

Fuel suppliers under energy efficiency obligation schemes – suitable for energy savings in transport?

Nikos Liapis
ELIN
33 Pigon Street
Kifissia 14564
Greece
liapis@elin.gr

Simos Efthymiadis
ELIN
33 Pigon Street
Kifissia 14564
Greece
efthimiadis@elin.gr

Vlasios Oikonomou
Institute for European Energy and Climate Policy
Kingsfordweg 151
1043GR Amsterdam
The Netherlands
vlasios@ieecp.org

Keywords

energy saving potential, energy efficiency obligation, transport savings, fuel suppliers

Abstract

In the framework of the Article 7 of the 2012 Energy Efficiency Directive (European Commission Directive 2012/27/EU), in both 2014–2020 and 2021–2030 periods, several Member States (MS) have opted for Energy Efficiency Obligation schemes (EEOs) to achieve the mandatory energy saving targets. In these EEOs, most MS focus on electricity and gas suppliers to achieve the energy saving obligations, while obligations are present to fuel suppliers (for transport and residential heating) in France, Austria, Greece, Ireland, Slovenia, and Bulgaria. The obligation to the transport fuel suppliers is heavily debated as they do not have direct access to their end-users (only through gas stations), they face competitiveness issues to the electricity and gas suppliers as the latter have contractual relationships with their customers, and they have limited options in carrying out energy saving measures. This paper examines the Greek EEO scheme as it is applicable on the fuel distributors and assesses the effectiveness of measures in the transport sector. The parameters that determine the capacity to carry out savings in the transport sector are mainly the possibility to aggregate actions, the structure of the fuel supply market and the flexibility provided by the EEO scheme administrator. Departing from Greece as an example, the key outcome of the paper is to point that financial tools and incentives in the transport sector are essential and can facilitate and ensure the achievement of the obligation. Regarding technical measures in the transport sector, which are mainly additivated low consumption fuels and premium lubricants, flex-

ibility must be provided, and the awareness raising/behavioural measures should not be limited. Last, energy efficiency potential should be assessed in order to allocate effectively obligation to EEOs participants.

Introduction

The Energy Efficiency Directive (EED) entered into force in 2012 (European Commission Directive 2012/27/EU), setting goals of reducing EU primary and final energy consumption by 20 % by 2020, compared to baseline projections. To support the achievement of these goals, Article 7 of the EED requires Member States to achieve yearly energy savings through an energy efficiency obligation scheme (EEOs) or alternative measures. The amending Directive on Energy Efficiency (2018/2002) extends the Article 7 energy savings obligation beyond 2020 to 2030. EEOs are considered as a cost-effective policy since the costs incurred by the obligated parties to fulfil the energy savings obligations are usually significantly lower to the costs of energy. Moreover, other costs such as administrative costs and start-up costs sum up to only a small fraction of total costs of those mechanisms (Rosenow & Bayer, 2017). In fact, costs to reach the overall energy efficiency target can be reduced when imposing an obligation contrary to applying traditional grant programmes.

From the incumbent EEOs, a relatively small share of energy savings obligations has been delivered in the transport sector so far. Member States often need to work across ministries and departments to design and implement policies in the transport sector, making it more difficult in many cases to bring forward proposals. Nevertheless, with one third of EU final energy con-

sumption coming from the transport sector, much potential remains untapped (EC 2018).

The EU Horizon 2020 ENSMOV project carried out a survey for the Article 7 policies for the transport sector, evaluating progress in the implementation of Article 7 of the EED estimated that only 6 % of energy savings notified were in the transport sector, making it the least represented sector, the others being buildings (42 %) and industry (8 %). The remaining 44 % of savings were estimated to come from cross-cutting measures, such as taxes and financial incentives applying to multiple sectors (ENSMOV 2020). Furthermore, the relatively small amount of savings in the transport sector reflects the views of energy efficiency experts surveyed for the Horizon 2020 Energy Efficiency Watch 3 and 4 projects. When asked in which sector they saw the most important gap in energy efficiency policies in their respective countries, transport ranked highest, with 38 %. There was virtually no change in these perceived gaps (averaged across the EU) compared to the survey three years previously. Nevertheless, the project did identify more than 300 transport related policy activities across the EU, including planning instruments, regulatory instruments, economic incentives, information and advice and R&D support. This suggests some room for sharing of best practice policy design and implementation between countries.

The causes of the lack of policy action on energy efficiency in the transport sector may stem from the tendency of governments to organise themselves in ways that splits energy efficiency strategy and transport between separate ministries or departments. These concerns could signify that EEOs need further elaboration to make them customized for achieving savings in the transport sector.

This paper departs from the Greek EEO scheme and attends to approach issues and concerns raised in the target allocation for the fuel suppliers. At the moment, there is no other significant research study on the way EEOs operate and achieve targets in the oil sector. The aim is to conclude to proposals about the improvisation of the scheme in Greece but also to extract experience useful for other MS concerning the implementation of Article 7 to oil distributors. For this, we studied the implementation of the Greek EEOs for the period 2017–2020, as well as the proposed scheme for the period 2021–2030, that is in debate between the Greek Ministry of Energy, the scheme operator and the Ministry advisor and the Obligatory parties. We tracked down the issues in EEOs in the transport sector noticed the key findings and analysed the methodology to determine the correct buy-out price. We proceeded to policy recommendations that could improvise critically energy savings through alternative measures, that could thus lighten the obligation of EEOs, and we ended up with conclusions.

This study can be quite useful for other countries as well, because the Greek scheme was based mainly in the transport sector and fuel suppliers and less to gas and electricity suppliers: for the period 2017–2021, the former carried out 61 % of the total obligation, performing quite satisfactory, not only succeeding their targets but creating surpluses.

Issues in EEOs in the transport sector

The general rule in the EEOs is that only a small number of MS included the transport sector through oil distributors for generating energy savings in the end use transport sector. Even

then, the outcomes of the period 2014–2020 are questionable, as the transport sector potential is low in general in most EU Member States. In Greece for instance, natural gas and electricity consumption for heating is not so common, mainly due to low expansion of medium and low-pressure natural gas grids from the former and high price and taxes for the latter. Thus, heating oil is the main product used for heating purposes, and due to its high energy content, the Ministry of Energy was obliged to include oil distributors to the EEOs. Still, resulting from the 2014–2020 period findings the amount of supplied energy is very high in comparison to the possible measures in transport/fuel related sector.

Judging from the 2017–2020 period of EEOs though, oil companies have a low potential in accumulating energy savings through their customers in the transport sector, and low profitability to finance actions to that purpose. There are several reasons that lead to this low potential comparing to the buildings or industrial sectors.

Primarily, the structure of the downstream petroleum products Market itself reduces the potential for savings. Fuel suppliers in the transport sector are mainly wholesalers and they purchase the petroleum products from the refineries and sell them to three main categories of customers: fuel stations, heating diesel distributors and final consumers, the latter being mainly industrial clients, transport and bus companies or shipping companies. Most of their sales are targeted to fuel stations and heating diesel distributors that act as intermediaries, the latter being the ones having the direct relation with the final consumer. Depending on the market structure in each Member State, fuel station owners can be independent entrepreneurs that may or may not have a contractual relation with the fuel supplier (relates to the franchising contractual agreements). Even more, final consumers almost never have a contractual relation with their fuel supplier, no matter if this is for automotive or heating fuels. As a result, fuel suppliers do not have direct access to the end users (which are the target group upon which energy savings are eligible). This also means that in the case of financing energy saving technical measures (higher cost than the behavioural ones), fuel suppliers can never pay back even a small part through continual sales (unless if there are financing schemes/mechanisms in place). This signifies that fuel suppliers face competitiveness issues to the electricity and gas suppliers, which can directly access their costumers and have contractual relationship with them. There is always an argument that including fuel stations in the EEOs can the scheme more efficient, due to their proximity to the end consumer, but this is often rejected by most Member States authorities due to the high operational cost of the inclusion of thousands of obligatory parties.

A second reason is that fuel suppliers' options in technical and behavioural measures towards the end users are limited and often difficult to implement (especially the technical ones, as they relate to individual vehicle inspections or tire pressure controls of fleet management for professional vehicles). Thus far the fuel suppliers have carried out predominantly behavioural measures in most EEO schemes. As there is no direct connections to customers, it is therefore hard to set direct actions. Setting of measures is not linked to energy efficient technologies only. Moreover, for some of the measures there are problems with feasibility and data protection, both behavioural and technical (such as tire pressure control). All the above result

to measures with low potential, as their low effect and risk of double-counting drive EEOs Manager to enforce high free rider coefficients and in general low value of the specific measures. In case of behavioural measures, there are clauses for avoiding double counting, such as (Ireland) a database for the residential measures (with each household electrical meter), where savings are attributed to specific measures linked to each household.

Thirdly, there are not plenty of standardized operations in transport and a lot of them have large potential, especially technical measures – in most Member States the main measures implemented are technical supplemented with financial assistance through other schemes – or certificate markets). Some countries (such as in Austria) will not include additivised fuels that claim fuel economy due to political directions, although it was a popular measure for suppliers. In Greece, savings from the use of fuel additives is calculated in the basis of 37 % of additivised fuel volume sold from retail stations. Only 2 % is considered as saving. In other MS, Bulgaria scheme accepts 80 % of the additivised fuels volume as eligible. Slovenia uses a coefficient depending on the calorific value of the fuel, calculated from real life tests. In the case of EEOs that are complemented by certificate markets, transport fuels present almost half of the obligation, but a small number of certificates, therefore fuel suppliers are obliged to implement measures in other sectors, via intermediaries, in many cases they are obliged to implement most of the measures in households, where they have limited access and loyalty.

As an additional measure to EEOs, the introduction of a fee for all fuels (which will be in the end a very minor addition to the price) for a short period of time could generate an important amount that can finance energy efficiency measures (with minimal effect on consumers) covering part of their obligation (making use of an energy efficiency fund, as prescribed in the EED). Most Member States though, being aware of the political cost of applying new taxes, are sceptical towards this possibility, ignoring the obvious advantages of a solution like this.

Next to the above-mentioned barriers and difficulties in the transport sector, as a result of energy saving strategy implementation in all sectors and especially in transport, fuel consumption per capita has decreased significantly the last decade (IOBE, 2019). Especially for Greece, the financial crisis, urged consumers to alternative energy fuels (diesel and LPG versus gasoline) and energy sources (electricity, pellets, even wood versus heating diesel), reducing thus the fuel market by 40 % the decade 2010–2020. This has turned fuel suppliers to low profitability, losses, mergers and even bankruptcies, creating even more unfavourable conditions in financing technical measures in other sectors than transport.

Finally, there are three more issues documented as barriers for the development of the EEOs in the transport sector:

- In EEOs with certificate markets, there can be concerns with voiding certificates that were already granted, which can be major challenge for the suppliers. Even when the certificates are voided with real reason, it is a shock for the supplier. In some countries there is no possibility for certificates/third parties to participate. There is a question on renewable energy sources and how they will be dealt with in combination with EEOs.
- Some countries calculate carbon component also, putting fuel suppliers in different position than other obliged parties.

- The changes in prices are in most situations transferred to the final consumer, so at the end the fuel is more expensive, but with not enough measures in transport sector to be in line with that price/not a lot of information to the consumers.

Key findings from the EEOs in Greece for the transport sector

In the Greek EEO scheme, for the first period 2017–2020 the energy efficiency target has been appointed equal to 333 ktoe of cumulative final energy savings representing 10 % of the total target (3,333 ktoe) for EED article 7. The annual targets have been specified with a minimum threshold to be achieved in the target year: 100 ktoe and 30 % in 2017, 133 ktoe and 50 % in 2018, 67 ktoe and 50 % in 2019, 33 ktoe and 100 % in 2020.

The obligated parties for the reference year 2017 consist of 4 electricity companies, 4 natural gas companies and 24 fuel companies, distributing LPG, gasoline, diesel, and heavy fuel oil, the latter reduced to 23 in 2020. The key factor to determine the obligation was that the suppliers should have a market share higher than 1 % and represent in total at least the 95 % of the energy sold for each fuel separately (ENSMOV, 2020). The fuel suppliers have undertaken the majority of the energy saving obligation for the period 2017–2019 (59 % share), while the shares of electricity and natural gas companies are considerably lower (35 % and 6 % respectively).

The obligated parties during the first two years of the operation of the EEO managed to deliver 366 ktoe of cumulative energy savings surpassing the total energy saving target for the whole period (333 ktoe). (Tourkolias, 2019). There was a penalty of €500,000/ktoe for non-compliance, while the obligated parties have the option either to implement measures themselves or to assign their obligation to third parties or to use the “buy out” option with the same cost. With the financial crisis, this has been a large burden for Greek companies. In the first period the performance was also including previous years, mainly from additives in fuels and behaviour measures. The measures include technical measures, which are additives and lubricants. Behavioural measures are leaflets and social network campaigns. The awareness measures in the transport sector contributed to 21 %, while the fuel additives 30 % of total energy savings from sectors.

In the second phase, changes the definition of energy savings and the rate at which they must be achieved: for the period 2021 to 2030, MS must achieve new savings each year equivalent to 0.8 % annual final energy consumption averaged over the three-year period 2016–2018. The final policy mix to achieve this goal was finalized and notified to the European Commission under the final National Energy and Climate Plan (NECP) at the end of 2019. The energy saving target set for the Energy Efficiency Obligation Schemes will account for a minimum of 20 % of the total cumulative energy savings target (1,460 ktoe), while both energy providers and distribution network operators will participate in the scheme. (Ministry of the Environment and Energy, 2019). The distribution network operators (electricity and natural gas) shall undertake 10 % of the total cumulative target, while the rest is allocated to energy providers (electricity, natural gas, gasoline, diesel, heavy fuel oil and LPG).

The Ministry of Environment and Energy in collaboration with CRES are currently at the design phase of the regulation

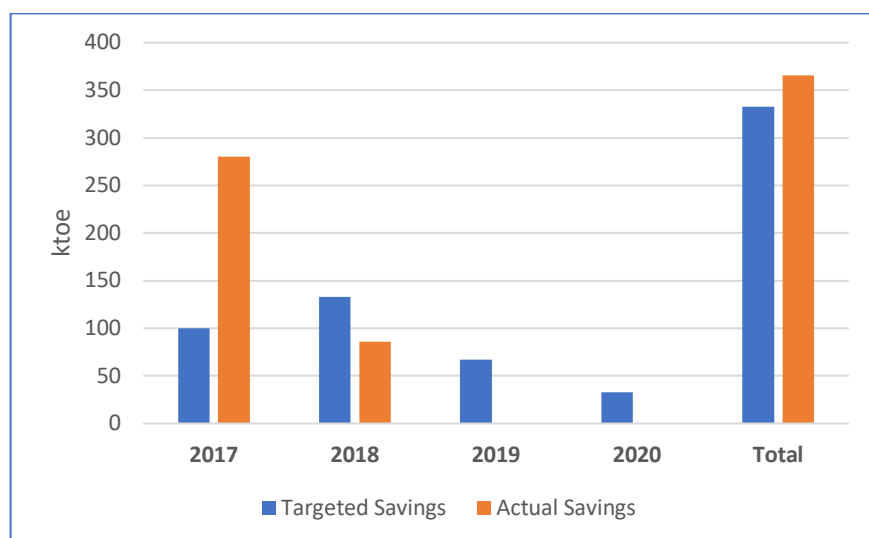


Figure 1. Greek EEO scheme, period 2017–2018 status (savings).

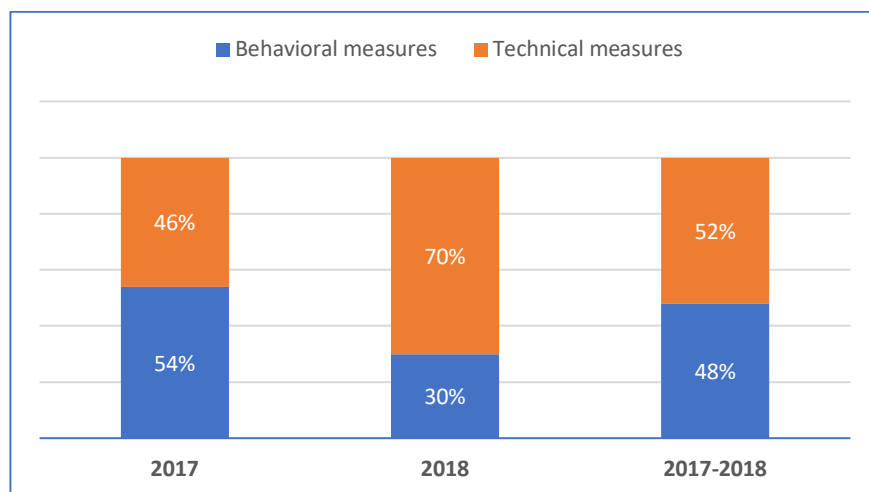


Figure 2. Greek EEO scheme, period 2017–2018 status (measures).

for 2021–2030. Some small companies might be excluded from obligation. There are several possible scenarios for the future scheme. An idea for the new scheme is that also the grid operators will participate.

There was no limit to behavioural measures in the last period, but for the new the limit under discussion is 50–55 %. Based on the allocations of the targets for the new period (1,460 ktoe) the compliance cost for fuel suppliers can reach €1.26 m/ktoe, with an average cost for the awareness measures (€10,000/ktoe), fuels with additives (€225,000/ktoe) and LPG (€250,000/ktoe). The assessment of the compliance costs corresponding to the measures in the transport sector is at the level of €165,000/ktoe; it would be logical therefore to impose compliance costs at levels below €500,000/ktoe for the new period. Furthermore, fuel suppliers proposed the financing the energy efficiency fund through the imposition of saving fee on fuels (or on energy products), and/or the absorption of part of the green fee; a charge of €0.003 per litre of fuel would generate revenues of €210,000,000 over the decade, capable of financing actions that will generate energy savings of 200–300 ktoe, fulfilling the remainder of the oil industry's obligation, until the 567 ktoe target is met. The horizontal payment

of a fee will also minimise distortions and conditions of unfair competition created by the exclusion of small companies, as well as independent service stations from the scheme.

Determining the correct buy-out price

Most EEOs included a mechanism, usually referred to as “pay to save” or “buy-out”, which allows obligated parties to pay a fixed fee instead of delivering the energy savings. The way this mechanism affect costs for obligated parties is different between the Members States. In case of first-year savings, it can be assumed that some measures will have longer lifetimes than one year and, thus, will bring benefits not only in the first year, so the cost should represent that. In comparison, yearly savings are taken accounted of for each year and the future savings will be rewarded separately, which decreases the price thereof.

Setting the buy-out price relatively high decreases the risk of undersupply, which would enable the market price to reach the equilibrium between supply and demand in later stages. In the initial stage, after the policy is put in place or after significant changes in the design of EEOS are made, a lack of a reference

of what the market costs of the measures could be will cause the initial price to be relatively higher than later when the equilibrium is reached. The example of Poland shows that setting the price relatively low increases the risk of undersupply in the initial stages and causes the market to be highly dependent on that price, which usually requires including additional rules to control the use of the buy-out option. It is considered that the triggered cost is slightly lower than the specified compliance cost. It should be noted that in Greece for the period 2017–2020 the compliance cost was set at €500,000/ktoe of final energy savings. Specifically, the compliance cost was estimated as the weighted implementation cost of a predefined mixture of energy efficiency measures, which was expected to be initiated by the obligated parties in order to fulfil the designated energy efficiency target in the period 2017–2020. The following main categories of energy efficiency measures were considered for the determination of the compliance cost:

1. Large-scale information and awareness-raising measures for fostering the rational use of energy in both buildings and transport, including training activities to promote economic driving.
2. Existing activities, which are implemented within the current framework of the business strategy of oil companies, such as the promotion of fuel additives, energy efficient lubricants and LPG in transport sector.
3. Energy efficiency measures, which have been integrated within the National Energy Efficiency Plan for the achievement of the defined energy efficiency targets, such as the

energy upgrading of buildings and the promotion of energy efficient vehicles in transport sector.

The assumptions for the estimation of the compliance cost are presented in Table 1 for all the categories of energy efficiency measures.

The weighted implementation cost of the above-mentioned scenario was calculated equal to €499,250/ktoe of final energy savings. The actual implementation of the energy efficiency measures in the period 2017–2020 leads to the conclusion that no considerable deviations have been identified compared to the initially considered mixture of energy efficiency measures. Specifically, the cumulative energy savings have been resulted for mainly by information campaigns in residential, tertiary and transport sector (47 % share). 30 % of the energy savings have been derived by fuel additives, while the contribution of the promotion of high efficiency lubricants and the energy upgrade of heating systems in residential sector was lower (6 % and 4 % shares respectively). Finally, 8 % of the energy savings has been resulted by interventions in the industrial sector.

It should be noted that changes are expected to the mixture of the implemented energy efficiency measure for the new period of the EEOS (2021–2030). As for the latest proposals of the Ministry of Energy and CREC, the EEOS Operator, it can be considered that the compliance cost of the EEOS will be defined to €285,500/ktoe (Table 2). The latest proposals of the above for the new Scheme, after a long debate with the Obligatory Parties, define that fuel suppliers should proceed with 25 % maximum horizontal behavioural and awareness measures, 45 % maximum targeted behavioural and awareness measures

Table 1. Energy efficiency measures compliance costs 2017–2020.

Category of energy efficiency measure	Energy efficiency measure	Unitary implementation cost (€/ktoe)	Contribution to the designated energy efficiency target
I	Awareness-raising and dissemination activities	10,000	50 %
	Eco-driving	100,000	3 %
II	Promotion of fuel additives	225,000	30 %
	Promotion of energy efficient lubricants	25,000	5 %
	Promotion of LPG in transport sector	250,000	5 %
III	Energy renovation of buildings	5,000,000	5 %
	Promotion of energy efficient vehicles	8,000,000	2 %

Table 2. Energy efficiency measures compliance costs 2021–2030.

Category of energy efficiency measure	Energy efficiency measure	Unitary implementation cost (€/ktoe)	Contribution to the designated energy efficiency target
I	Horizontal awareness-raising and dissemination activities	10,000	25 %
	Targeted awareness-raising and dissemination activities	500,000	45 %
II	Promotion of fuel additives	225,000	23 %
	Promotion of energy efficient lubricants	25,000	5 %
	Promotion of LPG in transport sector	250,000	2 %

and 30 % minimum technical measures in the transport sector, that include mainly fuel economy additives, high efficiency lubricants and LPG.

In any case the compliance cost is considered as the main driver for the initiation of the energy efficiency measures in the EEOS. In the case that the actual cost of the measures is higher than the compliance cost, the obligated parties will prefer to buy-out their obligation giving the authorisation to the responsible authority to achieve equivalent final energy savings to the designated energy efficiency target with the identical implementation cost.

Study to assess energy saving potential in 2021–2030

In November 2020, the Hellenic Petroleum Marketing Companies Association (SEEPE) conducted a study aiming to identify the potential for energy savings, which will be possible for oil companies to exploit under the Enforcement Regime in 2021–2030 with a view to optimally achieving the cost-effective energy saving target. The study has not been published but it is available for members of SEEPE (SEEPE, 2020).

In addition, this study could be used by oil companies for the discussion to be held with the Ministry of Energy in the context of the consultation on a variety of issues, such as, but not limited to, the allocation of the target between the different areas of final energy consumption, the determination of compliance costs, etc.

The structure of this study includes a description of the methodological approach developed in the context of this study (Chapter 2), the results of its application in buildings, transport, industry and the agricultural sector (Chapters 3–6 respectively), and the drawing of key conclusions (Chapter 7). The proposed methodological approach for determining the technical and economic potential for energy saving under the 2021–2030 Enforcement Scheme consisted of the following steps:

1. *Definition of eligible energy efficiency improvement measures in the building, transport and agricultural sectors.* Stage 1 concerns the definition of energy efficiency improvement measures, which are considered eligible under the Enforcement Regime in the period 2021–2030 and was assessed on

the basis of their technical and economic potential taking into account the technical requirements of Article 7 of Directive 2018/2002/EU. The measures were chosen mainly by the building, transport and agricultural sectors taking into account a number of factors, including, but not limited to, technological maturity, the expected potential for final energy savings and acceptance by final consumers.

2. *Determination of the parameters for assessing the technical, techno-economic and economic potential of energy savings for each measure individually.* In stage 2, the parameters required for the calculation of technical and economic potential for each energy efficiency improvement measure were defined separately.

There were calculated 2 scenarios, depending on the level of buy-out price (<€1 million/ktoe and <€3 million/ktoe). The schematic representation of the energy saving economic potential for these energy saving measures under Scenario 1 for the transport sector is shown in Figure 3.

The results from the analysis of energy saving economic potential show that achieving the savings target is achievable. The results of the scenarios under consideration for the assessment of the economic potential of energy savings in the final energy consumption sectors concerned are presented in Figure 4.

The transport sector has the largest contribution in both the first scenario (468 ktOE) and the second (523 ktOE). The contribution of awareness-raising and information measures is much greater than the expected energy savings from the other measures. This analysis shows that it is in oil companies' interest to meet their individual obligation applying measures in the transport sector, as such measures are closer to their main activity but also because of their better cost ratio than those of the other sectors.

Policy recommendations

In Greece, the SEEPE association has noticed to the Ministry of Energy that the overall savings obligation exceeds the potential of the sector, thus not achieving the requested savings and imposing heavy fines that will jeopardize the viability of the com-

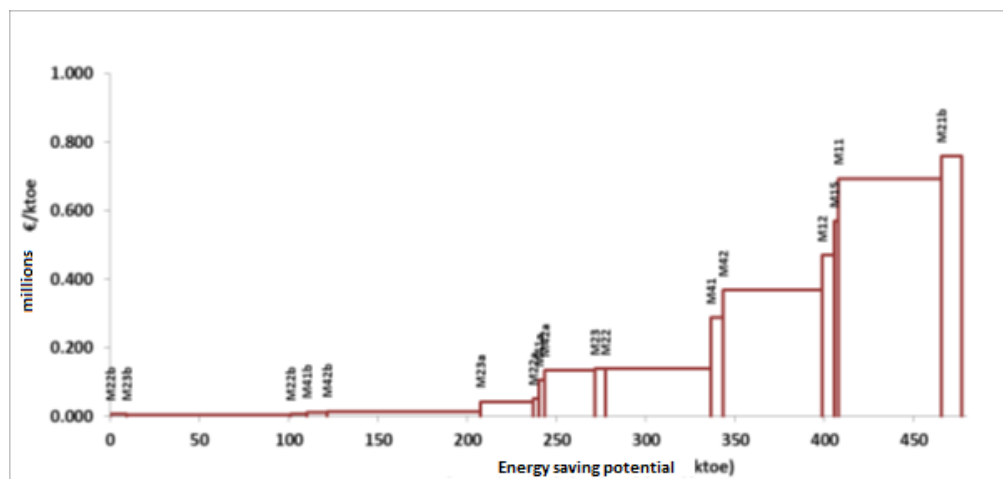


Figure 3. Schematic representation of energy saving potential for savings measures under Scenario 1 for the transport sector.

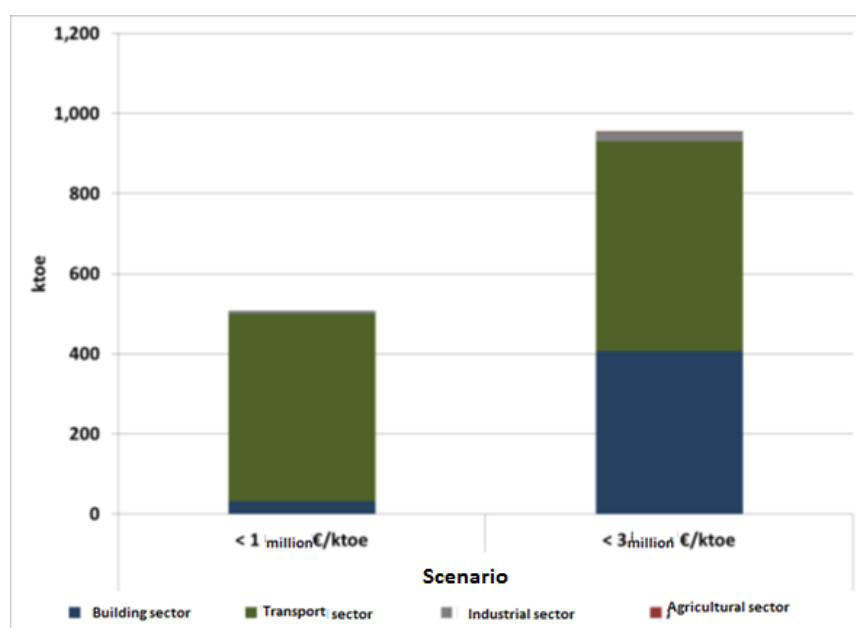


Figure 4. Schematic representation of energy saving economic potential assessment results.

panies. Even more, the proposal for putting a maximum for awareness-raising measures, while imply a minimum mandatory implementation of technical measures mainly in the building sector, creates an obligation for disbursement that only for the payment of compliance costs will be close to €3,000,000 per year and for a decade for a medium-sized company, possibly greater than its annual profitability (IOBE, 2019). This amount will also increase with the cost of implementing the remaining measures. Finally, the exclusion of small companies as well as independent service stations from the EEOs will lead to serious distortions and unfair competition on the market and will prevent consumers from recovering even part of the costs. Thus, some policy proposals for the 2021–2030 are namely:

- Imposing a significantly lower energy saving target on oil companies, taking into account the more difficult use of the technical and economic potential of measures to improve the energy efficiency of the transport sector compared to the corresponding capacity of the building sector.
- Maintain the existing procedure by applying a single regime for the whole period 2021–2030 and the annual determination of the obliged parties due to the volatility of the oil products market, with provision to adjust the overall obligation proportionate to the fall of the market.
- Maintain the existing procedure for selecting obliged parties and allocating the annual energy saving target in order to avoid distortion of competition. In the scheme to integrate all Providers regardless of market share. Those who cannot implement the obligation redeem it at the cost of compliance.
- Abolition of any restriction on the type of measures to be implemented by each YM, without imposing a ceiling on existing measures implemented in the transport sector (promotion of fuels with additives, lubricants and LPG). In the case of targeted awareness-raising and information measures, more stringent control and verification procedures should be applied.

- Transfer of surpluses for the period 2017–2020 to the new period 2021–2030 to each YM that produced them.

Next to these recommendations, a bundle of 8 alternative additional measures (recommended by SEEPE) could be implemented for the period 2021–2030, that could increase significantly the energy saving potential with low or moderate cost and lighten the obligation of the EEOs accordingly. These measures are:

1. *Energy saving certification system.* Certificates can be obtained by individuals or companies from accredited bodies, by implementing energy saving measures. The value of certificates depends on the expected energy savings and is a function of market trends. The main objectives are to strengthen end-user energy efficiency actions, increase energy savings in energy production and reduce losses in the energy distribution and transport sectors. The certificates will be available through a regulated market to taxpayers or will be exchanged for tax exemptions or discounts from green taxes. Annual savings target: 365 ktoe.
2. *Consulting – subsidy of energy audits to SMEs.* The mechanism provides support to SMEs to control energy and receive advice/studies to improve their energy efficiency. The purpose of energy audits and SME consulting is to identify weaknesses in energy use and to accept proposals or specific action plans for energy and cost savings improvements. Grants are awarded for specific and independent energy efficiency studies in SMEs. SMEs can receive funding for initial counseling and/or in-depth counseling lasting several days. Annual savings target: 50 ktoe.
3. *Voluntary energy efficiency agreements.* Voluntary energy efficiency agreements for trade and industry include an action plan for energy-intensive industries, as well as sectoral action plans for large and medium-sized enterprises (agriculture, tourism, industry and transport) and a general action plan for companies that do not have a sepa-

rate action plan for their sector. Agreements are reached through sectoral associations. Target groups, including industrial companies, are committed to the goals of implementing their own agreement/action plan, setting an energy savings goal for themselves and reporting annually on the measures implemented and their impact on savings. The Sectoral Associations promote the achievement of the coverage goal and the implementation of the agreement/action plan in the field of industry. Annual savings target: 265 ktoe.

4. *White Tax*. A White Tax on energy consumption is set. Revenues are deposited in the Energy Efficiency Fund which finances energy saving actions. There is a direct correlation between the unit price of energy and consumption. Tax rates are not fixed but are reviewed and amended annually through an index-based system that takes into account any changes in the consumer price index. The amount of the tax rate depends on the energy product used. Annual Savings Target: 450 ktoe.
5. *Energy Efficiency Fund – energy saving investments*. Energy Efficiency Fund is established in which the Green Tax, energy/environmental fines, revenues from non-compliances are deposited, etc. From the Fund's resources, studies and energy saving actions of companies are financed directly or through tax exemptions, through a detailed list of eligible investments. Annual savings target: 70 ktoe.
6. *Reduction of speed limits*. Speed limits are reduced on highways from 120 km/h to 110 km/h and in cities from 40 km/h to 30 km/h. Full observance of the speed limit and speed control at 110 km/h will lead to a significant reduction in fuel consumption (-12 % in the case of a diesel vehicle and -18 % in the case of a petrol vehicle). (EEA, 2020). Reducing speed limits in addition to saving energy also promotes safety. Traffic fines for speeding violations are deposited in the green fund. Annual savings target: 55 ktoe.
7. *Green corridors*. Green corridors are a European idea that suggests long-distance freight corridors where advanced technology and modesty are used to achieve energy efficiency and reduce environmental impact. Green corridors address all types of agents operating in door-to-door concatenation chains, including ports. carbon footprint (CF) provides companies, customers and other stakeholders with information on GHG emissions from the product supply chain, identifying key points, potential risks and opportunities for improvement. (Ruijters, 2009)
8. *Industry energy network*. An energy consumer network is being established, as a voluntary body of companies working to maintain strong energy management and environmental protection practices. The companies participating in the network are committed to developing an energy management program, setting, and reviewing energy targets, conducting an annual energy audit and creating an annual energy efficiency account. Regular workshops, seminars and on-site visits allow network members to learn from energy experts and other experts and share their knowledge and experience with other energy managers. Annual savings target: 50 ktoe.

Conclusions

In the framework of the Article 7 of the EED (in both 2014–2020 and 2021–2030 periods), several member states have opted for EEOs to achieve the mandatory energy saving targets. From the incumbent EEOs, a relatively small share of energy savings obligations has been delivered in the transport sector so far. From a first glance, there is a low potential in accumulating energy savings through fuel suppliers' customers in the transport sector, and low profitability to finance actions to that purpose. There are several reasons that lead to this low potential comparing to the buildings or industrial sectors, such as the downstream petroleum products' market where suppliers are linked to intermediaries to reach out their customers, the limited options in technical and behavioural measures towards the end users, which are often difficult to implement, the lack of standardized operations in transport with high energy efficiency potential, and the reduction of the fuel consumption per capita over the years.

This paper examined the Greek EEO scheme and explained the issues and concerns raised in the target allocation for the fuel suppliers. The key conclusions and recommendations are that EEOs can influence substantially the market, so the savings should be set in line with the energy savings potential of the transport sector, based on the results of each implementing period, taking into account a realistic cost of non-compliance and buy-out price.

The energy saving measures in households could be funded via national funds in combination with EEOs, from other resources also. Savings of fuel companies, selling fuels in transport, should be achieved through the measures in transport (for example low consumption fuels with additives and premium lubricants), where the companies have link to consumers and the awareness raising/behavioural measures should not be limited. Decarbonization pathways should be set in the transport sector, letting low carbon transport/mobility solutions as the most important measures for fuel suppliers in the next period.

At the moment, there is a lack of data in order to compare the effectiveness of measures in the transport sector throughout all MS that include oil distribution companies in their EEOs. Results from our study though, point out that there is a strong need for a cross-sector energy efficiency potential assessment to be carried out in each MS. Due to this assessment, obligation and bottom-up actions can be allocated to EEOs energy distributors in potential basis and not in energy content basis, as the latter leads to inefficient and high cost allocation.

References

1. Directive 2012/27/EU.
2. EEA (2020, November 23). *Do lower speed limits on motorways reduce fuel consumption and pollutant emissions?* <https://www.eea.europa.eu/themes/transport/speed-limits-fuel-consumption-and>
3. Energy Efficiency Watch 4 (EEW4), a HORIZON 2020 project, online on: <http://www.energy-efficiency-watch.org/>.
4. ENSMOV, 2020. *Snapshot of Energy Efficiency Obligation Schemes in Europe* (as of end 2019). [online] p. 23. Available at: <https://ensmov.eu/wp-content/uploads/2020/06/>

- ENSMOV_Snapshot_EEOS_provisional.pdf [Accessed 27 March 2021].
5. European Commission (2018) *Assessment of the progress made by Member States towards the national energy efficiency targets for 2020 and towards the implementation of the Energy Efficiency Directive as required by Article 24(3) of the Energy Efficiency Directive 2012/27/EU*. https://ec.europa.eu/commission/sites/beta-political/files/report-2018-assessment-progress-energy-efficiency-targets-april2019_en.pdf
 6. *European Commission Directive 2012/27/EU of 25 October 2012 on energy efficiency*. [Online]. [Accessed 27 March 2021]. Available from: <http://eur-lex.europa.eu/>.
 7. Hellenic Petroleum Marketing Companies Association (SEEPE), November 2020: *Study to assess energy saving potential in 2021–2030*.
 8. IOBE (2019) *Aggregate Data and Indicators of the Petroleum Trade Sector for the year 2019*.
 9. Ministry of the Environment and Energy, 2019. *National Energy and Climate Plan*. Athens, p. 154.
 10. Rosenow J., Bayer, E. (2017). *Costs and benefits of Energy Efficiency Obligations: A review of European Programmes*. Energy Policy 107, 53–62.
 11. Ruijters, H., 2009. What is green in “Green Corridors”? In: *EU Green Corridors Conference: Towards Climate Neutral Freight Transport*. [online] European Commission. Available at: https://ec.europa.eu/transport/themes/sustainable/event/green-corridors-conference_pt [Accessed 27 March 2021].
 12. Tourkolias, C., 2019. *Experiences with the monitoring and evaluation of the Greek Energy Efficiency Obligation Scheme*.
 13. United States Government Accountability Office Washington, DC 20548 Committee on Environment and Public Works, United States Senate, *Subject: Energy Efficiency: Potential Fuel Savings Generated by a National Speed Limit Would Be Influenced by Many Other Factors*.