvious recommendation: the scope and content of regulation should not go beyond what is necessary to ensure market access for all participants[243]. In addition, administrative procedures should be simplified and it shall be ensured that *'all administrative and financial requirements are transparent and applied consistently to all market participants to avoid discrimination'*[244] .

3. Limited access to data

According to ACER's Monitoring Report 2023, aggregators (including independent aggregators) and energy service companies[245] have the greatest problems with access to consumer data.

[241] ACER, *supra note*, 52: 10.
[242] Leinauer, *supra note*, 187: 11.
[243] ACER, *supra note*, 49: 95.
[244] ACER, *supra note*, 52: 30.
[245] According to article 2(11) of Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast), 'energy service' means the physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings.

ACER's recommendation for overcoming of this barrier is to ensure that all eligible parties have access to the same set of non-customer data through a single data platform, with the consent of consumers[246].

Among the measures that have been taken to overcome this barrier, it is worth noting the adoption of Commission Implementing Regulation (EU) 2023/1162 on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data[247].

The draft for DR NC aims to regulate national terms and conditions for a flexibility information system (article 24), principles for governance, accessibility and interoperability (article 25), data exchange related to settlement of local services (article 36), data exchange between DSOs and between DSOs and TSOs (article 52), data exchange requirements from service providers (articles 53, 54)[248], which constitutes a significant development of the regulatory framework in terms of access to consumer data in the electricity market.

4. Violations of unbundling requirements regarding ownership of storage facilities

In its Monitoring Report 2025, ACER notes the need for EU Member States to bring their national legislation in line with the requirements of Directive 2019/944 and DR NC (despite it is not yet adopted)[249].

The DR NC proposes to regulate in detail the requirements for the ownership and operation of storage facilities for system operators, as well as the procedure for assessing the costs and benefits of terminating the ownership/operation of storage facilities by system operators (articles 40-42)[250].

5. Lengthy and complex administrative procedures for small/new actors

To remove this barrier, ACER in Monitoring Report 2025 proposes a number of actions for EU Member States:

- Simplify procedures for obtaining the necessary licenses;
- Introduce a one-stop shop for such administrative procedures;
- Ensure that financial requirements are adequate to size of the market participant;
- Ensure consistent application of administrative and financial requirements to all market participants[251].

[246] ACER, *supra note*, 49: 32.

[247] "Commission Implementing Regulation 2023/1162 of 6 June 2023 on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data". EUR-Lex. Accessed 2 December 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1162.

[248] ACER, *supra note*, 5.

[249] ACER, *supra note*, 52: 10.

[250] ACER, *supra note*, 5.

[251] ACER, *supra note*, 52: 30.

The issue of prequalification for balancing services deserves special mention. In 2023, ACER recommended that TSOs establish a prequalification procedure and, in particular, set deadlines for such procedures, reducing them as much as possible[252].

In the draft DR NC it is proposed to regulate in details the qualification, verification, and prequalification procedures. Moreover, it is assumed in the draft that after the adoption of the DR NC, ENTSO-E and EU DSO entity within 12 months will propose steps to further simplify these procedures (article 21)[253].

Mixed barriers

Next are options for overcoming mixed barriers that have a regulatory component.

Regulatory and economic

1. Network tariff design that does not create incentives for flexibility.

ACER's Monitoring Report 2023 proposes a number of measures. First and foremost, it is necessary to roll out meters that allow for time-of-use pricing. If such meters are not available, as a temporary solution, NRAs can design their network tariffs based on user consumption profiles. For countries where time-of-use tariffs exist, they should be mandatory for consumers, with no opt-out option. If such tariffs are not applied, NRAs should assess the possibility and feasibility of introducing them[254] .

ACER also recommends avoiding net metering when calculating network fees. This authority emphasizes that Directive 2019/944 does not allow application of net metering to active customers after the end of 2023[255].

In Monitoring Report 2025, ACER proposes the following steps. NRAs should provide significant incentives for consumers to switch to dynamic price contracts. At the same time, EU Member States shall ensure that such contracts are consistent with energy efficiency and grid reliability policies. In addition, EU Member States are recommended to abandon net metering[256].

2. High market concentration

In Monitoring Report 2023, ACER provided for obvious recommendations: remove identified barriers and restrictions for entry of new participants, in particular by expanding opportunities for innovative models and making it easier to switch to other suppliers[257] .

3. Unjustified exemptions and discounts in network tariffs

[252] ACER, *supra note*, 49: 112.
[253] ACER, *supra note*, 5.
[254] ACER, *supra note*, 49: 110-111.
[255] *Ibid.*, 117.
[256] ACER, *supra note*, 52: 19.
[257] ACER, *supra note*, 49: 115.

ACER does not call for the abandonment of justified exemptions, discounts or other alterations in network tariffs, but emphasizes the importance for NRAs to periodically assess the need and adequacy of any network tariff differentiation, taking into account the overall network impacts[258]. ACER recommended that NRAs apply exemptions only when justified by the network costs they impose and without creating disincentives for efficient network use[259].

4. Insufficient public funding for demand response

This barrier is mentioned in the article by Christina Leinauer et al. "Obstacles to demand response: Why industrial companies do not adapt their power consumption to volatile power generation" (2022)[260]. The authors do not provide an answer on how to overcome this barrier.

5. System operators are incentivized to expand networks instead of using demand response

ACER recommends that NRAs encourage more cost-efficient operation and planning of the grid. To this end, incentive-based network tariff regulation should be introduced, which would include CAPEX/OPEX in tariffs depending on the operator's implementation of non-wire alternatives (i.e., flexibility)[261].

Article 44(1) of the draft DR NC proposes to oblige DSOs, when preparing the Distribution Network Development Plan, to consider the purchase of local services as an alternative to network expansion, as well as to address physical congestion and/or voltage issues in the system. The results of the analysis shall be presented in the abovementioned Plan[262].

6. Advance payments and lack of correct ex-post settlement

Although CEER did not describe in detail how to remove this barrier, the path is logically traced from what is written in the report: *'[a]s such, advance payments may be a barrier to demand response unless a correct settlement takes place after each consumption period'*[263]. Thus, it is necessary to ensure that even in the case of advance payments, a recalculation is made at the end of the consumption period.

7. Non-market procurement practices (balancing, redispatching, congestion management)

To remove this barrier, in its Monitoring Report 2023 ACER pointed to the necessity for national legislation of EU Member States to be consistent with EU *acquis*, as well as to the

[258] *Ibid*., 117.
[259] ACER, *supra note*, 52: 22.
[260] Leinauer, *supra note*, 186.
[261] ACER, *supra note*, 52: 32.
[262] ACER, *supra note*, 5.
[263] CEER, *supra note*, 30: 21.

provision of incentives for DSOs to purchase flexibility services from distributed generation, as provided for in Directive 2019/944[264] .

In addition to the above, in the Monitoring Report 2025 ACER urged system operators to initiate the procurement of ancillary services on a market-based basis[265].

DR NC proposes to regulate in detail the principles and procedure for granting a derogation from the market-based procedure for the procurement of local services by system operators (articles 29, 30)[266] .

Regulatory and technical

1. Restrictive design of products and procedures (bid size, granularity, lead times)

The most important issue in this barrier is the minimum bid size. Options for overcoming this issue include working through an aggregator[267] or reducing the minimum bid size[268] .

DR NC does not set EU-wide requirements for products, but such unification shall be at the level of EU Member States (article 16)[269] .

2. Direct/indirect restrictions for prosumer aggregation and P2P

This barrier is mentioned only once in the article by Moura and Brito "Prosumer aggregation policies, country experience and business models" (2019)[270]. The authors suggest overcoming it through virtual metering, including virtual net metering. To implement this mechanism, it is possible to combine several producers into a single entity or distribute energy among willing prosumers[271] .

Thus, this work anticipated the emergence of energy communities and energy sharing in Directive 2019/944.

3. Insufficient standardization and interoperability of IT systems used for demand response

Johanna L. Mathieu et al. in their article "A New Definition of Demand Response in the Distributed Energy Resource Era" (2024) argue that standardizing IT system interaction protocols and cybersecurity measures could help remove this barrier[272]. It should be noted that in our opinion such measures shall be implemented not at the legislative or regulatory level, but at the level of technical standardization.

[264] ACER, *supra note*, 49: 113.
[265] ACER, *supra note*, 52: 26.
[266] ACER, *supra note*, 5.
[267] Stede, *supra note*, 105: 5.
[268] *Ibid*., p. 9.
[269] ACER, *supra note*, 5.
[270] Moura, supra note, 19: 823.
[271] *Ibid*., pp. 823-824.
[272] Mathieu, *supra note*, 94: 8.

As for the regulatory level, the DR NC requires a development of a flexibility information system in EU Member States (article 24). Such systems shall simplify and standardize processes necessary to provide balancing and local services and their corresponding data exchanges (article 25(1)). The flexibility information system shall have a single and common access point for service providers, system users, and other entitled parties (article 25(2))[273]. DR NC contains a number of other general requirements for IT systems used for the provision of flexibility services.

Regulatory, technical and economic

1. The complexity of CER orchestration and high transaction/control costs

This specific, multi-dimensional barrier is only mentioned in the article by Johanna L. Mathieu et al. "A New Definition of Demand Response in the Distributed Energy Resource Era" (2024). The authors see a solution to this problem in technical methods and discuss options for the architecture of a digital platform that manages (orchestrates) CER[274].

Non-regulatory barriers

This subsection provides for an overview of methods to overcome non-regulatory barriers by regulatory methods, as they described in the literature.

Behavioral

1. Low awareness of demand response, flexibility, and storage, poor understanding of one's own role and the benefits of demand response

Gareth Thomas et al. in their article "Deliberating the social acceptability of energy storage in the UK" (2019) recommend for system operators and national governments to *"begin engaging the public around the need for flexibility"* in order to mitigate public resistance to possible increases in network tariffs associated with the development of flexibility[275].

ACER in its Monitoring Report 2025 calls on EU Member States to inform consumers about the benefits and risks associated with their participation in demand response[276].

Technical and economic

1. Insufficient rollout of smart meters

In Monitoring Report 2023, ACER gave the following recommendations:

- EU Member States that have decided to roll out meters and have legally established rollout plans should accelerate the rollout.

[273] ACER, *supra note*, 5.
[274] Mathieu, *supra note*, 94: 7.
[275] Thomas, *supra note*, 143: 9.
[276] ACER, *supra note*, 52: 24.

- EU Member States where there are no plans and with low meter penetration should *'accelerate the development of these devices'*[277] .

2. The complexity and lack of a standardized baseline calculation methodology

DR NC provides for a definition of the baseline method (Article 2(3)), requires system operators in EU Member States to develop a common proposal regarding the processes for the definition, calculation and validation of the baselining methods (Article 14(1)), and sets out the principles for accessing the data necessary for baseline validation (Article 15).

According to the draft, the rules for calculating the activated volume and delivery of local services are part of the rules for the settlement of market-based procured local services (article 35(4)), which shall be developed by the DSOs of EU Member States, taking into account national specifics (articles 32(1) and 32(2))[278].

Summarizing the described ways to remove barriers, the following should be noted.

A number of recommendations boil down to bringing national legislation into line (for example, for barriers such as incomplete legal framework for active customers, aggregators, and energy communities, violations of unbundling requirements, non-market procurement practices). The effectiveness of these recommendations is questionable, as described in more detail in section 2.3.

With regard to the barrier "Lengthy and complex administrative procedures for small/new actors," ACER's recommendations include such measure as "Ensure that financial requirements are adequate to the size of the market participant." This recommendation seems reasonable. In our opinion, administrative procedures should be simplified as much as possible and financial requirements reduced for household / small non-household customers. At the same time, the prequalification procedure must ensure that such customers can provide local services.

Regarding the reduction in the size of standardized products to ensure the participation of consumers with small-capacity electrical installations in demand response. It should be noted that the volume of deviation from consumption pattern must be sufficient to affect the system. Thus, it is necessary to hear the opinion of system operators on the size of standardized products, as they will be the ones working with these products in practice.

It should also be noted that ACER recommends avoiding net metering. This mechanism was introduced precisely to stimulate RES[279]. Thus, it is necessary to record a change in approach from greater support for RES to greater support for system operators.

[277] ACER, *supra note*, 49: 109.
[278] ACER, *supra note*, 5.
[279] "Net Metering – Support Scheme for RES and Energy Efficiency," European Commission, accessed 4 December 2025, https://clean-energy-islands.ec.europa.eu/countries/cyprus/legal/electricity-support/net-metering-support-scheme-res-and-energy-efficiency.

The identified in this section ways to overcome described barriers are summarized in Table 2. For convenience, the numbering of barriers is retained from Table 1.

Table 2. Described methods for overcoming identified regulatory barriers

Barrier	**Method for overcoming**
I. Main barriers	
A. Regulatory barriers	
1. Incomplete legal framework for active customers, aggregators, and energy communities	Full and correct implementation of the EU acquis and internal harmonization of national law; adoption and implementation of DR NC.
2. Regulatory complexity, fragmentation, and uncertainty	Limit the scope of regulation to what is "necessary and sufficient"; simplify procedures; make requirements transparent and non-discriminatory.
3. Limited access to data	Ensure equal access for all eligible parties to a single data platform with the consumer's consent; in DR NC – create a flexibility information system and standardized data exchange.
4. Violations of unbundling requirements regarding ownership of storage facilities	Bring national law in line with Directive 2019/944 and DR NC; in DR NC – regulate in detail the ownership/operation of storage facilities and the procedure for termination of the ownership/operation of storage facilities by system operators.
5. Lengthy and complex administrative procedures for small/new players	Simplify licensing; introduce one-stop shops; ensure proportionate financial requirements; ensure uniform application of administrative and financial requirements; reduce and standardize prequalification requirements (including through DR NC).
D. Behavioral	
10. Low awareness of demand response, flexibility, and storage, poor understanding of one's own role and the benefits of demand response	Conducting information campaigns aimed at explaining the need for flexibility, the benefits and risks associated with demand response for final customers.
II. Hybrid barriers	
E. Regulatory and economic	
14. Network tariff design does not create incentives for flexibility	Mass rollout of meters for time-of-use tariffs; mandatory application of time-of-use tariffs; incentives for consumers to switch to dynamic price contracts; phasing out net metering.
15. High market concentration	Remove entry barriers and restrictions for new players; simplify conditions for testing innovative models; simplify switching suppliers.
16. Unjustified benefits and discounts in network tariffs	Conduct periodic assessments of network tariff differentiation; allow reductions only when justified and without undermining incentives for efficient network use.
17. Insufficient public funding for demand response	No ways to eliminate this barrier have been identified in the analyzed literature.

18. System operators are incentivized to expand networks instead of using demand response	Introduce incentive-based tariff regulation (CAPEX/OPEX taking into account non-wire alternatives); in DR NC – require DSOs to consider purchasing local services as an alternative to network expansion.
19. Advance payments and lack of correct ex-post settlement	Ensure mandatory adjustment based on actual consumption at the end of the period, even with prepayment.
20. Non-market procurement practices (balancing, redispatching, congestion management)	Bring national law in line with EU acquis; encourage DSOs to purchase flexibility on the market; transfer ancillary services to a market basis; in DR NC – strictly regulate derogations.
F. Regulatory and technical	
21. Restrictive product and procedure design (bid size, granularity, lead times, prequalification)	Lower the minimum bid, reduce product requirements; ensure participation through aggregators; in DR NC – standardize requirements (at first – at the Member State level, later – at EU level).
23. Insufficient standardization and interoperability of IT systems for demand response	Standardize cybersecurity protocols and requirements (at the technical standardization level); in DR NC – create a flexibility information system in each EU Member State with a single point of access and standard processes/data exchange.
G. Technical and economic	
24.1 Insufficient rollout of smart meters	Accelerate the roll-out of smart meters.
25. Complexity and lack of a standardized baseline calculation methodology	Develop baseline methodologies and calculation rules at national level, with further harmonization at EU level.
J. Regulatory, technical and economic	
31. Complexity of CER orchestration and high transaction/control costs	The literature reviewed suggests a technical, rather than regulatory, approach to overcoming this barrier.

2.3. Analysis of the described barriers and methods to overcome them

Based on the results of the analysis, the following issues are the most evident:

1. ACER proposes the full and correct implementation of directives as a method for overcoming most regulatory barriers. Since this recommendation is found in both 2023 and 2025, and given that EU Member States shall implement directives even without this recommendation, this recommendation appears to be inefficient.
2. The literature has drawn attention to the need for harmonization at the EU level of the methodology for determining baseline consumption, which is necessary for calculating the volume of local services provided and for relevant financial settlements. It is possible to improve the mechanism for such harmonization provided for in the DR NC, which currently seems appropriate, given that at the moment the DR NC is a draft.

This section will provide a more detailed description and analysis of these issues.

2.3.1. Challenges in implementing EU directives in EU Member States and the role of European institutions in addressing them

Throughout the analyzed ACER reports, there is a constant emphasis on the necessity of full, correct and timely implementation of EU *acquis* into the national legislation of EU Member States. Some provisions needed implementation in 2023 and still need implementation in 2025 (e.g. unbundling requirements, avoidance of net metering for calculating system tariffs, market-based basis procurement of ancillary services).

We may conclude that there is a constant issue of implementation of EU acquis by Member States. There are two ways to overcome this issue: control and assistance.

One of the ACER's tasks is facilitation of consistent, efficient, and effective application of Union law[280].

In terms of assisting NRAs, ACER can make recommendations to assist regulatory authorities and market participants in sharing good practices[281]. In addition, EU Member States facing difficulties in applying EU Energy Law[282] with regards to specific issue can themselves request ACER's opinion[283].

[280] Regulation 2019/942, article 1(2).
[281] *Ibid*., article 6(2).
[282] Hereinafter, EU Energy Law refers to Regulation (EU) 2019/943, Regulation (EU) 2024/1789, Directive (EU) 2019/944, Directive (EU) 2024/1788 and the network codes and guidelines adopted for their implementation.
[283] Regulation 2019/942, article 6(7).

While ACER has the ability to assist in sharing good practices, it does not have the right to offer its assistance in implementing EU Energy Law on its own initiative. Given that EU Member States are experiencing difficulties with implementation, ACER should take a more active stance, for which it should be granted such a right.

In terms of monitoring functions, ACER can monitor and analyze the implementation of the network codes, results of such analysis shall be reported to the European Commission[284]. At the request of the NRA or the European Commission, ACER shall assess whether a specific NRA decision complies with EU Energy Law. ACER shall submit its assessment to the European Commission and the NRA concerned[285].

It is the European Commission that plays a key role in the control mechanism, as it can initiate infringement proceedings (Articles 258-260 of the Treaty on the Functioning of the European Union[286]). The Commission often resorts to this mechanism. Thus, as of the date of this research, there were seven infringement packages with energy law-related cases for 2025[287]. Since there are still difficulties with the implementation of EU Energy Law, the European Commission should make more active use of this instrument. At the same time, ACER should offer its assistance in such implementation ("stick and carrot").

In turn, ENTSO-E shall promote the digitalization of transmission networks, including the deployment of smart grids, efficient real-time data acquisition, and intelligent metering systems. In performing its tasks, ENTSO-E shall take into account the development of demand response[288].

These powers may be key to the deployment of smart meters, which is one of the most important demand response enablers. However, these tasks are not new to ENTSO-E – they have existed in Regulation 2019/943 since its adoption. Given that smart meters rollout is still an issue, European legislators nay consider adjustment of ENTSO-E's tasks from "promotion" to "assistance to NRAs, TSOs, and DSOs".

However, given that most residential/small non-residential consumers are connected to distribution networks and that the potential users of flexibility services will mostly be DSOs rather than TSOs, involvement of EU DSO entity is very important. Thus, it is the EU DSO entity that is responsible for:

[284] *Ibid.*, article 5(1)(d).
[285] *Ibid.*, articles 6(5), 6(6).
[286] "Treaty on the Functioning of the European Union". EUR-Lex. Accessed 3 December 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:12012E/TXT.
[287] Latest package available as of the date of this research: "November infringements package: key decisions on energy". European Commission. Accessed 3 December 2025. https://energy.ec.europa.eu/news/november-infringements-package-key-decisions-energy-2025-11-21_en.
[288] Regulation (EU) 2019/943, paragraphs (h), (o) of article 30(1).

- facilitating the integration of RES and distributed generation in the distribution network;
- facilitating demand side flexibility and response and distribution grid users' access to markets;
- contributing to the digitalization of distribution systems, including the deployment of smart grids and intelligent metering systems;
- supporting the development of data management, cyber security, and data protection[289];
- cooperation with ENTSO-E on monitoring the implementation of network codes and guidelines and adopting best practices related to distribution systems[290].

It should be noted that the EU DSO entity was established only in 2021 and is an 'expert entity working for the common Union interest'. It is expressly prohibited from representing particular interests or seeking to influence the decision-making process to promote specific interests[291]. Therefore, it is too early to assess its effectiveness, and it is incorrect to expect it to influence EU Member States or decision-making at the EU level.

However, it is worth paying attention to the results of the joint work of the EU DSO entity, ENTSO-E, and ACER – the draft for DR NC. Many of the barriers described, as well as many options for removing these barriers, are provided for in the DR NC draft and will be implemented upon its adoption.

2.3.2. DR NC and baselining methodology

One of the key elements of regulation of demand response is the method of calculating the baseline, on which both the volume of services provided and subsequent calculations between participants depend. In section 2.1 of this study, this issue was highlighted as a separate barrier – "Complexity and lack of a standardized baseline calculation methodology" (barrier 25), and section 2.2 shows that the DR NC draft largely delegates the detalization to the EU Member States.

This approach is a compromise. Thus, it is necessary to take into account national characteristics (experience, existing regulations, technical features of the energy system), which complicates "top-down" unification. On the other hand, the need for unification of approaches is enshrined in the DR NC itself.

The draft DR NC provides for a mechanism for unifying the baselining methodology at the EU level through the accumulation and analysis of national practices ("bottom-up"). Thus,

[289] *Ibid*., paragraphs (b) to (e) of article 55(1).
[290] *Ibid*., paragraphs (a), (b) of article 55(2).
[291] *Ibid*., article 52(2).

system operators in EU Member States shall develop proposals on the baselining methods[292], based on which ENTSO-E and EU DSO entity shall publish on their website a baselining method register[293]. ENTSO-E and EU DSO entity shall periodically (once every two years, according to ACER's draft) prepare a joint report for ACER based on this register, including, among others, a cost-benefit analysis of further unification of the baselining methodology[294].

In our opinion, this approach has both advantages and disadvantages. Its advantage is that the methodologies will be developed primarily by system operators, who will be directly working with this methodology. The accumulation of practice at the national level will make it possible in the future to identify solutions that have proven their effectiveness in various Member States and are suitable as models for further harmonization.

However, it should be noted that the responsibilities of ENTSO-E and the EU DSO entity are limited to preparing an analytical report and conducting a cost-benefit analysis of further harmonisation of the baseline methodology. However, there is no direct obligation to formulate specific proposals for the harmonization of baseline methodologies at the EU level on this basis, which creates the risk that even with repetitive positive experience in Member States, the harmonization will not be carried out.

In view of the above, it seems appropriate to clarify the draft DR NC in terms of regulating baseline methods. Thus, Article 55 of the DR NC could explicitly state that ENTSO-E and the EU DSO entity not only prepare an analytical report and conduct a cost-benefit analysis of further harmonization of the baseline methodology, but also, in the event of a positive assessment of the potential for harmonization, formulate specific options for harmonizing baseline methodologies at the EU level. The further amendment procedure already exists. Thus, the proposals of ENTSO-E and EU DSO entity should be submitted in the form of draft amendments to the DR NC, submitted by ENTSO-E and EU DSO entity to ACER as persons who are likely to have an interest in any network code adopted in accordance with Article 60(2) of Regulation (EU) 2019/943. After that, ACER, having conducted its assessment and consultations in accordance with Article 60(3) of this Regulation, will submit the amendments to the European Commission.

Finally, it should be noted that this paper does not propose any non-regulatory methods for removing non-regulatory barriers: such recommendations require specific knowledge and a multidimensional research. As the analysis shows, regulatory intervention in these issues is possible, but it would be wrong to recommend measures without a comprehensive study involving industry experts. In such a case, the proposed measures themselves could become a barrier.

[292] ACER, *supra note*, 5: article 14(1).
[293] *Ibid*., article 14(4).
[294] *Ibid*., paragraph (b) of article 55(2).

2.4. Conclusions from Part 2

Based on the research conducted in this part, a number of summarizing conclusions can be made about the barriers to consumer participation in demand response and the role of regulatory measures in overcoming them.

1. A review of the literature shows that barriers to consumer participation in demand response are diverse in nature and cover regulatory, economic, technical, and behavioral aspects, often with a mixed nature. With regard to regulatory barriers, a significant part of them is directly related to the incomplete, late or incorrect transposition of EU directives into national law, among other things, with regard to the legal status of active customers, rules for access to customer data and the prohibition of DSOs from operating energy storage facilities (unbundling).

2. At the same time, the literature does not limit itself to identifying barriers, but also suggests possible ways to overcome them. For most of the identified barriers, regulatory mechanisms for elimination or, at a minimum, mitigation are described. For example, simplifying market entry for new active customers-providers of local services is possible through the design of local products and simplification of licensing, while encouraging system operators to purchase such services is possible through the design of network tariffs and ensuring access to customer consumption data.

3. With regard to regulatory barriers caused by the incorrect transposition of directives, the prevailing recommendation in the literature is a call for full and correct implementation of the EU acquis. Its effectiveness appears to be questionable: Member States are already legally obliged to transpose directives in a timely manner, and ACER's repeated findings of persistent gaps indicate that the problem is systemic in nature. In this regard, it is advisable to strengthen the role of ENTSO-E and ACER in providing methodological and analytical assistance to EU Member States (their designated bodies, regulatory authorities) in implementation. In addition, the European Commission should make more active use of control mechanisms to monitor the fulfillment of transposition obligations.

4. The matter of baseline methodology requires special attention, as it is key to the development of local services, in particular to ensure that the volume of services provided is fully accounted. The logic underlying the draft DR NC assumes “bottom-up” harmonization based on national methodologies developed by system operators, followed by analysis and summarization by ENTSO-E and the EU DSO entity. However, their responsibilities are limited to maintaining a register and preparing reports and do not include an explicit obligation to develop specific options for harmonizing baseline methodologies at EU level and to submit such proposals to ACER for consideration. Given the crucial role of harmonizing baseline methodologies for the functioning

of local flexibility markets in the EU, it seems necessary to enshrine this responsibility in the DR NC, thereby ensuring such harmonization in the future.

CONCLUSIONS

1. **Insufficient implementation of concepts of active customer and demand response and related institutions is itself a barrier to the participation of such customers in electricity market and, consequently, limits the development of competition in such market.**

Even the basic elements of the EU *acquis* – the definition of an active customer, their rights and obligations – were only partially implemented across EU Member States by the end of 2022. As a result, even if active customers at EU level are formally recognized as potential participants in local services market, they still cannot act as service providers in the absence of a legal framework at a national level. In this situation, distribution system operators will continue to resolve local congestion and other network issues primarily with their own resources, rather than purchasing local services on a competitive basis from active customers. This situation hinders the development of the local services market as a new segment at the retail level and prevents the above-mentioned customers from realizing their potential as local service providers.

2. **The issue of timely and correct transposition of EU law is systemic in nature, and ACER's dominant recommendation on full and correct implementation of the *acquis* is insufficient without institutional assistance and control.**

An analysis of ACER reports and other analytical documents shows that gaps in transposition have persisted for years and are repeated across different EU Member States, pointing to a systemic problem rather than specific cases. At the same time, the key recommendation provided for in the analytical documents amounts to the self-evident thesis of the need for timely and correct implementation of EU *acquis*, which does not create new tools for overcoming this issue. As demonstrated in this research, in order to effectively overcome this issue, ENTSO-E and ACER shall proactively provide methodological and analytical support in transposition to the relevant national authorities of the EU Member States. At the same time, the European Commission should more actively use control and enforcement mechanism for non-compliance of the Member States with transposition obligations (infringement procedure).

3. Harmonization of baseline methodology at the EU level is a necessary condition for the functioning of local flexibility markets; for this purpose ENTSO-E and the EU DSO entity shall be required to develop specific proposals for such harmonization.

The baseline methodology is a key element in the legal regulation of demand response and local services, determining the volume of services provided, which in turn is the basis for financial settlements between relevant market participants. The draft Network Code on Demand Response (DR NC) establishes a bottom-up approach: system operators in EU Member States shall develop methods for calculating baseline consumption, while ENTSO-E and the EU DSO entity

shall consolidate practices in the form of a register and prepare reports assessing the potential for further harmonization. However, the functions of ENTSO-E and EU DSO entity are limited to preparing analytical reports, not the legislative proposals. To ensure harmonization (where it is economically and technically justified), DR NC should be supplemented with an explicit obligation for ENTSO-E and EU DSO entity to develop common baseline approaches (as draft amendments to DR NC) based on the results of harmonization possibility assessment and to submit them to ACER in accordance with the established procedure for revising network codes.

4. It is necessary to develop instruments to encourage the participation of active customers in provision of flexibility services, as a legal framework itself may not be sufficient for such participation.

For customers, including active customers, participation in the electricity market is not their main activity. In addition, researchers point out that customers may not always respond to price signals. This means that even with the creation of a comprehensive legal framework, a significant number of customers may remain passive, refraining from exercising available to them opportunities to participate in demand response. At the same time, the analyzed literature contains almost no discussion of what tools (including regulatory ones) should be used to encourage consumers to participate in demand response. The development of such tools is an important area for further research.

RECOMMENDATIONS

1. In order for ACER and ENTSO-E to assist EU Member States in the correct and timely transposition of the provisions of directives, in particular Directive 2019/944, the following legislative changes are proposed.

Regulation (EU) 2019/942 shall be amended as follows:

Article 3(1) shall be replaced as follows:

'ACER may, upon a request of the European Parliament, the Council, the Commission, Member States, their regulatory authorities or on its own initiative, provide an opinion or a recommendation to the European Parliament, the Council and the Commission, as well as to Member States and their regulatory authorities on any of the issues relating to the purpose for which it has been established.'.

Regulation (EU) 2019/943 shall be amended as follows:

Point (h) of article 30(1) shall be replaced as follows:

'(h) provide assistance to regulatory authorities, TSOs, and DSOs for the digitalisation of transmission networks including deployment of smart grids, efficient real time data acquisition and intelligent metering systems'.

2. In order to ensure effective control of timely, complete and correct transposition and application of Directive (EU) 2019/944, the European Commission should initiate and pursue, as appropriate, infringement proceedings under Articles 258–260 TFEU against Member States, which violate relevant obligations.

3. In order to ensure future harmonization of baseline methodologies at EU level, the following amendments to the demand response NC are proposed.

Article 55 shall be amended as follows:

'Where, pursuant to point (b)(ii) of paragraph 2, ENTSO-E and the EU DSO Entity conclude that one or more baselining methods could be harmonised at European level, taking into account the findings set out in the report published pursuant to paragraph 4, they shall within [two months] after the publication of the report develop and submit to ACER a proposal containing specific amendments to this Network Code setting out such harmonised baselining method(s) or common baseline principles, as appropriate.'.

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ABSTRACT

The master thesis investigates the legal framework governing the active participation of final customers in the European Union's retail electricity markets. The research aims to analyze the sufficiency and efficiency of the current EU legislation, in particular, the Clean Energy Package (including Directive (EU) 2019/944 and Regulation (EU) 2019/943), in fostering a consumer engagement into electricity market. It examines the development of the "active customer" and "demand response" concepts, as well as barriers for consumer participation in demand response mechanism and regulatory measures to overcome these barriers.

The results of the research demonstrate that while the EU *acquis* has introduced the legal status of active customers, the regulatory environment in Member States remains fragmented and often insufficient to achieve the Union's energy and climate goals. The research identifies significant barriers to market entry, including complex administrative procedures, limited access to consumption data, and inconsistent implementation of EU *acquis* across Member States. It concludes that EU institutions, in particular, EU DSO entity, ENTSO-E, ACER and European Commission shall, by means of assistance and control, ensure consistency of national legislation of EU Member States with EU *acquis*. These institutions shall also promote harmonization of local flexibility markets on the Union level to further strengthen competition and consumer participation in the retail energy sector.

Keywords: Active customer, Demand response, Clean Energy Package, Retail electricity market, EU energy law

SUMMARY

Legal aspects of further strengthening the competition in retail energy markets

Aim and Objectives

The aim of this master thesis is to to identify existing barriers for participation of active customers in demand response, methods for their overcoming, systematize them, to identify possible inefficiencies in described methods and provide for relevant proposals to overcome such inefficiencies. To achieve this aim, the thesis pursues three main objectives: provide a comprehensive description of scientific discourse on the legal status of active customers and demand response mechanism; second, identify barriers for consumer participation in demand response and mechanisms to overcome such barriers; and third, to assess, whether these methods are efficient; if they are inefficient – propose ways for their improvement.

Structure and Contents

The thesis is structurally divided into two main parts. The first part provides a historical and theoretical retrospective of final customer engagement in the electricity market. It examines the evolution of the "active customer" and "demand response" concepts through three distinct phases: the scientific discourse prior to the adoption of the Clean Energy Package (CEP), the specific provisions introduced by the CEP, and the subsequent post-adoption academic and policy discourse. This section highlights the transition of the consumer's role from a passive user to an active market participant.

The second part focuses on the practical identification and analysis of barriers to consumer participation in demand response. It categorizes these barriers into regulatory, economic, technical, and behavioral groups. This part also critically analyzes the draft Network Code on Demand Response (DR NC) and the approach for baselining methodology harmonization provided for by this document.

Main Results of Research

The research concludes that while the EU has established a high-level legal status for active customers, the regulatory framework in Member States remains fragmented and insufficient to fully achieve the Union's climate and energy policy goals. A key finding is that the implementation of EU directives by Member States is often incomplete or incorrect, leading to persistent regulatory barriers. Specifically, the study identifies that the lack of a standardized baseline calculation methodology and restrictive market entry requirements significantly hamper the scalability of flexibility services in electricity market.

The thesis proposes several specific legal measures to address these inefficiencies. Firstly, it suggests amending Regulations (EU) 2019/942 and 2019/943 to strengthen the mandate of ACER and ENTSO-E in assisting Member States with the correct transposition of technical

requirements. Secondly, it calls for the European Commission to more actively utilize infringement proceedings under Articles 258–260 TFEU against non-compliant Member States. Finally, regarding the critical issue of baselining, the author proposes amending the draft DR NC to include an explicit obligation for ENTSO-E and the EU DSO entity to develop harmonized EU-level baseline methodologies when economically and technically justified. These proposals aim to create a more uniform, transparent, and competitive retail energy markets across the EU.