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REAPPLYING CO-OPETITION IN PRACTICE

**The missing opportunity of cooperation among the smaller obligated
parties of the Hungarian Energy Efficiency Obligation Scheme in 2024**

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Abstract

The pursuit of energy efficiency in the European Union has been with us for almost two decades now, driven by the 20/20/20 targets set in 2007 and further clarified in the EU Energy Efficiency 2012/27/EU Directive' Article 7 in 2012. This directive mandates the Energy Efficiency Obligation Scheme (EEOS), requiring member states to meet energy saving targets through mandating energy distributors and retail sales companies to meet cumulative end-use energy savings. Influenced by previous built-out EEOS systems in Denmark, France, and Italy, 17 member states have implemented EEOS, with Hungary joining in 2021. Hungary's EEOS requires obligated parties, including electricity and natural gas suppliers and distributors, and associations selling transport fuel to end-use customers, to undertake projects resulting in verified energy savings. While compliance rates have been promising with 112% fulfilment of obligation, which exceeded the originally target, smaller obligated parties, whose initial obligation were under 1000 GJ faced challenges to meet their obligation requirement, and paid levy to fulfil their obligation. Failing to meet their obligation can be due to the lack of specialized expertise and resources needed to implement an energy efficiency project that can be typically found in larger companies. Smaller obligated parties are less able to deliver the lowest cost energy efficiency projects, which puts them at a competitive disadvantage compared to larger obligated parties. The Hungarian legal framework allows obligated parties to fulfil their obligation jointly, for instance through joint specialised energy efficiency projects, which can be a solution to reducing smaller obligated parties' competitive disadvantage. The research study explores whether the legal framework of EEOS through allowing joint fulfilment of obligation strengthens cooperation among smaller actors. The research question is the following, *"Does the legal framework of the Hungarian Energy Efficiency Obligation Scheme, which ensures the joint fulfilment of the energy savings obligation, strengthen cooperation between small, obligated parties?"*. Rooted in Brandenburger's theory of co-opetition, which advocates collaboration among competitors for mutual benefit by resource sharing or joint innovation, the study employs qualitative primary methods, including interviews with regulatory bodies, obligated parties, and experts, alongside comprehensive literature reviews to assess cooperation among competitors in practice. Results show based on the literature and interviews, that cooperation between smaller obligated parties is not relevant in the current EEOS due to lack of trust, knowledge and information, high transaction costs, and oversupply in the market. This study aims to show how cooperation between competitors can be relevant to reduce competitive disadvantage of smaller players.

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I. Introduction

The goal of improving energy efficiency among European Union Member States has been with us for almost two decades now. In 2007 the European Council set 20/20/20 targets with the goal of 20% energy efficiency improvement. Afterwards, in 2012 they stated in the EU 2012/27/EU Directive that the most efficient way to achieve the 20% energy efficiency target is by requiring the member states to set national energy efficiency targets, and projects.

In the EU Energy Efficiency 2012/27/EU Directive' Article 7 it is stated that Member States should introduce an Energy Efficiency Obligation Scheme (EEOS) which requires energy distributor and/or retail energy sales companies within each Member State to meet a cumulative end-use energy savings target by December 31, 2020 (European Commission, 2012). These targets involved achieving yearly energy savings of 1.5% from January 1, 2014, to December 31, 2020, based on the annual energy sales volume to end-users. They also stated that in case of not setting up Energy Efficiency Obligation Scheme, Member States may take alternative policy measures to achieve energy savings among end-users. Before the implementation of the Energy Efficiency Directive's Article about the EEOS, there were already built-out systems in Europe. Based on stakeholders' opinion, the examples of Denmark, France, and Italy were great influence on the implementation of the system (Egenhofer et al., 2016). For instance, Denmark implemented the EEOS in 1999, which relied on voluntary agreement between the government and energy distributors with increasing annual energy-saving targets (Fawcett et al., 2019). Italy introduced EEOS in 2005 with tradable White Certificates, focusing on the residential sector, gradually expanding to include industrial sectors with notable energy savings (Egenhofer et al., 2016). White certificate is the proof issued by an authority that provides a guarantee that a certain amount of energy savings has been achieved (Bertoldi et al., 2006). France implemented EEOS in 2006 with tradable energy efficiency certificates (White Certificate) as well, focusing on building and household sectors, with obligated parties including various energy suppliers (Bigano et al., 2016). Obligations set based on energy delivery thresholds and adjusted for turnover and market shares to meet commitments to energy savings over successive periods (Bertoldi et al., 2010). There are 17 Member States currently who have implemented the EEOS.

Hungary has introduced the EEOS under the Energy Efficiency Directive as new policy instrument in 2021 (MEKH, 2024). It requires obligated parties to introduce projects and implement measures that result in verified energy savings for the end-user. For instance,

upgrading or replacing an inefficiently operating machinery line with a more modern one. Among the obligated parties in Hungary, we can list electricity and natural gas suppliers and distributors, and associations selling transport fuel to end-use customers. Based on the number of obligated parties in the 16 other Member States, the obligated parties in Hungary are found to be one of the most widespread ones (Broc et al., 2020). Usually among obligated parties' suppliers or distributors can be found whereas in Hungary we can find both. For the first period of the EEOS (2021-2022), 830 obligated parties have been flagged, with a total of 684 323 GJ of obligation (HUPX, 2022). Out of these there were 799 smaller obligated parties (with less than 1000 GJ of obligation), and 31 larger obligated parties (with more than 1000 GJ of obligation). Based on the first period results, the registered verified energy savings consisted of total 763 048 GJ, which represented a 112% compliance rate that meant that the originally target has been exceeded. However, it is notable that smaller obligated parties fulfilled 59% of the total smaller obligated parties' emissions, whereas larger obligated parties fulfilled 96% of their obligation. According to Section 15/E (1) of Act LVII of 2015 on Energy Efficiency, if the obligated party has not fulfilled the energy saving obligation for the given year by reporting certified energy savings, it may choose to pay an energy efficiency fee instead of fulfilling the energy saving obligation, in whole or in part (Parliament, 2024). The energy efficiency fee is HUF 50 000 per 1 GJ/year of energy savings not achieved. At least 100 smaller obligated parties choose to fulfil their obligation by paying the levy. It can be the result of not having the same specialised expertise, human and financial resources needed to manage energy efficiency projects that can be typically found in larger energy service and distribution companies often through the creation of specialised partner companies or within the companies (Felsmann, 2021). Smaller fuel and energy trading companies are less able to deliver the lowest cost energy efficiency projects, which puts them at a competitive disadvantage compared to larger obligated parties. However, this could be achieved through joint fulfilment of the obligation, which is provided for in Article 15/B (1) of Act LVII of 2015 on Energy Efficiency, whereby the obligated parties may decide to fulfil their energy saving obligation jointly, in which case their energy saving obligation shall be aggregated (Parliament, 2024). If smaller actors would cooperate with each other by creating specialised energy efficiency projects to fulfil their obligations together, than they could reduce their competitive disadvantage against the larger actors (Felsmann, 2021).

The research question of my thesis is the following, “*Does the legal framework of the Hungarian Energy Efficiency Obligation Scheme, which ensures the joint fulfilment of the energy savings obligation, strengthen cooperation between small, obligated parties?*”.

Az EEOS is an appropriate empirical research topic to answer the existing question of Brandenburger's theory of co-opetition, i.e. how much cooperation between competitors is realised in practice. Co-opetition theory acknowledges that companies can achieve together bigger success by collaborating while they remain competitors to each other (Brandenburger et al., 2011). Co-opetition encourages companies to find opportunities for mutual benefit, such as resource sharing or jointly innovation. In the context of my research, I will examine the issue through qualitative primary research by making in-depth interviews with regulatory, obligated parties' and expert advisory side, in addition to reviewing a wide range of literature to fully examine whether the possibility of joint fulfilment based on the legal framework strengthens cooperation among smaller obligated parties to reduce their competitive disadvantage compared to larger obligated actors.

My preliminary proposition to the research question is that although the legal framework of the EEOS in Hungary allows for cooperation, association and joint fulfilment between smaller obligated actors, the phenomenon of joint fulfilment of obligated actors is not common.

I will structure my thesis starting with the literature review. I will analyse the introduction of EU Energy Efficiency 2012/27/EU Directive' Article 7, the definition, and the structure of Energy Efficiency Obligation Scheme (EEOS) through international use-cases. Afterwards I will briefly describe the implementation of EEOS in Hungary, how it is structured, who are the obligated parties, what is the legal framework behind it, and what are the results of the EEOS based on the first period (2021-2022) experience. I will conclude the literature review by describing the topicality of the examined issue and connecting it to Brandenburger's co-opetition theory. I will continue my thesis with the discussion chapter. I will describe the research methodology and data collection and examine the research findings through the interviews and literature. Afterwards, I will present my answers to the research question and on whether the possibility of joint fulfilment of obligation strengthens cooperation among smaller obligated parties and reduces their competitive disadvantage. I will conclude my thesis by restating main arguments, reflecting on the research contribution to the literature, briefly define the limitations of the thesis, and describe the future research plans of the study.

II. Literature Review

II.1. Energy Efficiency Obligation Scheme

In March 2007 the European Council set targets, also known as 20/20/20 targets with the goal to increase the share of renewable energy to 20%, reduce greenhouse gas emissions by 20%, and to improve energy efficiency by 20%. Afterwards, in 2010, they published the Energy 2020 Strategy where they stated that energy efficiency is the most cost-effective way to reduce emissions (Zygierewicz et al., 2016). The EU 2012/27/EU Directive stated that it would be preferable to achieve the 20% energy efficiency target by requiring Member States to set indicative national energy efficiency targets, programmes, projects. They found that on a Union-level scheme this objective could be achieved by introducing energy efficiency obligation schemes for energy utilities or other alternative policy measures.

Article 7 states that *“Each Member State shall set up an energy efficiency obligation scheme. That scheme shall ensure that energy distributors and/or retail energy sales companies that are designated as parties (energy distributor or retail energy sales company that is bound by the national energy efficiency obligation scheme) operating in each Member State’s territory achieve a cumulative end-use energy savings target by 31 December 2020....achieving new savings each year from 1 January 2014 to 31 December 2020 of 1,5% of the annual energy sales to final customers of all energy distributors or all retail energy sales companies by volume”* (European Commission, 2012).

The European Commission held an online consultation regarding the Energy Efficiency Obligation Scheme (EEOS), that highlighted the main barriers and challenges of the implementation of Article 7 (Zygierewicz et al., 2016). The main challenge was the limited timeframe (2014 to 2020) that makes it hard to attract investment for long term measures. Among the other challenges and barriers were the high administrative burden, lack of knowledge and skills of involved parties, lack of long-term vision.

In case of not setting up an energy efficiency obligation scheme, the European Commission stated that Member States may take alternative policy measures to achieve energy savings

among end-users. The following alternative measures were stated (European Commission, 2012):

- a) Energy or CO₂ taxes reducing end-use consumption.
- b) Financing schemes, fiscal incentives promoting energy-efficient technology, reducing end-use consumption.
- c) Regulations, voluntary agreements promoting energy-efficient technology, reducing end-use consumption.
- d) Standards, norms improving energy efficiency of products, services.
- e) Energy labelling schemes.
- f) Training, education, energy advisory programs promoting energy-efficient technology.

These alternative measures can be implemented faster than the Energy Efficiency Obligation Scheme (EEOS) and deliver quicker results (Egenhofer et al., 2016). However, they often require long-term government funding, whereas EEOS are less burden to the government budget. Also, alternative measures not always able to address non-financial barriers to energy efficiency. Among the potential benefits of the EEOS that was measured by the European Commission, we can list the lower bills for energy consumers, better awareness of energy efficiency, lower costs, stimulation of energy efficient renovation of buildings, and increased competitiveness in the energy market (Fawcett et al., 2016).

Based on another approach, benefits of the EEOS can be grouped into three categories (Rosenow et al., 2016):

- a) Participant benefits - directly benefit households and businesses installing energy efficiency upgrades (e.g. bill savings, health, comfort, disposable income, employee productivity).
- b) Utility system benefits - reduce costs in providing energy services to end-users (e.g. avoided transmission capacity costs, generation operation costs, CO₂ costs, reduced financial risk, improved customer, and corporate relations).
- c) Societal benefits - extend more broadly to the community and society at large (e.g. greenhouse gas emission reduction, energy security, employment, fiscal benefits).

II.1.1. Definitions

Energy Efficiency Obligation Scheme (EEOS)

EEOS is a policy tool designed to promote energy efficiency improvements within a country's energy sector (Argun et al., 2021). It involves a flexible structure that adapts to different national conditions and engages various stakeholders, including energy suppliers, distributors, and service providers. It is a regulatory tool requiring obligated parties to achieve specific energy saving targets by implementing approved end-use energy efficiency measures or procuring such savings (Joshi, 2012). The EEOS shares 3 key features worldwide, which are the following.

- a) Quantitative target: EEOS set specific goals for energy efficiency improvement.
- b) Obligated parties: certain entities are required to meet specific targets.
- c) Operational system: a system defines eligible energy-saving activities, verifies and reports achieved savings, and ensures the implementation of these activities.

Designing and implementing EEOS involves the following steps (Joshi, 2012):

- a) Defining objectives and legal framework, stating policy objectives, and establishing legal authority for the obligation.
- b) Setting targets and obligations, determining energy saving targets, choosing obligated parties, assigning responsibilities to them, and establishing compliance mechanisms.
- c) Defining approved energy efficiency measures, establishing procedures for measuring and verifying savings, and considering the implementation of trading mechanism, along with the necessary rules and infrastructure for trading.
- d) Establishing sustained funding mechanisms to cover costs and considering providing incentives for exceeding targets, implementing cost recovery mechanisms.
- e) Overseeing the EEOS' implementation, continuously reporting the results and identifying areas for improvement based on monitoring and feedback, enforcing compliance through mechanisms and sanctions.

White Certificates

“A white certificate is an instrument issued by an authority or an authorised body providing a guarantee that a certain amount of energy savings has been achieved. Each certificate is a unique and traceable commodity that carries a property right over a certain amount of additional savings and guarantees that the benefits of these savings has not been accounted for elsewhere. (Bertoldi et al., 2006)” Additional energy saving means that only those actions can

be supported by policy that result achieved energy savings. Main benefit of certificate trading is the minimization of costs of compliance. White certificates serve as tradable commodities to represent the quantity of saved energy (Argun et al., 2021). Obligated parties earn white certificates by achieving energy saving goals, purchasing them from others in the system, or selling excess certificates. Depending on the volume of trade, a virtual market platform may facilitate the trading of white certificates among obligated parties. Energy efficiency project savings are verified independently (either before or after the implementation) and certified through white certificates (Bertoldi et al., 2015). Italy and France are the only EU countries incorporating energy savings obligations with fully tradable white certificates. Trading methods may vary, and formal certification isn't always required. For instance, in the United Kingdom, certified energy savings can be traded between obligated parties without formal certificates, and parties can purchase certified savings or projects from third parties.

Market Actors

Market actors involved in EEOS include energy distributors or suppliers, energy efficiency businesses like ESCOs, installers, and eligible bodies, as well as energy end-users where projects are implemented (Bertoldi et al., 2010). A system administrator is also needed who oversees compliance, a certifying body who validates energy savings, and a registering body who tracks certified actions. These actors interact to shape and operate the EEOS system.

Obligated Parties

Choosing obligated parties and the size of obligations may vary among the current EU Member States' schemes. Some EU Member States choose to impose obligations on suppliers (retail companies) while other target distributors (grid owners) (Bertoldi et al., 2010). The main difference between the two, is that suppliers are closely connected to consumers, they may shift towards energy services with such obligations, whereas distributors are regulated monopolies, may not have the same incentive. Distributors' cost recovery mechanisms are easily implemented through distribution tariffs, while suppliers (retailers) have the freedom to set tariffs and recover their costs as they see fit (Bertoldi et al., 2015). Distributors provide a consistent revenue source, as regulated monopolies aren't affected by market competition (Lees et al., 2016). Energy regulators are experienced in handling changes in obligated distributor size. However, they have limited interaction with end-users, particularly those with low energy demand and some distributors may lack brand recognition among small users. On the other hand, suppliers have enhanced interaction with end-use customers, they have the potential for

promoting an energy service approach. However, they may exert control over the supply of energy efficiency, and pricing transparency may not always align with government preferences. Another approach is that in traditional, regulated electricity and gas markets obligated parties can be vertically integrated energy utilities, in unbundled markets energy retailers and/or transmission and distribution system operators, or in other energy markets road transport and heating fuel suppliers (Joshi, 2012). These participants are required to make energy efficiency improvements within specified periods, covering various sectors including housing, services, industry, and transport (Argun et al., 2021). They can implement energy efficiency actions directly or through partnerships with third parties like energy service companies or local authorities. They can also pass on a portion of the energy efficiency analysis cost to end-users through their energy bills. Those who fail meeting their energy efficiency target may face penalties, while those who exceed targets can transfer excess savings to subsequent periods or trade them among other obligated parties. The number of obligated parties may vary widely, ranging from fewer than 10 in some countries like the UK to several hundred or even thousands in countries like Denmark and France (Bertoldi et al., 2015). EEOS that involve district heating companies or fuel retailers typically have more obligated parties.

II.1.2. Developed Energy Efficiency Obligation Schemes

There are 17 member states who have already implemented the EEOS, however let's look on the Danish, Italian, and French EEOS examples that were built-out systems before the implementation of Energy Efficiency Directive's Article 7 about the EEOS, and that were, based on stakeholders' opinion, great influence on the implementation of the system (Egenhofer et al., 2016).

Denmark

Denmark implemented EEOS in 1999 but started developing the system in 1995. Among obligated parties are electricity distribution companies, natural gas suppliers, oil, and district heating companies (Egenhofer et al., 2016). Initially, in 2000 only gas distribution companies joined the scheme (Fawcett et al., 2019). In 2006, when they radically changed the scheme, oil companies joined the EEOS as well, but district heating companies could voluntarily decide whether they would like to join the scheme or not. There 3 natural gas, 55 electricity, 405 district

heating and 6 oil companies among the energy distributors, who cover all end-use sectors (Broc et al., 2020). The white certificate scheme system was introduced in 2006 (Argun et al., 2021). The Danish EEOS is based on a voluntary agreement “The Energy Savings Agreement” that was established in 2012 between the government and the obligated parties, and it is renegotiated every 3 years (Bigano et al., 2016). The administrative costs of this system are low because of the simple documentation procedures. They exclude actions with very low additionality to energy efficiency improvements. In 2016 there was a proposal to move the obligation from distributors to retailers to enhance competition and potentially reduce cost, but they remained with distributors (Fawcett et al., 2019). The energy-saving targets for distributors are set annually through agreements between Minister of Energy & Climate Change and the Danish Energy Association, the Danish Petroleum Industry Association, and other stakeholders (Bertoldi et al., 2010). Targets increased from 2.95 PJ/year to 5.4 PJ/year by 2010. District heating targets are individually determined, while sectoral targets for electricity and gas are based on market share. From 2015-2020 the annual target increased to 12.2 PJ (Bertoldi et al., 2015). The Danish EEOS is considered to be widely successful due to its operation. Targets for energy savings have been raised continuously, and the focus has shifted towards supporting technological measures over education and advice (Fawcett et al., 2019). Also, the voluntary agreement scheme between energy trade associations and the government is a motivating tool to complete the obligation.

Italy

Italy built out an EEOS mechanism that consisted of tradable White Certificates in 2005 (Egenhofer et al., 2016). Initially they targeted the residential sector, consisting of small actions with a focus on electricity savings, such as lighting. After that they expanded to residential heating, and from 2012 White Certificates shifted to the industrial sector. Among obligated parties are electricity and natural gas distributors. With more than 50 000 customers, there 12 electricity distributors and 44 natural gas distributors among the obligated parties (Broc et al., 2020). Most white certificates are traded through a specialized exchange or bilateral agreements (Bertoldi et al., 2015). Prices generally align with the annual cost recovery rate set by regulators for obligated parties. Energy-saving targets are expressed in primary energy units (ton of oil equivalent – toe) and were initially imposed on electricity and gas grid distribution companies with over 100 000 customers, later reduced to 50 000 customers (Bertoldi et al., 2010). Targets are automatically adjusted annually based on tradable white certificates. Distribution among

distributors is proportional to market share. All end-use sectors are eligible for energy efficiency projects certification, including supply options like combined heat and power, solar water heaters, and PV systems. Initially, half of the target had to be achieved through fuel reduction, but this requirement was removed in 2008 for increased competition. Obligated parties eligible to submit projects for earning white certificates are electricity and gas distributors with more than 50 000 customers, non-obligated distributors, companies operating in the sector of energy services, and companies having an energy manager or an ISO 50001 certified energy management system (Bertoldi et al., 2015). Over the past fifteen years, the Italian White Certificate scheme has successfully generated notable energy savings, with 62% occurring within the industrial sector (Pálffy, 2021). The adaptable regulatory framework and the extensive involvement of various stakeholders in the scheme's implementation have attributed to the success.

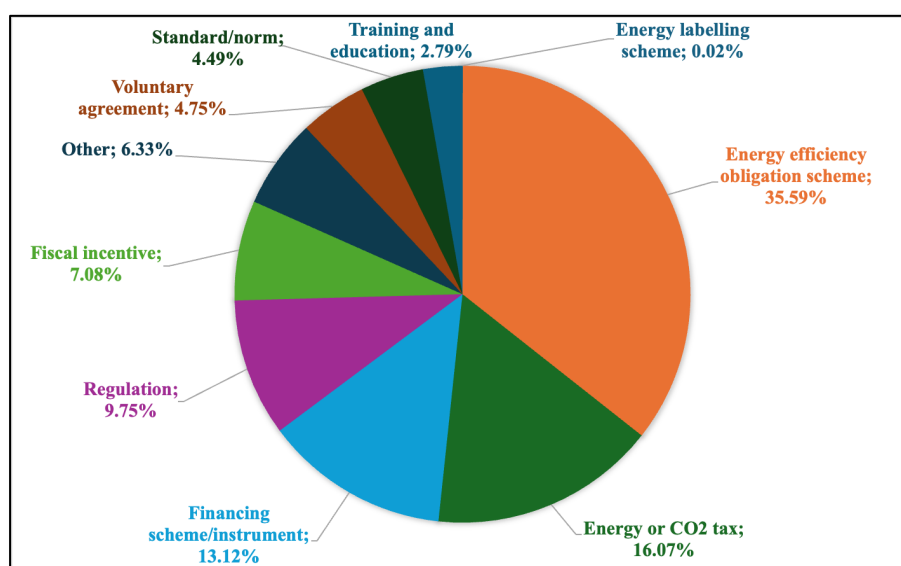
France

France has developed a scheme in 2006 of tradable energy efficiency certificates (*certificats d'économies d'énergie*, CEEs), white certificate scheme (Bigano et al., 2016). The French scheme's main targets are the building sector and the households. Among obligated parties are electricity, natural gas, district heating, petroleum and oil suppliers in the residential and service sectors and in transports (Argun et al., 2021). There are around 120 obligated parties overall (Broc et al., 2020). The energy-saving targets are established for energy suppliers delivering electricity, gas, domestic fuel, cooling, and heating for stationary applications (Bertoldi et al., 2010). During the first period (2006-2009), obligations were set based on a threshold for energy delivery, with a total target of 54 TWh cumulated over the actions' lifespan. Obligated parties received targets based on a combination of turnover and market shares. Projects yielding savings above 1 GWh over their lifetime were eligible, with pooling of similar actions permitted to meet thresholds if they were additional to the organization's usual activities. The third period's (2015-2018) goal was to fulfil France's commitments to energy savings, with a requirement to 700 TWh cumulated over the actions' lifespan (Bertoldi et al., 2015). Obligated parties gain White Certificates for their energy savings, where most of the issued certificates were based on savings in the residential sectors (Argun et al., 2021). The fourth period (2018-2020) has been exceeded to 2021 with a requirement of 2133 TWhc cumulated over the actions' lifespan.

II.1.3. Lessons learned from the implementation of EEOS

About half of the EU Member States have surpassed their cumulative energy-saving targets from 2014 to 2016, with notable success in Finland, Austria, Poland, Estonia, Denmark, and the Netherlands (Zangheri et al., 2019). Conversely, Bulgaria, Croatia, Cyprus, Latvia, Luxembourg, and Portugal appear to be significantly behind their savings goals. Twelve Member States, including Bulgaria, Denmark, Ireland, Spain, France, Italy, Latvia, Malta, Austria, Poland, Slovenia, and the United Kingdom, have achieved some or all their savings through EEOS. These schemes accounted for nearly 41% of total savings claimed under Article 7 at the EU level in 2016. Nine countries introduced new policy measures in their 2019 annual reports, with Hungary, Latvia, and Lithuania implementing the most measures (European Commission, 2020). However, Czechia, Estonia, Greece, Hungary, Italy, and Sweden are also unlikely to meet their targets. *1. Figure* shows that EEOS accounted for the majority of achieved savings (35,59%), followed by energy or CO₂ taxes and financing schemes.

1. Figure: Distribution of cumulative energy savings in 2014-2017 eligible under Article 7 per policy measure type



Source: European Commission, 2020 (own edit)

The primary disadvantages of EEOS are the transaction and administration costs (Blumberga et al., 2021). Additionally, accredited savings within the scheme may surpass actual achieved savings due to potential negotiations among stakeholders.

Based on the European experience with the EEOS, along with alternative mechanisms under the Energy Efficiency Directive (EED), several crucial lessons have emerged, the most crucial is the significance of public policy discipline and flexibility (Nadel et al., 2017). Despite the EU setting ambitious energy efficiency targets since 2006, many Member States struggled to implement consistent and cost-effective savings programs. The mandate provided by the EED is vital in driving a greater share of Europe's achievable savings potential. Also, flexibility is important because tailoring approaches to fit the diverse energy systems across EU Member States is essential. For instance, Denmark have demonstrated success with varied approaches, such as voluntary agreements and dedicated funds. Opposition to a "one size fits all" mandate underscores the importance of flexibility in achieving efficiency goals.

Based on international examples, the implementation of EEOS is vital for fostering an adequate energy market supply (Vedres, Ringhoffer, 2022). Without such supply, obligated parties may only comply with energy savings obligations at high costs, typically through high penalties. These fines, set at a deterrent level by regulators may fail to internalize external costs, risking regulation effectiveness. High costs may result in rejection of the obligation system, potentially leading to policy failure. The primary benefit of the EEOS is its ability to achieve energy saving targets in a cost-effective manner (Pálffy, 2021). This is accomplished by implementing economically viable energy efficiency measures across all end-user sectors. Building a successful EEOS requires time and commitment, it may take years to accumulate significant savings that convincingly demonstrate the value of efficiency investments to decision-makers (Nadel et al., 2017). The staged implementation of EEOS is likely to be more successful, especially in Member States with limited experience, as it facilitates gradual growth and development.

II.2. Energy Efficiency Obligation Scheme in Hungary

The Energy Efficiency Obligation Scheme under the Energy Efficiency Directive was introduced in Hungary as a new policy instrument from 1 January 2021 (MEKH, 2024). The National Energy and Climate Plan sets an energy efficiency target for the country that final energy consumption in 2030 should not exceed the 2005 level of 785 PJ. In order to achieve the energy efficiency targets, Hungary introduced the Energy Efficiency Obligation Scheme, which aimed to channel investments on a market basis to areas with the highest energy use and energy efficiency potential (ITM, 2020). In addition, a further objective was set at the time of

design to help vulnerable consumers, for example, by upgrading through the energy efficiency obligation scheme (MEKH, 2024). The target set in the National Energy and Climate Plan requires energy savings of 0.8% per year and new savings of 7 PJ per year for the period 2021 to 2030. The previously implemented energy efficiency programmes and measures have resulted in an average of 4 PJ final energy savings per year, thus a more effective policy measure became essential, which meant the introduction of an energy efficiency obligation scheme. It is also worth mentioning that the Green Recovery Tracker 2021 country report published by the Wuppertal Institute and E3G highlights the lack of energy efficiency improvement measures in Hungary based on the Hungarian Recovery and Adaptation Plan (Mölter, et al., 2022). According to the report, the plan includes a number of good measures to increase the share of renewable energy in final energy consumption. However, energy efficiency measures in the building sector were underrepresented in the plan, which meant that not enough renovation and modernisation measures were taken to contribute to long-term energy savings in Hungary, which was changed by the Energy Efficiency Commitment Scheme.

The EEOS requires obligated parties to introduce programmes and implement measures that result in verified energy savings for the end-user (MEKH, 2024). For example, upgrading or replacing an inefficiently operating machinery line with a more modern one. This scheme directs energy efficiency investments on a market basis to areas with the highest energy use and energy efficiency potential (ITM, 2020).

Based on research, the learning period and the implementation can be shortened down if a country builds on existing experience of a voluntary scheme for obligated parties or adopts a successful EEOS from another country (Fawcett et al., 2019). Hungary had several examples when implementing the EEOS in 2020-2021. Based on the number of obligated parties in other 16 EU Member States who implemented the EEOS before Hungary, the obligated parties are found to be one of the most widespread ones, as among the obligated parties there are distributors and suppliers as well (Broc et al., 2020). When usually among obligated parties' supplier or distributor companies can be found.

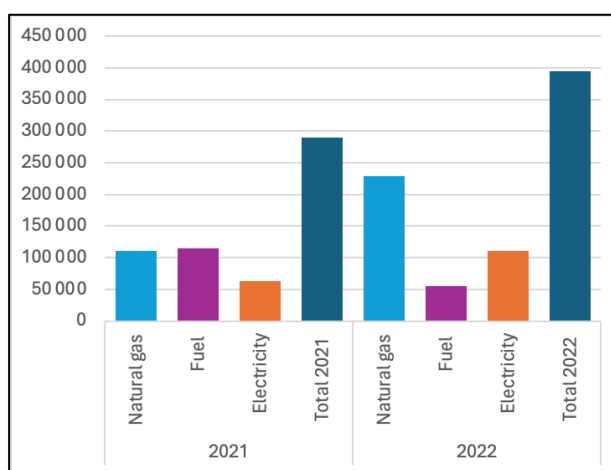
II.2.1. Obligated parties

The obligated parties of the Hungarian Energy Efficiency Obligation Scheme are (MEKH, 2024):

- a) licensees of electricity suppliers and distributors,
- b) licensees of natural gas suppliers and distributors,
- c) business entities and, from 2024, associations selling transport fuel to end-use customers,
- d) from 2024, parties supplying natural gas under contract to users acting in their own right.

In 2021, 750 obligated parties were defined, so the defined obligation was 290 164 GJ (HUPX, 2022). However, the first period was extended to 2021-2022 due to emergency provisions, so that for these 2 years 830 obligated parties were designated, with a total of 684 323 GJ of assigned amount. Due to the impact of COVID, which led, among other things, to low electricity consumption, there was also an impact on the level of end-use, resulting in a reduction in the level of obligations for fuel traders for the year 2022. In addition, the amount of obligations for fuel traders has also been reduced under the revised rules. The obligation per industry was 169,927 GJ for fuel, 339,514 GJ for natural gas and 174,881 GJ for electricity for the period 2021-2022. 2. Figure shows the distribution of energy savings obligations by industry in 2021 and 2022. It is visible that the amount of obligations for fuel traders for the year 2022 has decreased.

2. Figure: Distribution of energy savings obligations by industry 2021-2022 (GJ)



Source: HUPX, 2022 (own edit)

The HUPX market monitoring report (2022) distinguishes between small and large obligated parties. Small parties are those with less than 1000 GJ of obligations. Obligated parties with more than 1000 GJ are classified as large obligated parties. In the period 2021-2022, smaller obligated parties accounted for 96% of the 830 obligated parties (799 companies) and large obligated parties for 4% (31 companies). Smaller obligated parties accounted for only 7% of the total (45 980 GJ).

3. Figure below shows how the number of smaller obligated parties (with less than 1000 GJ obligation) and larger obligated parties (with more than 1000 GJ obligation) was distributed over the period 2021-2022.

3. Figure: Distribution of smaller and larger obligated parties by industry

Area of obligation	Total number of obligated parties	Obligation categories	Obligated parties by category	Share of Top 5 actors (%)
Total	830	>1000 GJ	31	64.8%
		<1000 GJ	799	
Natural gas	46	>1000 GJ	16	90.6%
		<1000 GJ	30	
Fuel	747	>1000 GJ	10	70.2%
		<1000 GJ	737	
Electricity	63	>1000 GJ	13	78.8%
		<1000 GJ	50	

Source: HUPX, 2022 (own edit)

II.2.2. Level of obligation

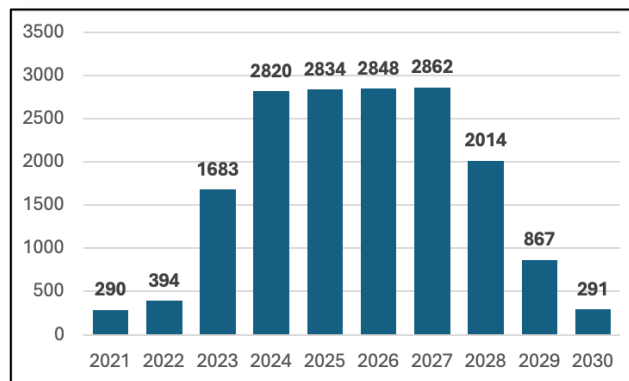
The increase in the level of the obligation is set as follows until 2030 to ensure that the operation of the Energy Efficiency Obligation Scheme contributes significantly to achieving the EU Directive's energy efficiency target for Hungary of 0.8% per year of new final energy savings per year between 2021 and 2030. However, this will require new final savings of 7 PJ per year, of which the planned share of the EEPR is estimated at 25-28% (Felsmann, 2021). This means that Hungary will continue to give a significant role to alternative policy measures.

According to § 15 (1) of the Obligated Energy Efficiency Act LVII of 2015, obligated parties are required to achieve annual energy savings of set percentages among final customers. The targets are as follows (Parliament, 2024):

- a) in 2021, 0.05% of the quantity of energy sold to final customers in Hungary in the year 2019 and subject to the obligation,
- b) in 2022, 0.1% of the quantity of energy sold to final customers in Hungary in the year 2020 and subject to the obligation,
- c) in 2023, 0.3% of the quantity of energy sold to final customers in Hungary in the year 2021 and subject to the obligation,
- d) in the years 2024 to 2027, 0.5% of the quantity of energy sold by it to final customers in Hungary subject to the obligation in the second year preceding each year,
- e) in 2028, 0.35% of the quantity of energy sold to final customers in Hungary in the year 2026 and subject to the obligation,
- f) in 2029, 0.15% of the quantity of energy sold to final customers in Hungary in the year 2027 and subject to the obligation,
- g) in 2030, 0.05% of the quantity of energy sold to final customers in Hungary in the year 2028 and subject to the obligation.

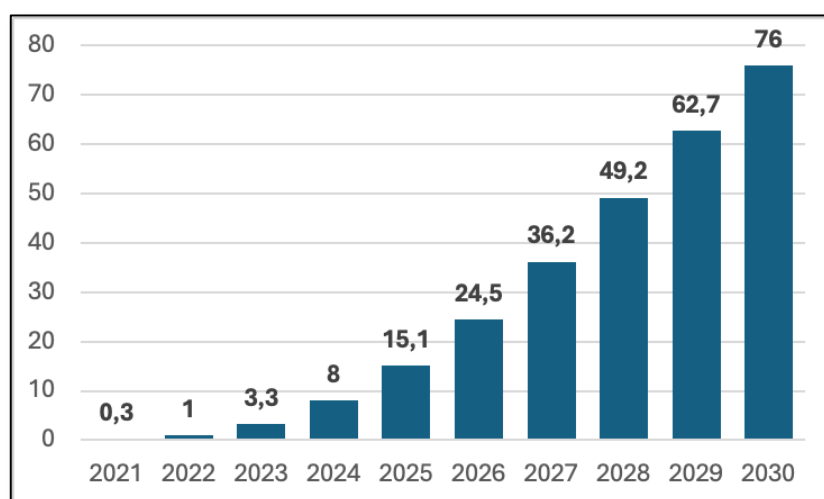
The following 4. Figure and 5. Figure show the estimate of the total energy savings obligation between 2021 and 2030 in TJ based on the pre-defined energy savings obligation and the annual target cumulative energy savings from the EEOS scheme, also between 2021 and 2030 in PJ through direct delivery.

4. Figure: Energy savings obligation estimate 2021-2030 (TJ)



Source: HUPX, 2022 (own edit)

5. Figure: Annual cumulative energy savings targets 2021-2030 (PJ) by direct fulfilment



Source: Government of Hungary, 2024 (own edit)

II.2.3. Legal framework behind EEOS

List of national and EU legislation related to the energy efficiency obligation scheme (Vedres, Ringhoffer, 2022):

- a) Act XXII of 2013 on the Hungarian Energy and Public Utility Regulatory Office,
- b) Act LVII of 2015 on Energy Efficiency,
- c) Government Decree No. 671/2021 (XII.2.) on the different application of Act LVII of 2015 on Energy Efficiency during an Emergency,
- d) Government Decree No 122/2015 (26.05.2015) on the implementation of the Energy Efficiency Act,
- e) MEKH Decree No. 17/2020 (XII. 21.) on the reporting of data on end-use energy savings,
- f) Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency,
- g) Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency,
- h) Commission Recommendation (EU) 2019/1658 of 25 September 2019 on the transposition of energy saving obligations under the Energy Efficiency Directive.

II.2.4. Determining the level of obligation

In the Hungarian EEOS, the Hungarian Energy and Public Utility Regulatory Authority (“Magyar Energetikai és Közmű-szabályozási Hivatal” – MEKH) determines the obligation annually (MEKH, 2024). The obligated party shall send the data required for the determination of the energy saving obligation to the Hungarian Energy and Utility Regulatory Authority in the manner, with the data content and within the time limit specified in Decree 17/2020 (XII. 21.) of the Hungarian Energy and Utility Regulatory Authority on the provision of data on end-use energy savings. By 31 May of each year, the *economic operator selling transport fuel* to end users shall report the sales data for the previous year to the EKR data collection system of the MEKH. The *electricity and natural gas trading licensees* shall submit the data required for the determination of the annual energy saving obligation in the framework of the regular data reporting in the V610b form by 31 May. Afterwards, according to Article 15/C (1) of Act LVII of 2015 on Energy Efficiency, the Hungarian Energy and Public Utility Regulatory Authority shall determine the amount of energy savings due in the year in question by 30 November of the year preceding the year in question in a decision on the basis of the individual obligated parties (Parliament, 2024). If the necessary data are not available by this date, the Hungarian Energy and Public Utility Regulatory Authority shall make the decision on the basis of the available data. The deadlines for data provision were different in the first year of the introduction of the system (2021), with the deadline for the economic entity selling transport fuel to final consumers being 2021 (MEKH, 2024). The Hungarian Energy and Public Utility Regulatory Authority issued a decision on the amount of energy savings due in 2021 by 31 March 2021. In the event of non-compliance or inadequate compliance with the data reporting obligation, the Hungarian Energy and Public Utility Regulatory Authority may impose a fine of up to HUF 10 million, provided that the legal sanction applied does not exempt the obligated party from its energy saving obligation.

Based on Section § 15/D (1) of Act LVII of 2015 on Energy Efficiency, the obligated party shall report the certified energy savings and the supporting data to the Hungarian Energy and Utility Regulatory Authority by 31 March of the year following the year in question at the latest (Parliament, 2024). In addition, according to paragraph (4), the obligated party shall declare by 31 March following the end of the year under review how much of the energy savings in excess of the energy savings required for the fulfilment of the obligation for the given year it intends to account for retroactively for previous years. In addition, it is important to note that paragraph

(5) states that if the obligated party fails to meet the energy savings obligation for the year in question, it shall declare by 31 March following the year in question whether it will meet the obligation in whole or in part by paying an energy efficiency charge or whether it will meet it in one of the following two years, taking into account reductions.

Under Article 15/D (3) of Act LVII of 2015 on Energy Efficiency, the obligated party may count the part of the energy savings declared for a given year in excess of the obligation for the current year as savings achieved for the two preceding years (Parliament, 2024). The energy savings reported for the two preceding years may be subject to a reduced assessment. Rate of reduction:

- a) 50% in the case of the calculation for the year preceding the current year
- b) 75% for the second year preceding the year in question.

Section 3 (1) of Decree 17/2020 (XII. 21.) of the MEKH states that the data of the verified energy savings to be accounted for a given year as the fulfilment of the energy saving obligation shall be reported to the EEOS data collection system by the energy auditing (verifying) organisation verifying the energy savings on behalf of the obligated party, with the following data content (MEKH, 2024):

- a) the name of the energy efficiency measure or investment implemented,
- b) the date of the start of the energy efficiency measure or investment,
- c) the location where the energy efficiency measure or investment was implemented,
- d) the date of implementation of the energy efficiency measure or investment in a building, or the date of actual and full commissioning of the investment in the case of an energy efficiency measure or investment in a building, or the date of commissioning of the investment in the case of other investments,
- e) the name, registration number and energy audit number of the energy auditor or energy auditing organisation that carried out the energy audit that substantiates the energy savings,
- f) the name and identification number of the energy audit organisation verifying the energy savings,
- g) the total annual savings (GJ) achieved by the energy efficiency measure or investment
- h) the annual amount of energy savings to be accounted for (GJ),
- i) in case of transferred energy savings, the name of the transferor, the tax number, the date of transfer and,

- j) in case of a combination of energy savings with an alternative policy measure, the identification of the alternative policy measure, the share of the non-refundable public aid or tax relief received.

It is also important to note that according to paragraph 4 of the MEKH Decree 17/2020 (XII. 21.) on the provision of data on end-use energy savings, the energy audit prepared for the purpose of determining energy savings must include (MEKH, 2024):

- a) a description of the initial situation before the energy efficiency improvement measure or the technical situation before the energy efficiency investment was made and the energy efficiency indicators that characterise it,
- b) a detailed description of the energy efficiency improvement measure or investment,
- c) in the case of building structures, a detailed description of the layering scheme, the product characteristics and thickness of the materials used and the relevant technical solutions,
- d) in the case of the purchase or replacement of machinery and equipment, the name, type, performance characteristics, expected operating time and lifetime of the machinery and equipment,
- e) a description of the building installation work, its material characteristics, size or quantity and a calculation of the energy savings achieved in accordance with the relevant legislation, national standard or professional code of practice,
- f) an indication of the requirement adopted or in force in the European Union or in Hungary for the new equipment installed, or a clear statement that no such requirement exists,
- g) an indication of the legislation, national standard, international standard, technical guideline or other technical document relevant to the measure implemented, taking into account which the energy savings achieved can be calculated,
- h) a detailed description of the methodology used to calculate the energy savings, taking into account Commission Recommendation (EU) 2019/1658 of 25 September 2019 on the transposition of energy savings obligations under the Energy Efficiency Directive.

II.2.5. Verification of energy savings

The verification of energy savings is carried out by the energy auditing organisations authorised to carry out the verification and they are also responsible for ensuring that the obligated party has properly taken into account the provisions of Decree 122/2015 on the implementation of the Energy Efficiency Act, and certify the additional contribution of the person implementing the investment or measure and the amount of energy savings for the year in question and the following years (MEKH, 2024).

Act LVII of 2015 on Energy Efficiency No 15/E. § (7a), if the Hungarian Energy and Public Utility Regulatory Authority finds during the audit that the energy savings or a part of the energy savings have not been properly determined, it shall oblige the certifying body to provide the final customers with energy savings equal to the amount of the energy savings not properly determined within 180 days, which obligation may be fulfilled by paying a redemption fee at the option of the certifying body at the rate set by the President of the Hungarian Energy and Public Utility Regulatory Authority in the Regulation issued by the President of the Hungarian Energy and Public Utility Regulatory Authority for the implementation of the relevant Act. The Hungarian Energy and Public Utility Regulatory Authority shall, in its decision obliging the certification body to comply with the energy saving obligation, oblige the certification body to pay a fine of HUF 70 000 for each 1 GJ of energy saving not achieved, in case of failure to meet the deadline for compliance. If the Hungarian Energy and Public Utility Regulatory Authority finds during the audit that the energy savings or a part thereof have not been properly determined, this shall not affect the full accountability of the energy savings as fulfilment of the energy savings obligation (Parliament, 2024).

II.2.6. Fulfilling the obligation

According to Article 15/B (1) of Act LVII of 2015 on Energy Efficiency, the obligated parties may decide to jointly fulfil their energy saving obligation, in which case their energy saving obligation shall be aggregated. In such a case, the obligated parties shall be jointly and severally liable for the fulfilment of their energy saving obligations and all related obligations, including reporting obligations and obligations to pay fines (Parliament, 2024). Furthermore, according to Article 15/B(2), the obligated party may fulfil its energy savings obligation either by energy

efficiency investments or energy efficiency improvement measures in its own sector of activity or in another sector outside its own sector of activity, or by certified energy savings by other obligated parties, energy efficiency service providers that are not obligated parties or other third parties. Importantly, Article 15/B (3) states that certified energy savings are a limited marketable asset that can only be transferred to the obligated party. The transfer of energy savings that have not been certified or have been invalidated by the Hungarian Energy and Public Utility Regulatory Authority, as well as the transfer of energy savings to a buyer that is not an obligated party, is null and void. Furthermore, Article 15/B (7) states that certified energy savings may be transferred by bilateral agreement or on an organised market.

II.2.7. Energy efficiency levy and penalty

According to Section 15/E (1) of Act LVII of 2015 on Energy Efficiency, if the obligated party has not fulfilled the energy saving obligation for the given year by reporting certified energy savings, it may choose to pay an energy efficiency fee instead of fulfilling the energy saving obligation, in whole or in part (Parliament, 2024). The energy efficiency fee is HUF 50 000 per 1 GJ/year of energy savings not achieved. The energy efficiency fee shall be paid by the obligated party by 31 May following the year in question to the account number specified by the Minister responsible for energy policy, who shall subsequently inform the Hungarian Energy and Public Utility Regulatory Authority of the crediting. If the contribution is not paid within the deadline and the energy saving obligation is not fulfilled by the obligated party, the Hungarian Energy and Utility Regulatory Authority shall impose a fine of HUF 70 000 for each 1 GJ/year of energy saving not fulfilled, pursuant to Article 15/F (1). The fine is imposed when it is no longer possible to offset the energy savings of the following years against the energy savings of the current year, or when the obligated party has failed to meet the deadline for submitting a declaration of non-compliance.

II.2.8. EEOS actors and process operation

The EEOS, as mentioned above, is a market mechanism that obliges designated actors in the energy market (defined obligated actors) to achieve a certain level of energy savings for end-users in proportion to their energy sales (MEHI, 2024).

The process of the EEOS starts with the obligated party, which sends to the Hungarian Energy and Utility Regulatory Authority the data necessary to establish its energy saving obligation, i.e. its sales data for the previous year by 31 May of each year via the MEKH's EEOS data collection system. Thereafter based on Section 15/C (1) of Act LVII of 2015 on Energy Efficiency, the Hungarian Energy and Utility Regulatory Authority shall determine the amount of energy savings due in the year in question by 30 November of the year preceding the year in question in a decision for each obligated party (Parliament, 2024). This is followed by the fulfilment of the obligated party's energy saving obligation, which results in energy savings for end-users, which can be fulfilled as follows.

Under Article 15 (3) of Act LVII of 2015 on Energy Efficiency, the obligated party may combine the fulfilment of its energy savings obligation with alternative policy measures to which the obligated party or any person has made a substantial contribution in the case of a transfer of certified energy savings. Examples of such alternative policy measures include (Parliament, 2024):

- a) energy or carbon taxes that result in a reduction of final energy consumption by end-users,
- b) financing schemes, instruments or financial incentives,
- c) regulation or voluntary agreements,
- d) the introduction of national standards to improve the energy efficiency of products and services and the setting of national values linked to European standards,
- e) energy labelling schemes,
- f) education, training, advisory and awareness-raising programmes,
- g) other means.

If the obligated party achieves the energy savings through the use of such alternative policy measures, the share of the energy savings achieved that is eligible for non-refundable public aid and tax relief to the obligated party and the final user may be accounted for under the alternative policy measure and the share of the additional eligible costs of the individual action as obligated energy savings (Parliament, 2024). In the case of obligatory use of education, training, counselling and awareness-raising programmes, the share of obligatory eligibility is set out in Government Decree 122/2015 on the implementation of the Energy Efficiency Act. Based on Article 15 (4) of Act LVII of 2015 on Energy Efficiency, in the case of non-refundable state aid, tax incentives or a combination of these, granted to the obligated party and the final user when

implementing individual measures to improve the energy efficiency of residential buildings, the obligated party may count 70% of the energy savings as obligatory energy savings.

The verification of energy savings is carried out by the energy auditing organisations authorised to carry out such verification, and Article 3(1) of Decree 17/2020 (21.12.20) of MEKH states that the data on the verified energy savings to be accounted for in a given year as the fulfilment of the energy savings obligation shall be reported to the EEOS data collection system by the energy auditing (verification) organisation verifying the energy savings on behalf of the obligated party (MEKH, 2024).

At the end of the process, the Hungarian Energy and Public Utility Regulatory Authority verifies the fulfilment of the energy saving obligation pursuant to Section 15/F (1) of Act LVII of 2015 on Energy Efficiency (Parliament, 2024). In the event of non-compliance with the obligation or failure to comply properly, as well as in the event of non-payment of the contribution within the deadline, a fine will be imposed. Pursuant to point (3), the Government shall set annual targets for the cumulative energy savings resulting from the energy efficiency obligation scheme as a policy measure. If the cumulative energy savings calculated by the Hungarian Energy and Public Utility Regulatory Authority fall short of the target value set in the Government Decree, the Hungarian Energy and Public Utility Regulatory Authority shall inform the Minister responsible for energy policy.

Based on the process operation of the EEOS, there are 5 actors in the EEOS scheme in Hungary.

End-users

Designated actors in the energy market are required to achieve energy savings for end-users in proportion to their energy sales. End-users may include residential, industrial, service and transport sectors, but exclude energy supplied to the energy transformation sector and the energy industry (MEHI, 2024).

Obligated parties

The obligated parties of the EEOS are obliged to achieve a specified annual energy saving for final customers for the year in question. This may be achieved by the obligated party either through energy efficiency investments or energy efficiency improvement measures in its own sector of activity or in other sectors outside its own sector of activity, as well as through certified

energy savings by other obligated parties, energy efficiency service providers that are not obligated parties or other third parties, according to Article 15/B (2) of Act LVII of 2015 on Energy Efficiency (Parliament, 2024). Alternatively, under (1), it is possible to perform them together.

The obligated parties of the Hungarian scheme are (MEKH, 2024):

- a) licensees of electricity suppliers and distributors of electric energy,
- b) licensees of natural gas suppliers and distributors of natural gas,
- c) business entities and, from 2024, associations selling transport fuel to final customers,
- d) from 2024, parties supplying natural gas under contract to users acting in their own name.

Verifying organisations, certifying bodies

Section 15/A (4) of Act LVII of 2015 on Energy Efficiency states that energy savings from individual actions that are to be accounted for as energy saving obligations or transferred to other obligated parties are to be certified by an energy auditing organisation registered by the Hungarian Energy and Public Utility Regulatory Authority, which is not a party to the obligation (Parliament, 2024). The certifying organisation may not become the first holder of the energy savings it has certified, unless the Hungarian Energy and Utility Regulatory Authority, as a result of its audit, obliges it to replace the energy savings.

As of 1 January 2024, an auditing organisation belonging to the same group of companies as the obligated party may carry out verification activities (MEKH, 2024).

Hungarian Energy and Public Utility Regulatory Authority

The Hungarian Energy and Public Utility Regulatory Authority shall determine the amount of energy savings due in the year under review by 30 November of the year preceding the year under review in a decision for each obligated party, and shall monitor the fulfilment of the energy savings obligation, impose fines in certain cases, and have an obligation to inform the Minister responsible for energy policy (MEKH, 2024). Paragraph (5) of the Law on Energy Efficiency of the Hungarian Energy and Public Utility Regulatory Authority (LVII) of the Energy Efficiency Act of 2015 establishes an obligation to provide information if the data on energy savings achieved through certain policy measures and on annual trends in energy

savings are sent to the Minister responsible for energy policy by 30 September following the implementation of the energy efficiency improvement measures (Parliament, 2024).

Minister responsible for energy policy

On the basis of Section 13(6) of Act LVII of 2015 on Energy Efficiency, the Minister responsible for energy policy shall prepare a report on the level of end-use energy savings to be achieved during the commitment period, the method of calculating such savings, the related policy measures and the methodologies with mandatory content elements for their application, as specified in the Government Decree implementing the Act, and submit it to the European Commission as part of the integrated national energy and climate plan. In addition, the Hungarian Energy and Public Utility Regulatory Authority has an obligation to inform the Minister responsible for energy policy (Parliament, 2024).

II.2.9. Results and experience

Savings that are registered and uploaded into the EEOS data collection system are called *verified energy savings* (although the international literature suggests calling them as *white certificates*, the Hungarian EEOS system calls them as *verified energy savings*, which as follows will be used further in the research paper), which are verified, approved and then certified by a verifying (auditing) organisation (MEKH, 2024). As previously mentioned, 830 obligated parties have been flagged for the period 2021-2022, with a total of 684 323 GJ of obligation. Based on the latest EEOS Verified Energy Savings Market Monitoring Report 2022 Q3 prepared by HUPX Zrt. (2022) on behalf of the Hungarian Energy and Utility Regulatory Office, it is revealed that as of 31 October 2022, the verified energy savings or pending in the register corresponded to 763,048 GJ, which represented a 112% compliance rate, thus showing that the originally set target of 684,323 GJ of obligation has been exceeded. Furthermore, it was also found that the smallest total savings that appeared in one company was 2.44 GJ, while the largest certified energy savings was 239,841 GJ, showing that 31% of the supply was concentrated in one operator. Further analysis shows that the supply side is concentrated, based on the experience of the first 2 years, with the top 3 actors having 55% of the savings and the top 10 actors having 74% of the certified energy savings.

In the EEOS's certified energy savings registry system, the category of measure is also provided for each savings. 39 measures can be distinguished, grouped into 6 categories (HUPX, 2022).

The 6 categories include building structures, building services, building services installations, building electricity, industrial processes, transport, others. The report shows that industrial processes and transport account for 74% of the total energy savings. Within these, the measure with the largest savings was the other measure related to steam systems, which resulted in a total of 106 652 GJ of certified energy savings, calculated as the average savings of 5 projects, with an average of 21 330 GJ. In addition, it was also examined which category of projects resulted in the highest overall savings. In the transport category, a total of 182 projects were initiated, resulting in a total of 262 871 GJ of certified energy savings. So, in total, projects in the industrial processes (projects for other measures related to steam systems) and transport categories resulted in a total of 470 483 GJ of energy savings, which was achieved by 268 projects. This accounts for 49.5% of the total number of projects, while energy savings account for 62% of the total. The Hungarian Energy Efficiency Institute's 2022 study on the post-first-period experience of the Energy Efficiency Obligation Scheme, based on feedback from obligated parties, showed that the most popular type of project included lighting modernisation, as well as projects related to technological investments, heat supply modernisation, heating system modernisation (MEHI, 2022). Furthermore, both studies confirm that there were no savings from residential building renovation and public building renovation in the first period.

The domestic obligation scheme allows for the accounting of excess energy savings over the fulfilment of the obligation in a given year by a factor of one and a half for the following year, subject to a certified duration of at least 3 years (HUPX, 2022). The lifetime of the measure is a critical factor in the Hungarian energy efficiency obligation scheme, as it plays a major role in meeting Member States' targets. For this reason, it is important to highlight that, based on the first 2 years, 33% of energy savings were achieved by investments with a lifetime of 1-3 years. Investments with a lifetime of more than 3 years accounted for 67% of energy savings. As an aggregate result, the analysis found that 53% of the energy savings are investments with a lifetime of 10 years or more, which result in long-term energy savings in Hungary.

Among the experiences and results of the first period, it is also essential to mention the compliance rate (HUPX, 2022). As mentioned earlier, a total of 830 obligated actors were registered in the period 2021-2022. Out of these, 799 smaller obligated parties (with less than 1000 GJ of obligations) and 31 larger obligated parties (with more than 1000 GJ of obligations) were registered.

Based on the register, 122 (15%) of the smaller obligated parties became eligible for certified energy savings, and 59% of the total small obligor energy savings (45,980 GJ) were achieved by 31 October 2022, representing 26,921 GJ of certified energy savings, with 64 companies having fulfilled their obligations. Among the larger obligated parties, 21 companies (68%) became eligible for certified energy savings and 96% of the total large parties' obligation (636 343 GJ) were achieved. Smaller obligated actors were more likely to take advantage of the possibility of financially redeeming savings, i.e. they paid a contribution of HUF 50 000 for each GJ not fulfilled (MEHI, 2022).

II.3. Topicality of the issue

The first period shows that the majority of smaller obligated actors did not fulfil their energy saving obligation, in several cases opting for the option of paying a contribution of HUF 50 000/GJ (MEHI, 2022). As mentioned earlier, several larger companies have met their energy savings obligation with savings from existing projects. The specialised expertise, human and financial resources needed to manage energy efficiency projects are typically found in larger energy service and fuel distribution companies, often within the companies, or through the creation of specialised partner companies for energy efficiency (Felsmann, 2021). However, these competences and the creation of an energy efficiency subsidiary are less feasible for smaller fuel and energy trading companies. Also noteworthy are the additional tasks and transaction costs associated with developing, documenting, and accounting rules for energy saving projects, which for smaller obligated actors with savings obligations of 100 GJ or less, make it more worthwhile for them to pay the default premium than to set up an energy efficiency project (MEHI, 2022). This calls into question the eligibility of smaller obligated actors, as the results so far show that they do not lead to higher energy savings.

The fact that smaller actors do not have the specialised expertise, human and financial resources that are typically present in larger companies means that they are less able to deliver the lowest cost energy efficiency projects, putting them at a competitive disadvantage compared to larger actors (Felsmann, 2021). However, it is possible to mitigate this competitive disadvantage by competing with the larger players and setting up specialised energy efficiency organisations. This could be achieved through joint fulfilment of the obligation, which is provided for in Article 15/B (1) of Act LVII of 2015 on Energy Efficiency, whereby the obligated parties may

decide to fulfil their energy saving obligation jointly, in which case their energy saving obligation shall be aggregated (Parliament, 2024). In this case, the obligated parties are jointly and severally liable for the fulfilment of their energy saving obligation and all related obligations, including reporting obligations and fines. The aim in this case is to reduce the competitive disadvantage of the larger players by having the smaller players fulfil their obligations jointly through cooperation, and thus not to create a cartel that would restrict competition for energy efficiency savings (Felsmann, 2021).

Co-opetition, is a concept introduced by Brandenburger and Nalebuff, refers to the simultaneous cooperation and competition between firms. This approach acknowledges that companies can achieve together bigger success by collaborating while they remain competitors to each other (Brandenburger et al., 2011). Coopetition encourages companies to find opportunities for mutual benefit, such as resource sharing or jointly innovation. This strategy needs to develop a balance between cooperation and competition in order to maximize overall value creation with the industry. Co-opetition allows companies to access to complementary skills and resources (Brandenburger, et al., 2021). One company may excel in a certain area while the other has expertise in a different aspect, enabling them to trade skills and capabilities. For instance, a successful collaboration was in 2013, when Ford and GM teamed up to share transmission technologies. Leveraging their strengths, this collaboration resulted saved costs for both companies, with no major strategic consequences, and allowed their engineers to focus on developing advanced electric vehicles, giving them a competitive advantage over other automakers. In the case of EEOS, if the smaller actors would cooperate with each other by creating specialised energy efficiency projects to fulfil their obligations together, than they could reduce their competitive disadvantage against the larger actors (Felsmann, 2021). The small actors would have a greater chance of meeting their energy saving target obligations by setting up energy saving projects together instead of choosing to pay the 50 000 HUF/GJ levy.

III. Research Methodology

The research question of my thesis is the following:

"Does the legal framework of the Hungarian Energy Efficiency Obligation Scheme, which ensures the joint fulfilment of the energy savings obligation, strengthen cooperation between small, obligated parties?"

The reason I am examining this issue is that the results and experience of the Hungarian Energy Efficiency Obligation Scheme (EEOS) so far suggest that smaller actors, i.e. obligated actors with less than 1000 GJ, are at a competitive disadvantage compared to larger obligated actors (Felsmann, 2021). This underperformance may be due to the lack of human capital and specific expertise that larger companies already had before the EEOS was introduced, as well as the high transaction and coordination costs associated with energy efficiency projects (MEHI, 2022). Furthermore, the literature suggests that this competitive disadvantage compared to larger actors can be reduced by allowing smaller actors to work together, i.e. to cooperate with each other to create energy efficiency projects that will make it easier for them to meet their energy efficiency obligations (Felsmann, 2021).

The research was conducted using qualitative methodology, through interviews. As explained in the literature review, at the moment it is possible to present some quantitative data on the obligation and the fulfilment of the obligation, the composition of the obligated parties, but the two-year time series currently available based on the experience and results of the first period (until 31 October 2022) does not allow to conduct the research using quantitative methodology. For this reason, I have investigated the research question through interviews, using primary data and qualitative methodology.

In order to get an overview of the Hungarian EEOS and to get an adequate overview of the relevance of the cooperation of smaller actors, I tried to compose the interviews in a way that I could examine the issue from the regulatory, obligated actor and expert advisory side. During my research I conducted 7 in-depth interviews, as the interviewees requested anonymity, I do not refer to them or the organisation they interviewed me on behalf of in my research paper. Of the 7 interviewees, I interviewed the *middle managers of the central public authority and of the public administration (ministry)* on the regulatory side, the *first line managers of the owner of*

the medium-sized and two small energy trading companies on the obligated parties' (company) side, and a sector advisor and an energy efficiency expert working for a large company on the expert/advisor side. The following table contains a summary of the interviewees and how they will be further referenced in the research paper.

6. Figure: Summary of the interviewees, how they are further referenced in the research paper

<i>Interviewee side</i>	<i>Interviewee</i>	<i>Further referenced in the research paper</i>
Regulatory side	Middle manager of the central public authority	Interviewee 1
	Middle manager of the public administration (ministry)	Interviewee 2
Obligated parties (company)	First line manager of the owner of the medium-sized energy trading company	Interviewee 3
	First line manager of the owner of small energy trading company 1	Interviewee 4
	First line manager of the owner of small energy trading company 2	Interviewee 5
Expert/Advisor	Sector advisor	Interviewee 6
	Energy efficiency expert working for a large company	Interviewee 7

Source: own source

The interviewees will be further referenced in the research paper as Interviewee 1, Interviewee 2 from the regulatory side, Interviewee 3, Interviewee 4, Interviewee 5 from the obligated parties' (company) side, and Interviewee 6, Interviewee 7 from the expert/advisor side.

The interview process consisted of semi-structured interviews. In addition to the pre-assembled interview questions, additional questions related to the research question were raised as a result

of the discussions during the interviews. In addition, it is important to highlight that the questions were formulated on the basis of separate regulatory, obligatory and expert/advisor sides in order to provide a comprehensive overview of my research question.

In order to understand the general functioning of the Hungarian EEOS and to assess the results so far, the following questions were raised in all three interview formats.

- (1) How do you assess the results of the Energy Efficiency Obligation Scheme in Hungary so far?
- (2) What impact do you think the increase in the required obligated volume will have on future compliance rates?
- (3) If you see the possibility for small actors to cooperate and fulfil their energy efficiency obligations together, what timeframe do you consider feasible?

When talking to the regulatory side, the focus was mainly on the measures taken to increase the effectiveness of the EEOS and the introduction of future measures, in particular to encourage fulfilment of the obligation by smaller actors. When interviewing the expert and consultant side, the focus was on the experts' views on the strategy they would recommend to help smaller actors to comply with their energy efficiency obligation. In addition, in order to properly overview the research question, I asked a few overlapping questions during the interview process with the expert/advisor side, including the following.

- (1) What is your experience with the implementation of energy efficiency projects and the delivery rates, especially focusing on smaller actors?
- (2) Do you see the possibility for smaller actors to fulfil their energy efficiency obligations through horizontal cooperation?
- (3) Do you have experience of horizontal cooperation in other European countries? If so, are there any examples of successful cooperation that could be transferred to the Hungarian context?
- (4) What are the benefits, constraints, and challenges of the possibility to cooperate with other actors to meet energy efficiency obligations and to achieve energy efficiency targets?
- (5) How can smaller actors be encouraged and supported to meet their energy efficiency obligations and to cooperate?

During the interviews with the obligated parties' (company) side, the focus of the interviews was on their experience of meeting their obligations so far and whether they had considered the possibility of working with other actors to meet their energy efficiency obligations. The following questions, among others, were asked specifically to the interviewees on the obligated side.

- (1) How do you assess the fulfilment of your energy efficiency obligations in the first period after the introduction of the Energy Efficiency Obligation Scheme?
- (2) What steps have you taken in the first period to meet your energy efficiency obligations?
- (3) Do they consider it a challenge to fulfil their obligations?
- (4) What difficulties have you encountered in meeting the energy efficiency obligation and how have you tried to address them?
- (5) Have you thought about it, or would you be open to cooperation, i.e. joint fulfilment with other actors, in order to better meet your obligation targets?
- (6) What advantages or obstacles do you see to cooperation with other actors?

For the preliminary expectation and proposition, I took into account the literature references used, which I presented in the theoretical part, and then I related them to the Hungarian practice, regulatory, obligatory, expert/advisor environment in the form of in-depth interviews.

Based on the literature, it is assumed that smaller players do not generate higher energy savings by being part of the obligated group, so there is an issue of economies of scale in this respect (MEHI, 2022). Furthermore, it is assumed based on the literature, that co-opetition requires a high level of trust between competitors, which can be challenging to maintain (Brandenburger, et al., 2021). There may also be concerns about control over shared resources or decision-making processes, and sharing proprietary information with each other.

On this basis, my preliminary proposition for the above research question is as follows.

The legal framework of the Hungarian Energy Efficiency Obligation Scheme allows for cooperation, association, and joint fulfilment between smaller obligated actors, but the phenomenon of joint fulfilment of obligated actors is not common.

The detailed results of my qualitative research are presented in the analysis and discussion chapter.

IV. Analysis

IV.1. Evaluation of the Hungarian EEOS' results

One of the main questions of the interview was how the interviewees evaluate the introduction and operation of the EEOS in Hungary based on their experiences so far, and how the implementation of the scheme has affected them.

The interviewees on the regulatory side, i.e. *Interviewee 1* and *Interviewee 2* were positive about the system. They stressed that although the scheme was launched in an accelerated manner, the first period (2021-2022) was successfully completed, more than 90% of the obligated parties achieved energy savings, but there were at least 100 smaller obligated actors who triggered their obligation by paying the levy. They assessed that the system put in place is working successfully, with the market outperforming the expected outcome. Already the results of the first two years show that more energy savings have been achieved since the introduction of the EEOS than were previously achieved through alternative policy measures. They explain that one of the great advantages of the scheme is that the market is aggregating savings that are the easiest and cheapest to achieve, so that it is not subsidising investments from outside.

However, there was criticism that the system has been developed with high administrative costs, referring here to the data collection system of the EEOS, where the certified energy savings generated are administered. For example, based on examples abroad, in Denmark, fulfilment of energy savings obligations is through voluntary contracts which can lower administrative costs. In, Finland, which has not introduced an EEOS, has developed a voluntary contractual system whereby companies voluntarily commit to savings in exchange for a government grant for a subsequent project which makes it unnecessary to develop a data collection system.

On the expert/advisor side, *Interviewee 6's* was clearly positive on the introduction of the EEOS, stating that the energy saving projects from the scheme contribute significantly to the country's energy saving target and that the scheme is performing better than expected.

Criticism was expressed that at the moment there are a lot of projects being implemented that do not result in long-term energy savings, such as energy saving education projects. The interviewee believes that the regulatory side should tighten up on this by removing such measures from the catalogue.

Interviewee 7 said that the introduction of the EEOS was welcomed, that their company had a history of energy efficiency and had introduced several energy efficiency projects in the past, so they were positive about the introduction of the scheme. The interviewee explained that this scheme has the potential to move the country towards energy efficiency and the motivation of the obligated parties generates market activity and encourages actors to implement projects that had not been thought of or given much attention before.

However, in the interviewee's opinion, there is a need to extend it more to the public, so it would be worthwhile to also address the education of the general public, i.e. to put more emphasis on creating awareness on energy saving.

On the obligated parties' side, the introduction of the EEOS affected the top managers of medium-sized and two small energy trading companies somewhat differently. *Interviewee 3* was positive about the introduction of the scheme, as their company's operations had already been implementing energy efficiency projects before the scheme was introduced, but now they have the opportunity to receive certified energy savings for the projects to meet their obligation. Because of the large number of projects that generate energy savings, they have no problem meeting their obligations if the obligation increases, and typically accumulate certified energy savings on top of their obligations. When the system was introduced, they were able to quickly adapt it to their operations, drawing on Italian and French examples.

However, based on *Interviewee 4's* and *Interviewee 5's* opinion, they were caught unawares by the introduction of the scheme and were not prepared for it. The energy savings commitment of these companies was well below 1000 GJ at the time of the introduction of the scheme. Furthermore, the scheme was introduced at a fast pace, with obligated parties having to revert to previous contracts and not knowing how to proceed. They were not clear about the rules that had been introduced, there had been no prior professional consultation, and they were waiting for clarification of the rules. Over time, they have adapted and have developed a working system for themselves through which they can obtain certified energy savings, mainly through

the certified energy savings of their customers from the implementation of their projects and have now incorporated the energy savings obligation into their general operating practices, the level of which they can now calculate in advance. Overall, the EEOS is seen as an incentive scheme because it contributes to the country's energy efficiency targets.

IV.2. Key findings on possibility of cooperation among smaller obligated parties

The main focus of the interview for each of the interviewees was the research question whether they see the potential for smaller obligated actors to reduce their competitive disadvantage compared to larger obligated actors through cooperation. On the regulatory side, the *Interviewee 1* and *Interviewee 2*, on the obligated parties' (company) side, *Interviewee 3*, *Interviewee 4*, *Interviewee 5*, and on the expert/advisor side, *Interviewee 6*, *Interviewee 7* stated that in the current situation, where over-performance was observed in the market and their experience showed that it is very easy to obtain certified energy savings, it is not relevant for smaller obligated actors to cooperate in fulfilling their obligations.

I specifically asked from the obligated parties' side *Interviewee 3*, *Interviewee 4*, *Interviewee 5* whether they had considered the possibility of cooperating with other obligated actors when introducing the EEOS, but the answer was unanimously in the negative. *The Interviewee 3* said that the amount of energy savings generated by the energy efficiency projects they had set up at the time of launch already covered their energy efficiency obligation, so they never considered cooperating with others, as they were strong players in the market on their own. *Interviewee 4* and *Interviewee 5* expressed a somewhat different view. They said that the introduction of the system had caused them a lot of extra work and that the not fully developed rules by the regulatory side did not make the steps clear, but that once they had experienced the system, they had integrated it into the core operations of the company. One manager also said that they have all the resources they need to meet their obligations, but that if they need a resource that they do not have, they will source it from the market rather than cooperating with other actors.

The data available so far from the EEOS and the in-depth interviews with the interviewees show that there is no relevance and openness for cooperation between smaller obligated actors in the current situation, despite the legislation allowing it, but in the following we will examine the

arguments regarding that smaller obligated parties have no motivation to fulfil their energy efficiency obligation together with other obligated actors in the current situation.

For the following reasons, the possibility of cooperation between smaller obligated parties is not relevant in the current operation of the Hungarian EEOS.

1. There is an oversupply in the market, and lack of competition

Based on the literature, the experience of the first period shows that the initial target of 684 323 GJ of obligation to be fulfilled was exceeded, which means that 763 048 GJ of certified energy savings were registered in the Hungarian Energy and Utility Regulatory Office's EEOS system, which represented a 112% compliance (HUPX, 2022). Furthermore, from the regulatory side, Interviewee 1 said during the interview that the completion of the first two years (2021-2022) was successful. More than 90% of the obligated actors met their energy savings obligations, which suggests that there is a kind of oversupply in the market, with many energy efficiency projects implemented during the first period.

In the first period, the obligated actors met their energy saving obligations relatively easily, and there were several companies that had already started energy efficiency projects before the scheme was introduced, so they benefited from the implementation of the scheme. This was also the case according to Interviewee 3 from obligated parties' side. Their energy efficiency projects have generated a lot of certified energy savings, which have been accumulated. Many other obligated parties went to them to purchase certified energy savings to meet their energy efficiency obligations. The price was calculated by agreement but was lower than the amount of the possible levy (HUF 50 000). By buying the certified energy savings from them, the smaller actors were indirectly involved in the energy efficiency project, which results in long-term energy savings. This also shows that there is a trade in certified energy savings between market players and that they can fulfil their obligations by helping each other. This company also trades even just a few GJ of certified energy savings, so it is not relevant if a smaller obligated player would like to buy just a few GJ from them because they provide the opportunity to do so.

Interviewee 4 and Interviewee 5 said that they primarily fulfil their obligations through their customers. So, their customer, who is not necessarily an obligated party, creates a project that

generates energy savings. This energy saving is audited by a certification body, which results in certified energy savings. The resulting certified energy savings are then purchased by these small energy trading companies, which can then meet their obligations.

On the expert/advisor side, according to *Interviewee 7*, the market has become liquid and it has become easy to get cheap certified energy savings, especially with the creation of the secondary market, where there is a good chance to buy certified energy savings below HUF 20 000. Based on the examples mentioned, cooperation is not relevant in this case for smaller obligated actors, as they can easily and cheaply obtain certified energy savings individually and avoid paying the energy efficiency obligation levy for non-compliance.

Interviewee 6 said that with so many energy efficiency projects being implemented, there is no competition in the market, as it is easy to get projects to meet the energy efficiency obligation. In his opinion, this will change when the regulatory side increases the obligation quotas, because then there will be a kind of competition for projects. In that case, cooperation between smaller obligated actors would become relevant, because by joining forces they would be able to get projects more easily with a higher obligation volume, which the certification body would be more willing to certify.

2. Meeting the energy efficiency obligation by passing it on to consumers

The interviews also showed that the ease of meeting the above-mentioned energy efficiency obligation is also due to the fact that many of the actors that are obliged to meet it pass it on to their customers, in many cases building it into the price, which allows them to meet the obligation later on and even profit from it.

For example, a fuel retailer is less likely to be able to set up an energy efficiency project because of the way it operates and is therefore more likely to buy certified energy savings from someone or to switch its obligation by paying a levy. However, it is also possible that a fuel retailer may include the obligation in the fuel price without the end-user being aware of it and use the proceeds to pay the obligation. Another possibility is that the trader may include the obligation in the fuel price but fulfils the obligation by buying the certified energy savings from another obligated party at a lower price than the amount of the levy, and thus profit from it.

E.ON distributor and supplier has recently launched a new service to help consumers choose which energy efficiency investments they should make to reduce their energy bills by completing a free online energy advice questionnaire (E.ON, 2024). If the consumer makes one of the investments suggested by E.ON within 1 year and then completes the required energy savings data reporting and verifies the energy saving by E.ON's independent certification body, the consumer will receive a gross refund of HUF 100 000 if the energy savings reach 12 GJ in the case of thermal insulation, HUF 80 000 if the energy savings reach 10 GJ in the case of replacement of windows and HUF 20 000 if the energy savings reach 5 GJ in the case of heating modernisation. If the consumer makes the investment in a heat pump with E.ON, he can get a further gross rebate of HUF 100 000.

The introduction of this service is positive in terms of encouraging and educating the public to be more energy efficient. However, it is clear from the description of the scheme that, as these investments by the consumer will result in energy savings and if verified by the certification body chosen by E.ON, there will be verified energy savings which E.ON will be able to account for as energy efficiency obligations without the consumer's knowledge. So, ultimately, this service will create a win-win situation for both the consumer and the obligated actor.

This kind of compliance does not encourage obligated actors to cooperate, because they can easily meet their energy efficiency obligations by passing them on to their customers.

3. High transaction costs

Setting up energy efficiency projects involves high transaction costs. For this reason, the literature also assumes that it is more profitable for obligated actors with an energy efficiency obligation of less than 100 GJ to pay the levy than to implement an energy efficiency project (MEHI, 2022). Engineering skills are needed to set up the project, a lawyer may be needed if any contract is to be signed between the parties, human resources are needed to carry out the projects, to document them as required, and then a certification body must be found at the end to turn the energy savings into certified energy savings. So even an investment in LED replacement, for example, is likely to be several times the amount that the obligated actor would pay by paying the levy.

Consequently, there are financial constraints to setting up an energy efficiency project such that smaller obligated actors, even if they were to join forces, would not necessarily be motivated to choose not to pay the levy or to otherwise obtain certified energy savings in order to meet their energy efficiency obligation.

4. Lack of human resources

The literature suggests that the specialised expertise, human and financial resources needed to manage energy efficiency projects are typically not available to smaller obligated actors, while large companies typically set up dedicated subsidiaries for energy efficiency (Felsmann, 2021). International examples also suggest that typically most savings may come from a small number of organization due to their larger customer base, energy sales and the greater administrative and management capacity (Bertoldi et al., 2015).

From the expert/advisor side, the interview with *Interviewee 6* raised the issue of human resource constraints in smaller obligated actors. Typically, in order to engage in an energy efficiency project, a company needs to put someone from the company in charge of the project who can manage the project, but many smaller companies do not want to and cannot deal with this issue due to lack of capacity, and do not want to hire new staff for this purpose.

Smaller firms therefore need external help. They can be helped by an energy company that can bring in and offer them a range of energy efficiency projects, where the energy savings generated can be verified later on, so that the obligated actor can then meet its energy efficiency obligations. As there is typically no spare capacity, human resources, to deal with even a possible project through cooperation, the lack of human resources is also a barrier to cooperation between smaller obligated actors.

5. Information asymmetry, lack of knowledge

As mentioned earlier, the specific expertise that is essential for managing a project is lacking in the case of smaller obligated actors. On the expert/advisor side, *Interviewee 6's* experience has been that they have met several smaller obligated actors who have been offered by certification bodies that they can provide them with projects that would make it more worthwhile for them

in the longer term to meet their energy efficiency obligations rather than pay the levy (HUF 50 000 per GJ), but small obligated actors rejected them.

For example, a certification body may ask for a commission for its administrative work from the client, but even including that, it can bring the client a 100 GJ project for HUF 2 000 000, but if the obligated operator refuses this and pays the levy instead, it will pay HUF 5 000 000, so it will lose HUF 3 000 000 by refusing the opportunity.

It can be concluded that there is a great lack of knowledge among the smaller obligated actors, as many of them are not yet aware of the benefits of certified energy savings from energy savings from projects, the information, practices, and contacts necessary to fulfil their obligations in an easy and beneficial way. For this reason, it is also less relevant for the cooperation of smaller obligated actors, as they do not know that they could meet the obligations under much more favourable conditions.

To this end, *Interviewee 6* suggested that it would be worthwhile to create forums for smaller obligated actors through stakeholder organisations to provide relevant information, contact details and practices on the EEOS, as there is no flow of information on this topic around a very small fuel retailer, for example, which would be inevitable to obtain certified energy savings in a favourable way. In addition, the Independent Petrol Retailers Association would be another way for fuel retailers to access information through them.

6. Existence or absence of trust

Section 15/B (1) of Act LVII of 2015 on Energy Efficiency allows the obligated actors to fulfil their energy efficiency obligations jointly, but the legislation also states that this entails joint and several liability, which raises a question of trust.

In the interviews with *Interviewee 1* and *Interviewee 2* from the regulatory side, it was found that joint fulfilment works by giving the obligated actors the possibility to come together, to form a sort of alliance, through which they can pool their obligations and do a project together, whereby the resulting energy savings have to be shared among themselves. Buying certified energy savings on the stock exchange would work in the same way, so that the certified energy savings bought there are transferred to the account of one actor, but from then on it is up to the

obligated actor and other actors to agree in advance whether the transfers are made to each other.

The issue of trust was raised in an interview with *Interviewee 4* from the obligated parties' side, who said that trust was a key element of cooperation. If it is lacking, there is no point in cooperation, because it would involve a lot of extra work and energy, important information would be leaked, a precise pre-written contract would have to be signed, where the agreement and the exact distribution of the resulting certified energy savings is described. The interviewee argues that it is not worth investing so much extra energy.

Trust appears in the theory of co-opetition as well, it emphasizes the importance of trust in co-opetition, highlighting that establishing and maintaining a high level of trust between competitors is crucial for successful collaboration (Brandenburger, et al., 2021). Trust plays a key role in overcoming challenges such as sharing proprietary information, managing control issues, and navigating conflicts of interest that may arise during co-opetition efforts. Trust is essential for building strong relationships, and by cultivating trust, companies can enhance the likelihood of successful co-opetition initiatives and create a foundation for long-term collaboration and mutual benefit.

Thus, the obligated actors may be sensitive to the existence of trust, as many trust issues would arise through competitors in a potential cooperation that can only be mitigated through a contractual relationship, but which would involve financial resources and extra documentation and work that the interviewees claim the obligated actors would like to avoid.

7. Sharing know-how

According to the co-opetition theory that emphasizes that sharing sensitive information or proprietary knowledge in co-opetition comes with risks, such as potential loss of competitive advantage or the need to establish trust and control mechanisms to protect shared resources (Brandenburger, et al., 2021). However, sharing of know-how can be a strategic move to leverage each other's strengths and capabilities, leading to innovation and competitive advantages.

Interviews with *Interviewee 3*, *Interviewee 4*, *Interviewee 5* from the obligated parties' side, clearly show that know-how is in all cases a closely guarded knowledge that they are reluctant to share with others. As a result, the possibility of cooperation has never occurred to them. If we take a large project of about 70 000 GJ, it requires the use of high-level technology and specialised knowledge which, once in the possession of a company, it does not want others to know what its competitive advantage is, what advanced technology it is using.

For this reason, the competitive advantage created by co-opetition theory is not a viable route for smaller obligated actors, as they are reluctant to reveal to their competitors how, in what form, and with what technology they achieve energy savings.

8. Operational limit

According to *Interviewee 3* from the obligated parties' side, many smaller obligated operators would not be able to set up energy efficiency projects due to their operations. For example, a fuel retailer can upgrade the lighting at a petrol station, but it is not necessarily relevant for several fuel retailers to cooperate to create a refinery, so it is more common for them fulfil the energy efficiency obligations imposed on them on the market by buying certified energy savings. Regardless of this, it would be possible for fuel retailers to set up energy efficiency projects, but it is indeed questionable whether this is relevant given the way they operate.

IV.3. Alternative tool to reduce competitive disadvantage of smaller obligated parties

A further question that arose during the interviews, which may provide a solution to reduce the competitive disadvantage of the smaller players examined under the research question, is whether there are other instruments that can reduce the competitive disadvantage of smaller obligated players.

In all cases, interviewees mentioned the emergence of a secondary market, the Energy Efficiency Obligation Exchange System established by CEEGEX, which makes it even easier for obligated actors to access certified energy savings.

According to the literature, Article 15/B (3) of Act LVII of 2015 on Energy Efficiency states that certified energy savings are a limited marketable right of property value, which can only be transferred to the obligated party. Accordingly, a company that is able to save energy and has it certified by an auditor registered by the Hungarian Energy and Public Utilities Regulatory Office may sell the amount of energy not consumed, i.e. the certified energy savings, to obligated parties. This also means that the certified energy savings can be sold and traded on the secondary market.

CEEGEX Zrt., the operator of the organised natural gas market in Central and Eastern Europe, a subsidiary of MAVIR Zrt. and a member of the MVM Group, launched the domestic Energy Efficiency Obligation Exchange (CEEGEX EKR Exchange) on 27 February 2024 (MEHI, 2024). By purchasing a certificate, the buyer can support energy saving projects or trigger or reduce his energy saving obligation.

On the supply side of the exchange, consumers, energy efficiency service providers, traders who have their energy savings certified, i.e. anyone who is entitled to sell and who is registered as owner of certified energy savings, a certain amount of GJ as a limited marketable asset in the register of the Hungarian Energy and Utility Regulatory Authority, can become a seller (MEHI, 2024). On the demand side are the obligated parties, so the buyer can be any obligated party. Membership is also conditional on the existence of an invoice in the register operated by the Hungarian Energy and Public Utility Regulatory Authority and the submission of a company certificate not older than 60 days.

CEEGEX Zrt. has developed an anonymous trading auction platform and a clearing system for trading energy savings (CEEGEX, 2024). On the exchange, the trading object is the certified energy saving, a certain amount of GJ, not the project itself, so a transaction can consist of several projects, or a project can be traded separately by the algorithm in several transactions. Available products include those with a lifetime of less than 5 years, those with a lifetime of 5 years or more and residential and public. The role of the exchange is to provide a price signal function in addition to the possibility to trade certificates, which will serve as a direct incentive for energy saving measures, including the improvement of energy efficiency in the home.

With the gradually increasing energy saving obligation, quota increase, the exchange can play an important role, as it is becoming increasingly difficult to meet the savings through own

investments, it is important to be able to purchase and meet the energy saving obligations from the market (HUPX, 2022). Buying certified energy savings on the stock exchange therefore offers smaller players the opportunity to obtain certified energy savings more easily and cheaply instead of paying a levy and at a price below the levy (below HUF 50 000), thus reducing their competitive disadvantage in the market compared to larger players due to a lack of human resources and specialised expertise.

V. Discussion

Based on literature and interviews with interviewees, cooperation between smaller obligated actors is not relevant in the current period due to lack of trust, high transaction costs, lack of human resources, knowledge and information, currently not high level of energy savings obligations, existence of oversupply, and fulfilment of the obligation by shifting of obligations on to consumers.

V.1. Supportive regulatory tools to increase the possibility of cooperation

In this respect, it is worth examining whether, if we would like to shift the structure in the direction of cooperation between smaller players, which is possible under Section 15/B (1) of Act LVII of 2015 on Energy Efficiency, what supportive instruments would be more likely to bring about this kind of cooperation from the regulatory side.

1. Increase in energy savings obligation

The strongest supportive instrument on the regulatory side is the increase in the energy savings obligation. Once the increase in the energy savings obligation under the EU's Fit for 55 package comes into force, it will result in an annual energy saving obligation for obligated operators of 0.5% of the amount of energy sold to final customers in Hungary subject to the obligation over the period 2024-2027, which is higher than the last 0.3% (Parliament, 2024).

This may raise the possibility that a smaller obligated actor that has so far fulfilled its obligation by paying the levy (HUF 50 000) will be forced to fulfil its obligation by paying certified energy savings, as the payment of hundreds, in some cases thousands of GJ of levies may result in a

financially large loss of money. The high transaction costs mentioned earlier would be lower with a higher obligation.

Let us assume that the average annual turnover of a fuel seeker is HUF 5 billion.

Assuming that the transaction and coordination costs for energy efficiency projects include the human resources (engineers, lawyers), administration and documentation required for energy efficiency projects, HUF 15 million, which is high for a 100 GJ obligation ($\text{HUF } 50\,000 \times 100 \text{ GJ} = \text{HUF } 5 \text{ million}$), the obligated party would not typically take on this obligation but would rather fulfil its obligation by paying a levy.

However, if the obligated actor's obligation increases to 1000 GJ, this amount becomes HUF 50 million, at which level it is no longer obvious that the obligated actor's best way to meet its obligation is to pay a levy. In this case, the obligated operator should consider fulfilling its obligation in another way, by purchasing certified energy savings or by setting up an energy efficiency project where the energy savings generated are certified by a certification body.

Furthermore, it is also possible, as mentioned above, to set up an energy efficiency project in cooperation with other smaller obligated actors, whereby the share of the transaction costs per obligated actor mentioned above would be reduced as more actors would be involved in the project. Therefore, while the possibility of cooperation between smaller obligated parties is not relevant at the moment, the increase in the size of the obligation, as shown in the above example, may encourage actors to take advantage of Article 15/B(1) of Act LVII of 2015 on Energy Efficiency to fulfil their energy savings obligation together.

2. Prohibition of direct costing of energy savings obligation

Article 15/E (1) of Act LVII of 2015 on Energy Efficiency states that if the obligated party has not fulfilled its energy savings obligation for the given year by reporting certified energy savings, it may fulfil its obligation by paying a contribution of HUF 50 000 per each 1 GJ not fulfilled (Parliament, 2024). Thus, the legislation provides for the possibility for obligated parties to trigger their obligation directly by paying a levy.

However, if the regulators were to tighten this legislation and prohibit the direct costing of the energy savings obligation, obligated actors would be forced to meet their obligation through some other means of verified energy savings. By purchasing verified energy savings on the market or by setting up an energy efficiency project. If the regulator were to prohibit direct cost accounting, smaller obligated actors that have been replacing their obligation with a levy would be forced to seek market information to explore how they could meet their obligation, possibly in partnership with other obligated actors for knowledge transfer or potentially joint fulfilment.

3. Scaling back energy-saving projects in the short term

From the expert/advisor side, the interview with *Interviewee 6* revealed that, based on their experience so far, energy saving projects have been implemented in the short term (e.g. energy efficiency awareness education), but in their opinion the regulators are trying to reduce these in order to meet their obligations by creating energy saving projects in the long term (e.g. pump replacement, window replacement, LED lighting). If short term energy saving projects were discouraged, obligated parties would be forced to invest in long term energy saving projects.

A long-term energy saving project could be up to 70 000 GJ, which requires specific knowledge and technology, but with a small energy savings obligation, a smaller obligated actor cannot create such a project alone, nor would it have the necessary motivation to do so, but it could if it could cooperate with other obligated parties, to create a larger project together. They would have the motivation to combine the required deliverables, expertise and technology and together create a project with long-term energy savings to meet their obligation.

It is also worth mentioning, as mentioned during the interview with the regulatory side, that the market is driven by the certification bodies, through whom the obligated actors can obtain certified energy savings. For very small GJ energy savings, the verifier may not go out to the obligated actor to verify the energy savings achieved, but if the actors cooperate, larger GJ energy savings are more likely to be verified by the certification bodies.

V.2. Possible forms of cooperation among smaller obligated parties

It is also worth looking at what kind of cooperation would be relevant if smaller actors were to move towards cooperation.

If they would be forced to do so by the increased energy savings obligation and, even in the current situation where there is a lack of knowledge about the operation of EEOS among some smaller obligated parties, it could be a solution for them to cooperate in some ways in order to meet their energy savings obligations.

1. Forming an alliance to transfer information and knowledge

Interviews with the regulatory side revealed a lack of knowledge and information among the smaller obligated parties and high transaction costs. According to *Interviewee 1*, it would be worthwhile for the smaller obligated actors to come together and form an alliance in order to be able to talk, share information and knowledge about their experience with the EEOS, thus reducing the lack of information and knowledge that is currently present in many cases.

In addition, the creation of an association could reduce the high transaction costs that currently exist. For example, if the smaller obligated actors were to hire a lawyer together to draft a contract template for the purchase of certified energy savings or, in the case of cooperation, for the mandatory contractual eventuality of setting up an energy efficiency project, they could reduce costs by hiring one lawyer instead of having the smaller actors do it separately.

In addition, a joint association would also provide an opportunity to develop, in addition to knowledge transfer, a common set of procedures that would allow them to meet their energy savings obligations more efficiently, once they have an existing template of how and through which means to meet the obligation.

The current problem is for smaller fuel retailers who are willing to buy certified energy savings from a certification body at any price (e.g. HUF 30 000) below the level of the levy (HUF 50 000), but they would most likely be able to get it cheaper on the market (e.g. HUF 20 000), but the fuel retailer would not expect this due to lack of knowledge, would be solved, as the creation

of an association would also mean that this kind of information, practices and experience could be shared among the smaller obligated actors.

2. Creating a large energy saving project together

In the period 2024-2027, the obligated parties will be required to achieve annual energy savings for final customers of 0.5% of the amount of energy sold to final customers in Hungary that is subject to the obligation (Parliament, 2024). This means that the energy savings obligation will increase from the previous 0.3%, which may also imply that the current oversupply in the market will be reduced. In this case, there will be fewer energy efficiency projects on the market that generate certified energy savings.

From the expert/advisor side, the interview with *Interviewee 6* shows that based on their experience so far, the energy saving projects that have been implemented so far, result short term energy savings (e.g. energy efficiency education). They believe that the regulatory side is trying to reduce these in order to ensure that in the long term the obligated actors fulfil their obligations by creating energy saving projects that result long term energy savings.

In addition, experience shows that before the introduction of the EEOS, many energy efficiency projects with a high investment cost, but which were not relevant to be done due to low electricity prices, were created after the introduction, as these projects resulted in certified energy savings that allowed the actors to meet their energy savings obligations (e.g. insulation, pump replacement, window replacement, etc.).

However, in case of a quota increase, few energy efficiency projects remain that will cause a price increase. If the smaller actors have not thought about cooperating earlier, there will be no projects left to carry out, as the larger actors will have already done them and fulfilled their obligations. When the smaller projects with energy savings run out, only larger projects will be left for the certification bodies, which in turn will require the smaller actors to pool their energy savings obligations (thousands of GJ of obligations can be created) to reach a certification body that can offer them a project that can be set up by that certification body to certify the energy savings created by the energy efficiency project.

3. Joint cooperation for the purchase of certified energy savings on the EEOS stock exchange

On the Energy Efficiency Obligation Scheme Stock Exchange (CEEEX EEOS Stock Exchange), established by CEEEX, the obligated participants are required to have an account in the register of the Hungarian Energy and Public Utility Regulatory Authority and to submit a company certificate not older than 60 days in order to participate as a buyer (MEHI, 2024).

On the regulatory side, an interview with *Interviewee 2* mentioned the fact that very small obligated parties (actors with energy commitments of less than 100 GJ) would not be able or would not want to be listed on the exchange due to their size or resources. The possibility of cooperation between smaller actors could be relevant here, if several actors were to join forces, their energy efficiency obligations could be combined, allowing them to entrust a larger actor with the purchase of GJ in exchange for a predetermined commission, which would allow them to meet their obligations. Of course, the issue of trust mentioned earlier may also arise here, but if they can agree on the details in advance through a contract between themselves, this could also be an incentive for cooperation between smaller players.

V.3. Question of scale efficiency of the EEOS

In the longer term, it is worth considering the question of scale efficiency of the EEOS whether it is worth keeping very small obligated actors in the pool of obligated actors, assuming on the basis of literature that obligated actors with an energy savings obligation of 100 GJ or less do not result in higher energy savings. Furthermore, due to high transaction costs, additional tasks to develop energy saving projects, lack of human resources, it is more profitable for them to pay the HUF 50 000 per GJ levy rather than to fulfil their obligation by creating energy saving projects (MEHI, 2022).

However, if smaller energy providers lack the necessary systems, infrastructure, or capacity, or serve few numbers of end-use customers in a jurisdiction, it might be beneficial to consider limiting the EEOS' obligated parties to larger providers (Joshi, 2012).

According to *Interviewee 1* and *Interviewee 2* on the regulatory side, it was suggested during the design of the scheme that obligated parties that had not reached 10 GJ energy savings obligation in the first period should not be included as obligated parties in the Hungarian EEOS, but this suggestion was eventually dropped. If not all traders had been included in the obligated actors, the possibility would have arisen that, since obligated actors have to comply with energy savings, which entails costs, another actor within the same industry, which was not included in the obligated scope, would have a competitive advantage over the obligated actor.

This proposal was also rejected because regulators expected that those actors that were very small at the outset would become large over time as the level of the energy savings obligation increased.

Based on literature, the obligated actors for the period 2021-2022 included 799 small actors (with energy savings obligations below 1000 GJ) and 31 large actors (with energy savings obligations above 1000 GJ) (HUPX, 2022).

Based on the 2024 energy savings obligations, there are 678 small actors (with energy savings obligations below 1000 GJ), of which 255 obligated actors have energy savings obligations below 100 GJ (MEKH, 2024). These obligated actors represent 33.25% of the total number of obligated actors. The number of larger obligated actors (with energy savings obligations above 1000 GJ) is 89

It can be seen that those with energy efficiency obligations below 100 GJ represent 33.25% of all obligated actors, for whom it is still reasonable to pay the levy, which is up to HUF 5 million even for a fuel retailer with a turnover of several billion HUF. For this reason, it is worth considering in the long term to limit the number of obligated operators and not to keep obligated operators below 100 GJ, as these operators cannot generate energy savings that would contribute to Hungary's energy savings target due to their operation.

V.4. Limitations of the research paper

1. Lack of data

Among the limitations of the thesis and research is the lack of data currently available. As explained in the literature review, data for the first period of the Hungarian EEOS (2021-2022) are currently available, so this two-year time series provided the opportunity to present some quantitative data on the fulfilment of the obligation and the composition of the obligated parties.

However, it did not allow me to conduct the research using quantitative methodology to draw further conclusions. As a consequence, since the Hungarian EEOS is still at a very early stage, it does not yet provide the opportunity to compare certain data and results, as the results for the period after 2021-2022 have not yet been published by the Hungarian Energy and Utility Regulatory Authority.

Further conclusions on the development of the fulfilment of energy efficiency obligations, as well as on the extent to which the smaller obligated actors have fulfilled their obligations and whether there have been any changes compared to the previous results, would have been possible on the basis of the data for the next period, which could have had provided an opportunity for quantitative methodological analysis.

2. Lack of examples on cooperation among obligated parties in Hungary or abroad

A further limitation of the thesis is that there are no examples in the literature of cooperation between obligated parties in Hungary or in other European Member States, which would have allowed the results of the research to be compared with other examples and evaluated.

This may be due to the fact that the Hungarian EEOS system, as mentioned before, is still in its early stages, the obligated actors are constantly experiencing the operation of the system and how, by what means and by what methods to fulfil their energy efficiency obligation, and therefore they may not yet have the full knowledge and awareness of the system that would allow them to fully exploit the potential of the legislation for the joint fulfilment of the energy efficiency obligation by the obligated parties.

Furthermore, a legal divergence may have resulted the absence of international examples of obligated parties cooperating in the literature. The Hungarian EEOS system is specific in that it provides for the possibility of joint fulfilment of the energy efficiency obligation, however, as the literature review shows that the EU Energy Efficiency Directive 2012/27/EU' Article 7 does not limit the Member States in the way and manner in which EEOS is to be introduced in the Member States, who they define as obligated parties, how the energy efficiency obligations are to be defined and fulfilled, and therefore these data are completely variable and in many cases may differ. This also means that the legislative background to the EEOS introduced in the Member States varies from country to country.

3. Lack of interviews with additional obligated parties

Finally, it should be mentioned that the part of the research that specifically focused on the cooperation of the actors involved in the obligations could have been extended with additional interviews.

While I aimed to compose the interviews in such a way that I could examine the research question from the regulatory, obligated parties' and expert/advisor side, the obligated parties' side could have been extended by interviewing even smaller obligated parties, such as fuel retailers. The lack of knowledge and information mentioned in the research could have been best assessed if small, independent fuel retailers had also been open to being interviewed on the issue. However, it is important to highlight, as mentioned earlier in the research paper, that these actors are difficult to reach due to their operational nature.

To conclude, in order to fully explore the research question and to examine how the fact that the legislation allows for joint compliance strengthens the cooperation between the obligated actors, the extensively designed interviews provided an opportunity. Sufficient conclusions could be obtained from the interviews with the top management of the owner of a medium-sized and two small energy trading companies on the obligated (company) side, and with sectoral advisor and energy efficiency expert from large companies on the expert/advisor side, and with middle managers of the central public authority and of the public administration (ministry) on the regulatory side.

VI. Summary

In my research, I investigated whether the legal framework of the Hungarian Energy Efficiency Obligation Scheme, that is provided by Section 15/B (1) of Act LVII of 2015 on Energy Efficiency, which allows the obligated actors to fulfil the energy efficiency obligation jointly, strengthens the cooperation between smaller obligated actors.

Furthermore, the example of EEOS provided an opportunity to examine in practice the theoretical issue of Brandeburger's co-opetition theory, according to which companies can achieve together bigger success by collaborating while they remain competitors to each other.

Qualitative primary research, by making in-depth interviews with regulatory, obligated parties' and expert advisory side, in addition to reviewing a wide range of literature have supported the research's stated preliminary proposition. According to the preliminary proposition of the research, although the legal background of the Hungarian Energy Efficiency Obligation System allows for cooperation and joint compliance between smaller obligated parties, the phenomenon of joint compliance of obligated parties is not typical.

The interviewees and the literature confirmed that the current functioning of the Hungarian EEOS does not support the relevance of cooperation between smaller obligated actors but mentioned a number of obstacles that do not allow these small actors to cooperate and, where appropriate, to fulfil their energy efficiency obligation together.

One of the obstacles is that there is currently an *oversupply in the market*, which means that smaller obligated players do not perceive competition to encourage them to cooperate. The literature indicated that in the initial period, energy savings achieved by the obligated parties in Hungary, surpassed the target, resulting in a 112% compliance rate, which suggests that there have been a lot of successful energy efficiency projects introduced.

Based on the interviews, there is an oversupply in the market due to the numerous energy efficiency projects completed. Companies with already existing energy efficiency projects could easily fulfil their obligations, whereas small energy trading firms primarily fulfil their obligations through their customers' projects, that resulted energy saving, and was verified by certification body, and afterwards, the smaller firms purchase the certified energy savings. It

was also noted that the market is liquid, especially since the introduction of the secondary market, which results that there's a lack of competition due the numerous projects. It can be predicted that competition may arise with increased obligation quotas, necessitating cooperation among small actors to secure projects efficiently.

Another limitation is that obligated parties often *meet their energy efficiency obligation by passing it on to consumers*. The interviews also showed that the ease of meeting the energy savings obligation is also due to the fact that many of the obligated parties pass it on to their customers, in many cases building it into the price, which allows them to meet the obligation later on and even profit from it.

For instance, fuel retailers may embed the obligation into fuel prices, either transparently or covertly, to fulfil their obligations. We could see the example of E.ON distributor, who offer a service, guiding consumers in energy-efficient investments, incentivizing them with refunds upon meeting energy-saving targets. This practice allows obligated parties to fulfil energy efficiency obligations without consumer awareness, creating a mutually beneficial situation. Such compliance methods discourage cooperation among obligated actors, as they can rely on consumers to fulfil obligations on their behalf.

High transaction costs associated with energy efficiency projects can pose a significant barrier to cooperation among obligated parties. Engineering, legal, and administrative expertise, along with human resources, that are required when introducing energy efficiency projects, make projects financially challenging for smaller obligated parties. Additionally, *lack of human resources* further hinders cooperation, as smaller entities lack the capacity to manage projects independently. Worth to mention that smaller obligated parties often *lack the knowledge* of understanding how the EEOS system works, what it offers, and what is their most beneficial way to meet their energy efficiency obligation. This unawareness underscores the need for platforms, such as stakeholder forums, to spread relevant information and establish connections, thereby facilitating more seamless compliance.

Existence or absence of *trust* is also crucial to mention as a barrier of cooperation among the obligated parties. Joint fulfilment of energy efficiency obligation requires trust among obligated actors, as it involves shared liability and resource sharing. Without trust, cooperation becomes not feasible, necessitating detailed contracts and additional effort to mitigate risks. Also,

resistance of *sharing know-how* inhibits cooperation as it jeopardizes competitive advantage. For instance, protecting technological expertise makes harder collaborative innovation, limiting potential benefits of co-opetition. Lastly, there are operational constraints, such as the inability to undertake large-scale projects, hinder cooperation among smaller obligated actors. For instance, in case of a small fuel trading company, purchasing certified energy savings may be more feasible than undertaking projects individually due to operational limitations.

This shows that the current functioning of the EEOS does not allow or encourage smaller obligated actors to cooperate and to meet their energy efficiency obligations together. However, it is worth considering which regulatory support instruments would be more likely to lead to cooperation between smaller actors.

Increase in energy saving obligation, as proposed under the EU's Fit for 55 package signifies a significant shift. The increase of annual energy savings obligation for obligated parties of 0.5% of the energy sold to end-use customers in Hungary over 2024-2027 from 0.3% increases pressure on obligated actors. Smaller obligated parties may need to shift from relying on levies to considering options like purchasing certified energy savings or engaging in cooperative energy efficiency projects.

Another supporting tool for cooperation would be if *regulators would tighten legislation* of allowing obligated parties to fulfil their obligations directly by paying levy. By prohibiting direct costing, obligated parties would need to fulfil their energy efficiency obligations through alternative methods.

Lastly, a *shift towards long-term energy-saving projects* over short-term initiatives is expected. This change would compel obligated parties to invest in larger, long-term projects. Collaboration would become crucial as smaller obligated actors may lack the resources, and motivation to undertake such projects on their own. By pooling resources and expertise, small actors could collectively address large long-term energy-saving projects to meet their energy efficiency obligations effectively.

Furthermore, interviews revealed that if changes were to be introduced to facilitate cooperation from the regulatory side or if the increase in energy savings obligations, which is expected due to the increase in energy savings set out in the EEOS scheme design and the EU Fit for 55

package, would encourage smaller obligated actors to cooperate, than there are forms of cooperation that would be relevant.

In this case, in the following options cooperation would provide a solution for operators to better meet their energy savings obligations and to reduce their competitive disadvantage compared to large obligated parties.

Establishing an alliance among smaller obligated parties can address knowledge gaps and reduce transaction costs. Through shared communication and knowledge sharing, they can better fulfil the EEOS requirements. Collaboratively hiring legal representation and developing standardized procedures would streamline compliance efforts and potentially lower costs. Also, alliance could facilitate sharing market insights and best practices, for instance on how to purchase certified energy efficiency savings at more competitive rates.

As mentioned before, mandated increase in energy efficiency savings obligations necessitates larger-scale, long-term energy-saving projects. Collaboration would become crucial for pooling resources and fulfilling energy efficiency obligations efficiently and to get access to larger projects.

Participation in the EEOS stock exchange requires registration and company certification. Another way to cooperate is to form an alliance, combining smaller obligated parties' energy savings obligations, and entrust a larger obligated actor with the purchase of certified energy efficiency on the EEOS stock exchange in exchange for a predetermined commission, which would allow small actors to meet their obligation. Trust issues can be addressed through predetermined agreements, incentivizing cooperation for mutual benefit.

Furthermore, the research also explored what other instruments could be used to reduce the competitive disadvantage of smaller obligated players compared to larger obligated actors.

The emergence of a secondary market, the EEOS stock exchange created by CEEGEX, will allow obligated actors to have easier access to certified energy savings at a lower cost. With quota increases, if supply on the market decreases, it could play an important role in enabling other ways to buy certified energy savings from the market. As the stock exchange will act as a price signal, it will therefore also determine the price of certified energy savings purchased

through different means, in the event that the previously mentioned information asymmetry between obligated participants decreases and they become aware of the price at which they should purchase certified energy savings.

The research showed that in the current situation, cooperation between smaller obligated actors is not relevant, despite the possibility provided by Section 15/B (1) of Act LVII of 2015 on Energy Efficiency, smaller obligated actors do not take advantage of the possibility of joint performance. This also means that they do not take advantage of the Brandenburger co-opetition theory, according to which cooperation between competitors can lead to greater joint benefits while remaining competitors than if they continue to operate alone.

As a consequence, one has to take into account the possibility that, if oversupply on the market decreases, competition will emerge, which is not the case at present. If there remain smaller obligated actors, where the lack of specific expertise, human and financial resources does not allow them to fulfil their energy savings obligation by setting up an energy efficiency project and they continue to fulfil their obligation by paying a levy, they will continue to be at a competitive disadvantage compared to large obligated actors. The possibility of cooperation between obligated parties could provide them with a solution to this problem, making it easier for them to fulfil their obligation and reducing their competitive disadvantage compared to the large players.

Also, if there are still obligated actors with an energy efficiency obligation of 100 GJ or less, it is worthwhile from a regulatory perspective to consider the question of economies of scale and whether it is worth keeping these small actors in the EEOS obligated actors.

Literature and interviews have shown that these smaller obligated actors do not result in higher energy savings due to the size of their obligation. Furthermore, it is likely that as long as the volume of their obligation does not increase significantly, it will continue to be more profitable for them to continue to meet their obligation by paying a levy, due to the high transaction costs of energy efficiency projects. The research shows that those with commitments below 100 GJ currently account for 33.25% of all obligated actors, a proportion that will decrease with the planned quota increase, but there is still the possibility that smaller obligated actors of this size will remain. It is worth considering limiting the number of obligated actors in the long term, as very smaller obligated actors will not be able to achieve the energy savings that large companies

achieve through their energy efficiency projects and will therefore not be able to contribute significantly to the energy savings targets.

To conclude, as energy saving obligations are projected to increase in the period 2024-2027, i.e. 0.5% of the energy volume subject to the obligation will be required to be saved by the obligated actors from end-users each year, it will be worthwhile to examine the researched issue in two years' time.

The thesis provides an opportunity for further research in the future. It will be worthwhile to examine the existence or continued lack of cooperation between smaller obligated actors two years after the increase in obligations, as the results of the period that follows will certainly be available for analysis by then.

It will be worth examining whether there has been a change in the way the obligations are fulfilled. Are the obligated actors still using the option of fulfilling their obligations by paying a levy or, as they become more accustomed to the EEOS system and the information asymmetry that is now present in the market decreases. Also, are they more inclined to set up energy efficiency projects in order to achieve greater energy savings for end-users.

It will also be interesting to see if there has been any change in the legislative background of the Hungarian EEOS, for example if there has been a tightening of the regulation or an easing of the requirement for very small operators with an obligation below 100 GJ to remain a mandatory operator. It is therefore also worth examining whether smaller obligated actors are still at a competitive disadvantage compared to larger obligated operators.

The introduction of the secondary market and its impact on the Hungarian EEOS system and the functioning of the market will provide further research opportunities.

It would be worth to analyse to what extent the system provides incentives for operators to meet their obligations by purchasing certified energy savings or by creating energy efficiency projects. Furthermore, to what extent do operators make use of the possibility to trade on the stock exchange after the energy savings generated by energy efficiency projects have been verified by a certification body if they accumulate certified energy savings. As auctions will

now be regularised, it will be worthwhile to examine the impact of the introduction of the EEOS exchange on the market at a later stage.

To conclude, since, as it can be seen from the research, only the results of the first period of the Hungarian EEOS have been officially published so far, which did not give the opportunity to analyse them with quantitative research tools, but in two years, when the results of the next period will be available, further research and experiences will be published, and the impact of the EEOS exchange will be outlined in the market. It will be worthwhile to examine again whether there has been a change in the issue researched in this research paper, the cooperation of the obligated parties in the Hungarian EEOS system.

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VIII. Annexes

VIII.1. Semi-structured in-depth interview questions

Regulatory side

1. How do you assess the results of the Energy Efficiency Obligation Scheme (EEO) in Hungary so far?
2. What measures have been taken recently to increase the efficiency of the scheme?
3. What is your experience with the compliance rate of smaller players?
4. Do you see the possibility for smaller actors to meet their obligations through horizontal cooperation?
What measures do you plan to introduce to encourage smaller actors to comply with their obligations?
6. Are you using instruments to support smaller actors in their energy efficiency investments?
7. Do you have any experience with the compliance rates of smaller operators in other European countries?
8. Do you have experience of this type of cooperation in other European countries? If so, are there any examples of successful cooperation that could be transferred to the Hungarian context?
9. What plans do you have for the future to develop and improve the effectiveness of the Energy Efficiency Obligation Scheme?
10. What impact do you think the increase in the required obligated volume will have on future compliance rates?

Obligated parties' (company) side

1. How do you assess the results of the Energy Efficiency Obligation Scheme (EEO) in Hungary so far?
2. How do you assess the compliance with your energy efficiency obligations in the recent period?
3. What steps have you taken so far to meet your energy efficiency obligations?
4. Do you consider it a challenge to meet your obligations?
5. What difficulties have you experienced in meeting the obligations and how have you tried to overcome them?
6. Have they been open to cooperation with other actors to meet the obligations?

7. Do they perceive regulatory support for the implementation of energy efficiency projects?
What support or assistance would they expect from regulators to meet their obligations?
8. What benefits and opportunities do they see in working with other actors?
9. What barriers do you see to cooperation with other actors?
10. If they were open to cooperation, what regulatory changes would they need to make to facilitate cooperation?
11. If they were open to cooperation, what timeframe do they consider feasible for cooperation and for meeting their obligations?
12. What impact do you think the increase in the required obligated volume will have on future compliance rates?

Expert/Advisor side

1. How do you assess the results of the Energy Efficiency Obligation Scheme (EEES) in Hungary so far?
2. What are your experiences with Energy Efficiency Obligation Schemes in other countries and how do they compare with the Hungarian system?
3. What is your experience in implementing energy efficiency projects, especially focusing on smaller actors?
Do you see the possibility for smaller actors to fulfil their obligation through horizontal cooperation?
5. What tools and strategies do you propose for smaller actors to fulfil their obligations?
6. How can smaller actors help each other to meet their energy efficiency obligations?
7. What are the benefits, constraints and challenges of the possibility to cooperate with other actors in meeting their obligations and energy efficiency targets?
8. Do you see examples from other countries of smaller actors fulfilling their obligations?
9. Do you see examples of successful practices of energy efficiency cooperation from other countries?
10. How can smaller actors be encouraged or supported to meet energy efficiency obligations and to cooperate?
11. What impact do you think the increase in the required obligated volume will have on future compliance rates?