

Cost-effectiveness and financial aspects of EEOs

Workshop background document



This project has received funding from the European Union's Horizon 2020 Research and innovation programme under grant agreement No 840034

Acknowledgments & Disclaimer

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Document version 1.0, final, published in February 2021.

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ENSMOV Project

ENSMOV is an EU-funded project aiming to support public authorities and key stakeholders in 13 Member States (MS) and the UK, represented by its consortium (Austria, Belgium, Bulgaria, Croatia, France, Germany, Greece, Hungary, Italy, Lithuania, Netherlands, Poland, Romania and the UK, addressing all 27 MS, the UK, and accession countries) to monitor, revise, improve and complement the design and implementation of their national energy efficiency policies by developing resources on practical and strategic issues arising from the Article 7 EED.

ENSMOV follows up on two other very influential projects that have helped to shape Member State policies to address Article 7 requirements of the EED – IEE ENSPOL (www.enspol.eu) and H2020 MULTEE (<https://multee.eu/>).

ENSMOV has the following strategic objectives that will deliver impacts beyond the duration of the project:

- a) to ensure that energy efficiency policies do not only promise, but also realize a major, long-term contribution to the energy, environmental, economic and security goals of the EU and MS under the Energy Union; and
- b) to sustain an active platform and community for knowledge exchange of best practices in policy development and implementation of Article 7 EED policies, strengthening cooperation and improving the dialogue between national policymakers and stakeholders across the EU.

Representatives of EU Member States and beyond are invited to participate in [international workshops](#) and can contact the [project coordinator](#) in order to arrange national workshops.

Document introduction

This document serves as background and preparation for the workshop on Cost-effectiveness and financial aspects of EEOs

Introduction

Energy Efficiency Obligations (EEOs) are considered as cost-effective policies 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. Cost data are rarely published and not always comparable. The most commonly reported data are programme costs (the costs to obligated parties of meeting their obligations or the subsidy costs to Member State from financial support programmes or tax rebates). Administrative costs are more rarely reported (these are the costs to government of setting up, administering, monitoring, verifying and evaluating schemes). Participant costs are even more rarely reported and rely on evaluation evidence, carried out after actions have taken place. The costs to manufacturers and energy users of complying with regulations and meeting voluntary agreement targets also require ex post evaluation studies.

The differences between policies and the lack, or incoherent way, of presenting information about costs to the public makes it difficult to compare the EEOs in Europe in terms of cost effectiveness. There are least cost data available among Member States and some of them reported in an incomparable way. Programme costs are usually published, however administrative costs and participant costs are not commonly published. Previous studies on that topic (Rosenow & Bayer, 2017) showed that the costs for obligated parties are typically between 4 EUR/MWh and 11 EUR/MWh, which is similar to what was shown in some of the ENSMOV factsheets (for Denmark in 2016 and 2017 it was 6 to 7 EUR/MWh assuming an action lifetime of ten years; for Ireland 56 EUR/MWh (first year savings) in 2016; for France between 6.7 and 8 EUR/MWh based on the recent market prices). Furthermore, a study on market-based instruments for energy efficiency estimated the average weighted programme cost of delivering a kWh lifetime energy saving, across 35 EEOs and two energy efficiency auctions, at USD 0.013 (€0.011). The study included five of the largest EEOs operating EU Member States (Austria, Denmark, France, Italy as well as United Kingdom as a former Member State).

Benefits that result from EEOs usually also exceed the costs, but there are least data available about wider costs and benefits, some of them published in an inconsistent way. A quantification of the impacts on carbon emissions, local air pollution and other factors is crucial, in order to get reliable information. The net impact of the increase in energy prices to cover the costs of EEOs is usually lower in a long term than the impact of cost decrease resulting from energy savings. This could be further enhanced with the periodic redesign of the EEOs that is aimed to increase cost effectiveness. Additionally, the energy efficiency measures can generate other benefits as mentioned in the section above. Finally, there is almost no mentioning of data on wider costs and benefits as they are not reported in a consistent way. In order to generate a truer picture of the relative cost-effectiveness of energy policy measures in saving energy, a quantification of the impacts on carbon emissions, local air pollution and other factors would be needed. The value of these benefits could be netted off the costs of generating energy savings.

Influence of policy design on cost effectiveness of EEOS

Buy-out mechanism

Most Member States 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 Members States. A short survey about those costs was conducted among ENSMOV partners. Results of that survey are presented in Figure 1.

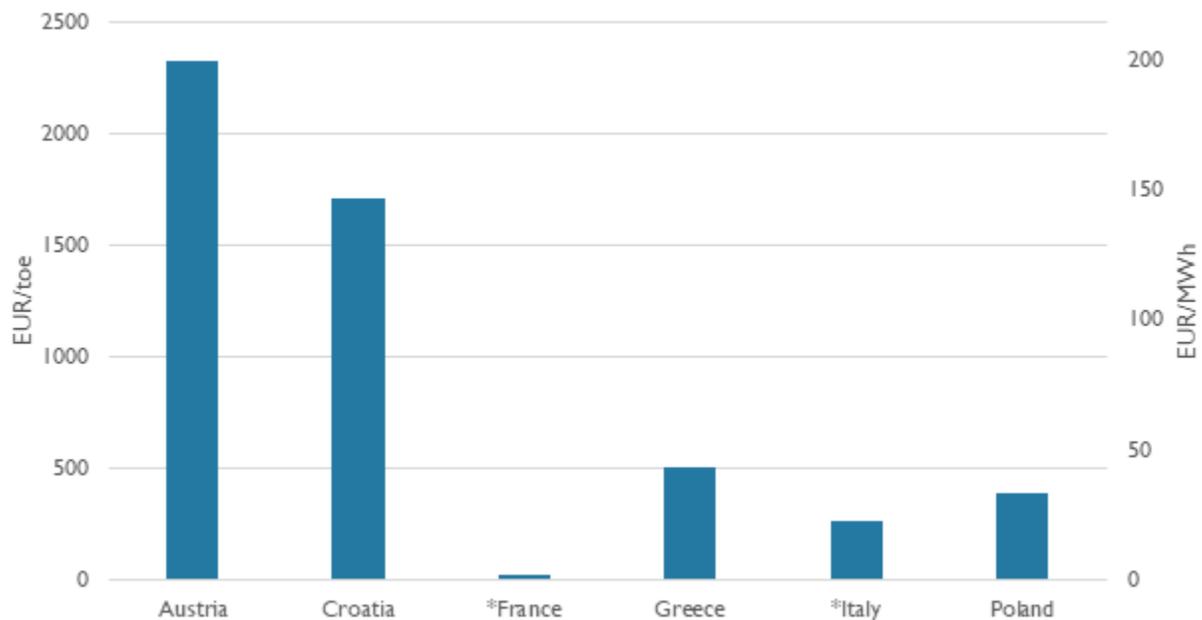


Figure 1 Buy-out or pay-to-save costs (for first-year savings *for Italy the value is in yearly energy savings and for France in cumulative yearly energy savings). (Source: survey conducted by KAPE)

It is important to notice that the price in Figure 1 is referring to first-year savings for most countries except Italy and France, where it refers to one year of energy savings. 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.

Multiplication factors that impact the obligation in EEOS

Mechanisms that independently impact the fulfilment of the obligation in comparison to achieved energy savings (similar to the *profit-sharing* principle in Italy) also exist or existed in other EEOS.

In **France**, the above-mentioned multiplying factor is used to stimulate investments in low-income households. In fact, part of the obligation has to be carried out for the benefit of low-income households in order to address fuel poverty. And, as an additional incentive, the EEOs has set that operations implemented for the benefit of very low-income households will deliver twice the number of certificates that would have been delivered for the benefit of regular households.

Moreover, the “Coup de Pouce” (boost or push) has been implemented in 2019. Given the applicant has signed a charter of commitment, the volume of certificates delivered will be increased compared to the standardised amount. This only concerns a handful of operation, mainly targeting renovation of residential buildings. Likewise, if the operation targets low-income or very low-income households, the “boosted” volume of certificates will be higher than when targeting regular households.

Overall, multiplication factors have been a decisive tool to reach national renovation targets such as households’ insulation and conversion from coal to more efficient heat production. With rising prices, quality checks had to be tightened. The latter then have a strong impact on the building sector which is made up of actors with less flexibility or diversification and therefore tend to be more affected by the regulatory changes.

In **Poland**, an “ ω ” coefficient was used that could either increase or decrease the volume of certificates compared to achieved energy savings. This mechanism was meant to represent better the actual investment support needed for each investment. Entity applying for certificates could ask for lower number of certificates than resulted from the savings using the “ ω ” coefficient, thus having a higher chance to receive the certificates, as the “ ω ” coefficient was one of the main deciding factors in the auction. Yet, this mechanism proved to be ineffective in the early stage of the EEOS operation due to the undersupply of WhC on the market. Many of the applicants decided to ask for increased volume of certificates compared to achieved energy savings (since undersupply allowed for that), which was represented in changes of average “ ω ” coefficient with each auction. There were other regulations in place controlling the “ ω ” coefficient used by applicants in the auctions; however, those could only prevent the extreme use of the “ ω ” coefficient (acceptance of applications with “ ω ” coefficient significantly different than the average). The mechanism was terminated with the significant changes in regulations in 2016 and is no longer in place in Poland, thus, it is difficult to estimate its impact in the long term or on a market where undersupply is not an issue. Mechanisms that affect the volume of certificates in comparison to achieved savings will affect the achievement of energy-savings targets. If the volume of the obligation that could be fulfilled with the certificate (or energy efficiency measure) depends on some other factors than achieved energy savings, both the energy-saving targets and the fulfilment of the obligation by obligated parties should be monitored separately.

Stringency of MRV requirements

As EU programmes strengthen their M&V systems in response to Article 7 EED requirements, programme costs per (reported) energy saving are likely to rise, and indeed this has been one of the reasons behind the increase in Italian White Certificate prices in recent years. The price in the French White Certificate programme has also risen since 2017, in part as a result of the significant increase in ambition in the 2018–2021 programme phase, which is considerably more ambitious, in % of annual final energy consumption terms, than the other programmes surveyed in the 2017 study. This would signify that when MRV systems become more demanding in terms of data and effort, the overall program costs can increase.

Snapshots of costs of Energy Efficiency Obligation Schemes in the EU

Below we present some key facts on the cost effectiveness of the EEO schemes in several parts of the EU as a result of the ENSMOV surveys we have carried out. The cost-effectiveness is structured with the general costs of the EEO scheme (such as the overall costs, investment, operational and administrative costs), impacts of prices on EEO certificates (where a market is available), distribution of costs among suppliers/distributors and end-users, qualitative data such as the types of investments and technologies installed, accompanied with any public documentation.

Bulgaria

EEO costs

SEDA does not collect information on all the investment or operational costs. We have only information that is in the energy audits. If scaled savings are used, we do not require this information from the obligated parties. The collected and kept in database information is about primary and final energy savings, CO₂ emissions savings and date of measure implementation. There are no data on the investment costs summarized or subject of data collection.

The only analysis we have made is about the average investment cost for energy savings measures in buildings and industry, but this analysis is overall, not only for the EEOS. The only data available on the costs of the most common measures in industry and buildings are from the SEDA's energy audits database and the National Energy Efficiency and RES Fund database. According to these data, the investment needed for energy savings are (on average): 1016 BGN (519€)/saved MWh in Buildings, and 580 BGN (297€)/saved MWh in Industry.

Administration cost of the EEOS is part of the SEDA's annual budget as a government institution. There is no special budget dedicated only for EEOS' management activities.

There are no data about the administrative costs for the OPs.

For the current period of obligation 2021-2030 there are some changes planned and SEDA will (hopefully) start collecting more precise information on the actual investment costs.

We have only an overall analysis on the cost of the whole scheme, based on average investment costs for energy savings measures from the above-mentioned data bases. This analysis is based on expert calculations, it is only for internal use and is not public.

EEO certificates

There is no certificate market present in Bulgaria.

Cost distribution

There is no data on cost distribution among suppliers and end-users in Bulgaria.

Qualitative data on measures

There is no qualitative assessment on the types of measures available in Bulgaria

Relevant documentation

The most important source is the SEDA's register on the type of measures, implemented by the OPs is not public. Usually, the most common measures are those for which there are scaled savings methodologies adopted. The link to the list of the adopted and published scaled methodologies (BG only): <https://seea.government.bg/bg/metodiki/2-uncategorised/9912-specializirani-metodiki-za-ocengwane-na-energijnite-spestqwanig-utwyrdeni-ot-me>

Poland

EEO costs

The investment costs for the energy efficiency measures are not publicly reported. The information on investment costs are only described in the ex-ante and ex-post audits. The information is available to the Energy Regulatory Office (ERO) managing the scheme but is not analysed in an aggregated way and this is the same situation concerning the operational costs.

The administrative costs are not directly reported by the ERO. It was reported that in 2019 4 workers were engaged in the evaluation of the applications and issuing of certificates, which was insufficient for the effective operation of the mechanism (Supreme Audit Office, 2019).

EEO certificates

There are different types of certificates available on the market depending on their expiration date.

- The certificates granted during the old auction based system that can be used towards the obligation until 31 June 2021. They are marked on the energy exchange as PMEF.
- Transition period certificates are the certificates granted during the transition period (2016-2017) based on the mix of principles from the old and new system and are valid for the obligation only for the year they were issued in. So the transition period certificates issued in 2017 can only be used by the obligated parties for the obligation in year 2017. Since the certificates for each year of the obligation have to be presented to the ERO by the end of June next year it is possible to buy and sell those certificates by June next year than they were issued in. They are marked on the energy exchange as PMEF-XXXX, where XXXX stands for the year of the issuing.
- The certificates granted based on the principles from the new system, which do not have any expiration date and can be used for any obligation period. They are marked on the energy exchange as PMEF_F.

In case the number of the certificates available on the market is not sufficient for the obligated parties to cover their obligation, they can use the buy-out option – to pay a fixed fee per toe that was not covered with the certificates. This fee was set at 1500 PLN/toe (around 330 EUR/toe) in 2017 and is increasing 5% a year since then. The buy-out price affects the market significantly, as the price of energy certificates is usually close to the buy-out price and the buy-out option was used for a large part of the obligation in the first period of the scheme when the significant undersupply of certificates was noticed. Currently, new rules are in operation that prevent the use of the buy-out option when cheaper certificates are available on the market. The price of the certificates in Poland is still very close to the buy-out price with some fluctuations that result from other factors, such as time period towards expiration date of specific types of certificates or eligibility of certificates to fulfil the obligation in a particular obligation period.

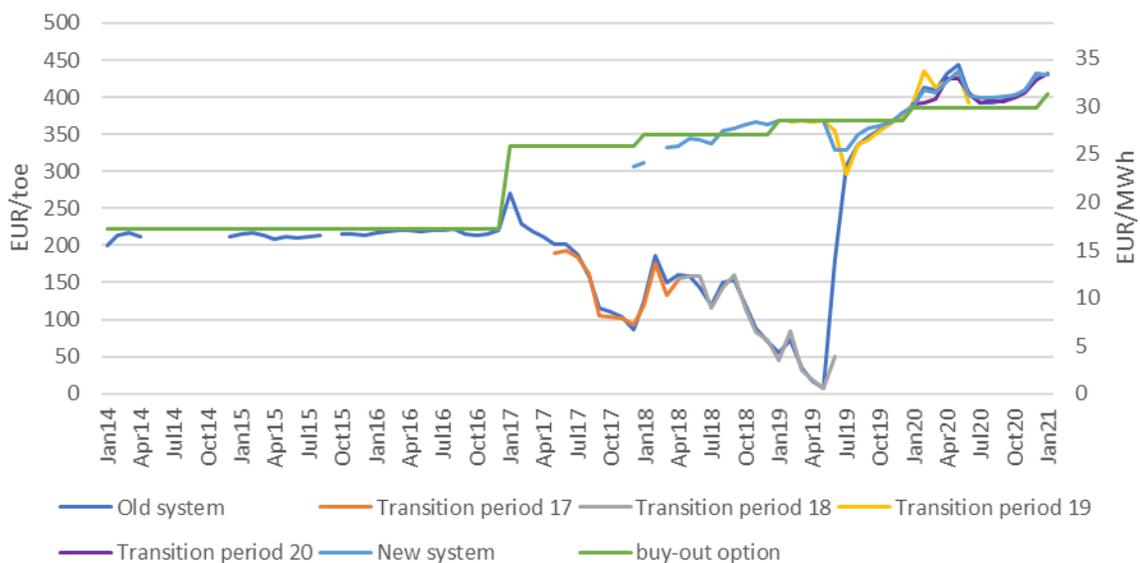


Figure 2 Market prices of White Certificates in Poland; source: recalculation from TGE

Cost distribution

The White Certificates acquisition costs are paid by the obligated parties - energy suppliers. Those can be redeemed through the tariffs. It was estimated in 2012 that the system will cause less than 1% increase of the electricity prices (URE, 2012). In 2019 the obligated parties presented 328 877,578 toe of certificates for redemption. Assuming average cost on the level of the buy out price for 2019 (1653.75 PLN/toe about 367.5 EUR/toe) the total cost of the certificates presented for redemption is estimated for 120 mln EUR.

It is estimated that the acquisition of the certificates will cost over 1.7 billion EUR over the period 2021 – 2030, which could increase to 2.5 billion EUR if the new regulations increasing the obligation will come to force.

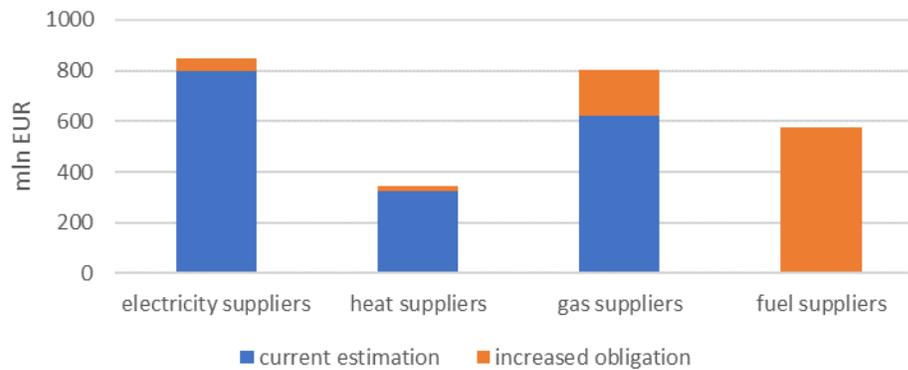


Figure 3 Estimated costs for the acquisition of white certificates in Poland for different types of obligated parties over the 2021-2030 period; source: recalculation from impact assessment for the draft of the Energy Efficiency Act

Qualitative data on measures

Initially in the old systems in the auctions WCs were separated into 3 categories of measures:

- Energy savings for end users
- Energy savings for the power companies own use
- Decreasing the losses in energy transmission and distribution

This categorisation was no longer in place after the changes in Energy efficiency Act in 2016. Short information on all projects that were granted WCs is presented on EROs website. Base on the description provided an indicative categorisation was made by KAPE. The primary energy savings from projects that were granted WC until may 2019 per category are shown in the Figure 4.

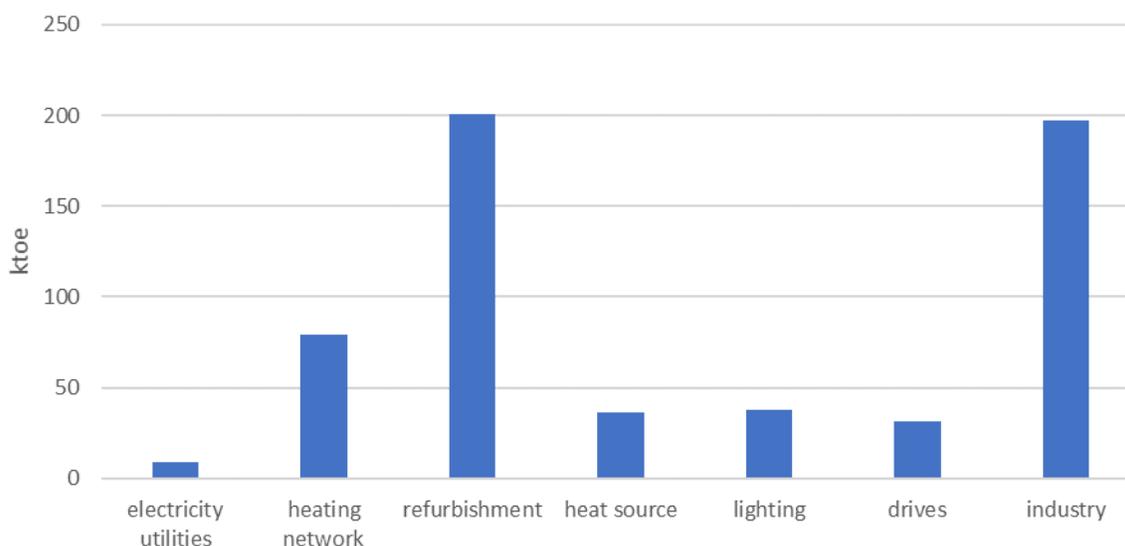


Figure 4 Primary energy savings from projects that were granted WC (2013 - May 2019) per category of measure

In 2018 and until May 2019 over 50% of the primary energy savings were achieved in the industrial processes.

Relevant documentation

<https://bip.ure.gov.pl/bip/form/3,Efektywnosc-Energetyczna.html?sort=2&pid=6>

<https://www.ure.gov.pl/pl/urzed/media/ure-w-mediach/4982,Wplyw-bialych-certyfikatow-na-ceny-pradu-niewielki.html>

<https://tge.pl/dane-statystyczne>

<https://www.nik.gov.pl/kontrol/P/18/021/LWA/>

<https://legislacja.rcl.gov.pl/projekt/12337302/katalog/12710930#12710930>

France

EEO costs

In France, the obligation scheme of white certificates represents a total investment cost of nearly 3-4Mrd € for obligated parties.

In 2019, production cost was between 7,20€/MWh cumac and 9,20 €/MWh cumac. With almost twice as much obligation volume in 2018-2020 than in 2015-2017, the offset widens between white certificates demand and production capacity, thus rising production costs.

The price of one certificate is made of the production cost, the premium paid to final consumer and the different margins (obligated parties, intermediary etc...).

EEO certificates

For **France**, the buy-out price is fixed and has only been changed once since the beginning of the EEOs operation. Thus, the buy-out price depends on the quantity of white certificates produced and available. In mid-2019, the price was just below 7 EUR/MWh of yearly energy savings as shown in Figure 5 and at 8 EUR/MWh of yearly energy savings for “fuel poverty”. Overall, this price has been almost continuously rising since 2008 as shown in Figure 5, as each objective set for a period was higher than the previous one. Especially after 2017, a remarkable rise in the French White Certificate programme is observed, partly because of the 2018-2021 programme phase, which is notably more ambitious than the previous ones.



Figure 5 Evolution of the weighted average buy-out price of white certificates in France (source: ATEE)

Changes in EEOs rules, lack of new deposits, additional control, or the ending of an incentive measure can explain the erratic trend of the French buy-out price. The drop between 2013 and 2016 was mainly due to an incentive bonus on white certificates. The rise that followed from 2017 until mid-2019 was partly due to the lack of visibility between the transition from one period to another.

As the support levels necessary to trigger the action can be different between sectors, or groups of energy efficiency measures, different levels of buy-out options could be set for each. This mechanism will boost cost efficiency if the obligation is split between sectors as well. That way, cost effectiveness could be increased as the amount of support for projects would not only be regulated through the market (approaching a similar average level for all measures) but also reflect the actual difference in societal costs (or investment costs) of the measures. Such mechanisms are in place in Ireland, where there are different buy-out prices for the non-residential sector, the residential sector, and consumers affected by energy poverty. Other regulations can also

achieve similar results, e.g. in France, certificates delivered from low-income households will receive an uplift by a factor of 3 making the measures targeting those households more attractive.



Figure 6 Evolution of weighted average price in France

In comparison, the penalty cost if the obligation is not fulfilled is set at 15€/MWh cumac. The price difference between direct production and certificate bought on the market is around 10-15%.

Cost distribution

Obligated parties pass on the production cost onto energy prices and solely on customers which sales volumes are subject to obligation (i.e. Households, services and transport). The impact is estimated to be:

- 5,80 c€ TTC per litre of fuel;
- 0,67 c€ TTC per kWh of electricity;
- 0,40 c€ TTC per kWh of gas.

Overall it represents 100 to 150€/year per households so between 3 and 4% of total French households' energy expenditure.

Regarding the 3rd period (2015-2017), it has been shown the following distribution per € paid by households:

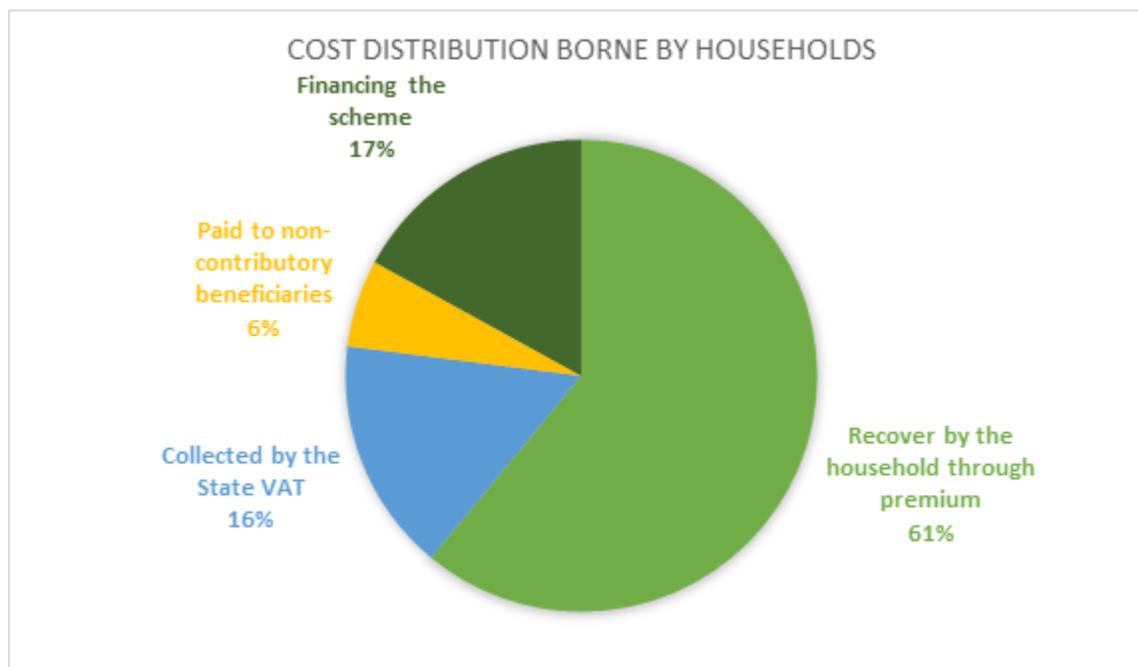


Figure 7 Cost distribution for households

Qualitative data on measures

To adjust the production of certificates towards energy poverty, some bonus actions have been implemented on several operations. These zero-cost operations had an impact on certificates production as well as on their production costs. The bonus focusing on a few standardized operations increased competition between actors. For instance, the cost of the massive communication needed in order to attract customers can be estimated at 0,5 to 1,5 €/MWh cumac (7-15%).

Relevant documentation (links)

[Evaluation du dispositif des CEE](#), ADEME, 2020

[Online National register of white certificates](#), EMMY

Croatia

EEO costs

The information regarding the costs for EEOS in Croatia – whether these are costs from the perspective of the supplier or the Ministry – are not yet publicly available.

Since the EEOS is still in its early stage in Croatia, as it is implemented from 2019 onwards, there is still some sensitivity regarding cost transparency and availability. We can only roughly deduce that the administrative costs are covered by one person within the Ministry responsible for EEOS administration and monitoring.

However, we are expecting that through analysis of achievements from both EEOS and alternative measures in the period 2014-2020 will be performed for the purpose of Report on 2020 targets as required by art 27. of Regulation on Governance of Energy union (due on 30 April 2022) and that this analysis will not only provide energy savings but also costs of implemented measures. We hope we can use this data for the final report before ENSMOV concludes next year.

EEO certificates

As of now, there are no certificate markets in Croatia.

Qualitative data on measures

The types of investments include eco-driving, energy audits, heat pumps, air conditioning, efficient housing appliances, cooling, heating, office equipment, solar thermal heating, photovoltaics, electric motors, integral renovation of buildings, thermal insulation of envelope, investments in industry, advanced metering system. Obligated parties have also reported some measures in energy production/transformation such as energy efficient transformers or use of waste heat, measures in district heating systems etc.

Greece

EEO costs

No information is available about the overall cost of the Energy Efficiency Obligation Scheme (EEOS) in Greece for the period 2017-2020.

Nevertheless, it is considered that the triggered cost is slightly lower than the specified compliance cost. It should be noted that the compliance cost was set at 500 thousand €/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 is 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:

- I. 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.

- II. 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.
- III. 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 the following table for all the categories of energy efficiency measures:

Table 1 Energy efficiency measures compliance costs

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%

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 2017-2018 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 the reference years 2017 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 no significant changes are expected to the mixture of the implemented energy efficiency measure for the whole period of the EEOS (2017-2020). Consequently, it can be considered that the actual implementation cost of the energy efficiency measures within the framework of the EEOS is slightly lower than the defined compliance cost.

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 authorization to the responsible authority to achieve equivalent final energy savings to the designated energy efficiency target with the identical implementation cost.

Generally, two man-years are required on annual basis in order to cover the administrative burden of the administrator for the calculation, monitoring, control and verification of the delivered energy saving within the EEOS.

EEO certificates

No certificate market has been established in Greece.

Cost distribution

No information about the cost for the fulfilment of the energy efficiency target has been collected.

No recovery mechanism is foreseen, while the obligated parties have the capability to pass the costs to their customers.

No impacts on energy prices have been observed.

Qualitative data on measures

Information about the implemented energy efficiency measures in the period 2017-2018 of the EEOS is presented in the first section of the memo.

Relevant documentation

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UK

EEO costs

BEIS receives quarterly summary information from all obligated energy companies on their costs associated with delivering ECO. Delivery costs are defined as the cost of installing an ECO measure in a property. This includes the costs of technical monitoring, cost of assessment, costs involved with searching for ECO properties, installation costs and marketing costs by delivery partners involved with promoting

the ECO obligations. These costs should include Value Added Tax (VAT) when it is not applicable for suppliers to claim this back from HMRC.

These costs should not include those ordinarily associated with Green Deal (e.g., insurance-backed guarantees). Some costs may be estimated prior to the measure being fully installed or incurred prior to when the carbon or cost savings are reported. The aggregate delivery costs are historic costs and future costs may go up or down depending on a range of factors.

Table 2 Estimated ECO3 delivery costs, by obligation, and administrative costs as reported by energy suppliers, by quarter, up to end September 2020

Obligation	Oct - Dec 2018	Jan - Mar 2019	Apr - Jun 2019	Jul - Sep 2019	Oct - Dec 2019	Jan - Mar 2020	Apr - Jun 2020	Jul - Sep 2020	Total ECO3 costs
Total delivery costs (Affordable Warmth)	£24.6m	£59.0m	£74.1m	£103.7m	£139.1m	£110.1m	£79.5m	£164.5m	£754.6m
of which Broken heating systems replacement (in the 35,000 equivalent cap)	£7.3m	£15.5m	£11.9m	£12.8m	£15.4m	£11.5m	£9.8m	£17.6m	£101.9m
of which Secondary heating systems delivered alongside primary insulation measures	£0.2m	£2.4m	£14.6m	£35.0m	£58.5m	£19.8m	£16.9m	£28.0m	£175.3m
of which Solid Wall Insulation measures	£3.8m	£9.8m	£11.7m	£11.1m	£9.6m	£11.1m	£6.4m	£13.7m	£77.1m
of which Solid Wall Insulation equivalent measures	£0.2m	£1.0m	£1.3m	£4.2m	£4.5m	£6.2m	£2.4m	£4.6m	£24.4m
of which 'Other'	£13.1m	£30.3m	£34.7m	£40.4m	£51.2m	£61.5m	£44.0m	£100.7m	£375.9m
Administrative costs^{1,3}	£11.4m	£8.9m	£8.8m	£8.7m	£9.5m	£8.3m	£7.8m	£7.4m	£70.7m
Total delivery and administrative costs²	£36.0m	£67.9m	£82.9m	£112.4m	£148.6m	£118.4m	£87.3m	£171.9m	£825.3m

¹ Administrative cost are only available as an overall figure per quarter.

² Total estimated ECO delivery and administrative costs include cost revisions submitted from some energy companies.

³ ECO3 Oct - Dec 2018 additionally includes any set up administrative costs for Jul - Sep 2018.

EEO certificates

Trading obligations between obligated parties is possible, but a set of required criteria need to be met. The trading process is administered by the managing authority and decisions are made on a case by case basis (Ofgem, 2019a).

Cost distribution

The Impact assessment carried out by BEIS, the responsible authority, estimated that ECO3 would have a **positive value to society of £722 million**. It is estimated that ECO will deliver 1.2 million measures, installed in approximately 1.2m households (BEIS, 2018).

Qualitative data on measures

The focus of ECO3 is on the promotion of measures to low-income, energy poor and vulnerable consumers. To support the reduction of heating cost in the residential sector, ECO3 will support insulation and heating measures. The managing authority has issued a list of qualifying measures (Ofgem, 2019b).

Relevant documentation

BEIS (2018). The Electricity and Gas (Energy Company Obligation) [Order 2018 No. 1183](#).

Ofgem (2019a). Energy Company Obligation (ECO3) [Guidance: Supplier Administration v1.1](#).

Ofgem (2019b). Energy Company Obligation (ECO3) [Guidance: Delivery Version 1.2](#).

Austria

EEO costs

In Austria, the implementation of Article 7 EED is based on a mixture between an obligation for energy suppliers and alternative strategic measures. The gathering of data regarding costs for the Austrian scheme was/is not intended. No studies or analysis have been performed in order to analyse overall cost, investment costs, operational costs, administrative costs. Public administration costs are about €800,000/year only for Art. 7 of the EED based on Annual report 2019 according to Article 24 (1) EED 2012/27/EU, evaluating the 2017-2019 period.

The OPs have to report the achieved energy savings by means of an IT-application called “*Anwendung zum EEffG*”. All public and private companies can get an energy savings account, and can transfer their energy savings to OPs through civil contracts (no trading/market). Companies with no obligation are allowed to bank implemented energy savings until the 14th of February of the subsequent year in order to be able to transfer them to OPs within the period from 2015 to 2020.

Instead of proving the implementation of energy efficiency actions, OPs may fulfil their obligation by carrying out energy efficiency actions for the respective year by a tender for the appropriate energy saving.

OPs can also use the “pay to save” option which means paying a compensation fee (0.2€/kWh of first-year energy savings).

If the OPs over-achieve their obligation in one year they are allowed to transfer the respective excess savings to following years of the obligation period (2015-2020). In the case of not achieving the obligation of a given year they have the possibility to buy new energy efficiency actions from the same year on the market or they have to pay of the above mentioned compensation fee of 0.2 €/kWh.

If an OP does not comply with the regulations of the Austrian energy efficiency act the extent of the administrative penalty can be up to 100,000 €.

The buy-out price was determined in 2015 and has not changed since then. It was intentionally quite high to encourage obligated parties to carry out energy efficiency actions by themselves or to gather them from other parties. The funds collected through obligated parties paying the buy-out price, as well as those settled by public authorities, would have been used to execute energy efficiency actions, but the assumption was that the former are able to carry out energy efficiency actions more efficiently than the ministry. In comparison, the cost for the obligated parties decreased in time from 560 EUR/toe to 230 EUR/toe (48 EUR/MWh to 20 EUR/MWh). This happened mostly due to the oversupply of energy savings. As the buy-out price is much higher for the obligated party than carrying out energy efficiency actions or gathering energy efficiency actions from other parties, this option is rarely used. The final costs for the obligated parties are more influenced by the market for energy savings than by the buy-out price.

EEO certificates

There is no certificate market in the Austrian EEO scheme

Cost distribution

The owner of the energy savings is usually the final customer. The OP has to document his role in the context of the carried-out energy efficiency action and has to provide in most cases a document signed by the final customer that transfers the ownership of the energy savings to the OP.

If the OPs over-achieve their obligation in one year they are allowed to transfer the respective excess savings to following years of the obligation period (2015-2020).

No data is available regarding the specific costs for OPs.

Qualitative data on measures

All actions for which final energy savings can be demonstrated (except oil boilers in households) in all end-use sectors are eligible, if they exceed certain energy performance requirements, and if they are not funded by national public subsidies. For actions carried out in households affected by energy poverty, the resulting end-use energy savings are multiplied by the factor 1.5.

The energy savings of energy efficiency actions can be calculated either with standardised or individual methods.

42 categories and more than 250 standardised methods (formula + deemed savings) are available. In addition a guideline for the calculation of energy savings for individual actions is available.

Between 2014 and 2017 76% of all reported measures were evaluated using standardised methods. 24% of the reported energy efficiency measures were documented by using individual methods.

Ireland

EEO costs

The average cost per kWh saved of the EEOS was €4.4cts per kWh in 2015 and €5.6cts per kWh in 2016. The costs per kWh saved over the lifetimes of the measures will be much lower, given that the targets are specified in terms of first year savings.

EEO certificates

In any given year OPs must meet a minimum of 95% of their target in any given sector. If this is not achieved, OPs may buy out by contributing to the fund for up to 30% of their target or sub-target. For any remaining underperformance, penalties are then applied at a rate of 1.25 times the buy-out price, which is set at the cost to the State to achieve these savings; the buy-out price varies by sector (6cts/kWh in the non-residential sector, 20.4 cts in the residential sector and 88 cts in the energy poverty sector). Banking and borrowing does not apply.

Cost distribution

OPs can choose to achieve some or all of their targets by working in partnership with existing government grant schemes, providing up to 30% of the funding towards residential measures and up to 95% for homes in energy poverty.

Qualitative data on measures

A relatively high proportion of measures was delivered in the non-residential sector in 2017-2018, however, over the period since 2014, all the three sub-targets are being met. Annual targets are additive in that, in any given year, OPs must meet the sum of all annual targets from 2014 until the year in question.

The top non-residential measures by savings in (2014-15 and 2017):

- Processes (24% and 33%)
- Lighting (24% and 37%)
- Heating (24% and 22%)
- Ventilation/AC (5% and 2%)
- Transport (4% and 7%)

Thermal savings (see chart to left) are around 50:50 oil and gas.

The top residential measures in (2014-15; 2017 and 2018):

- Boilers (47%, 33% and 24%)
- Heating controls (10%, 25% and 43%)
- Wall insulation (22%, 12% and 10%)

Wall and attic insulation are the top energy poverty measures.

Italy

EEO costs

The cost of the scheme can be calculated as the product of the cancelled certificates and the tariff reimbursement component. The costs incurred by GSE for information, evaluation, and control has been around 14 million euros in 2016, according to GSE' fiscal documents.

The costs incurred by GSE for information, evaluation, and control has been around 14 million Euros in 2016. Recent years are not available. No comprehensive information is available on the investments made to implement the energy efficiency projects, even if in the recent years such data have been requested for all projects.

EEO certificates

The exchange of white certificates between obliged and voluntary parties takes place on a dedicated platform managed by the GME (public company owned by GSE in charge of the Italian power exchange IPEX and of environmental and energy efficiency markets, i.e. emission trading, green and white certificates), either as a spot market exchange, or as a bilateral agreement between parties.

Penalties are provided in case a DSO does not meet its target. The amount depends on the severity of the default and on the effort to recover it. Figures show the trend of WhC price in the spot market exchange and in the bilateral one:

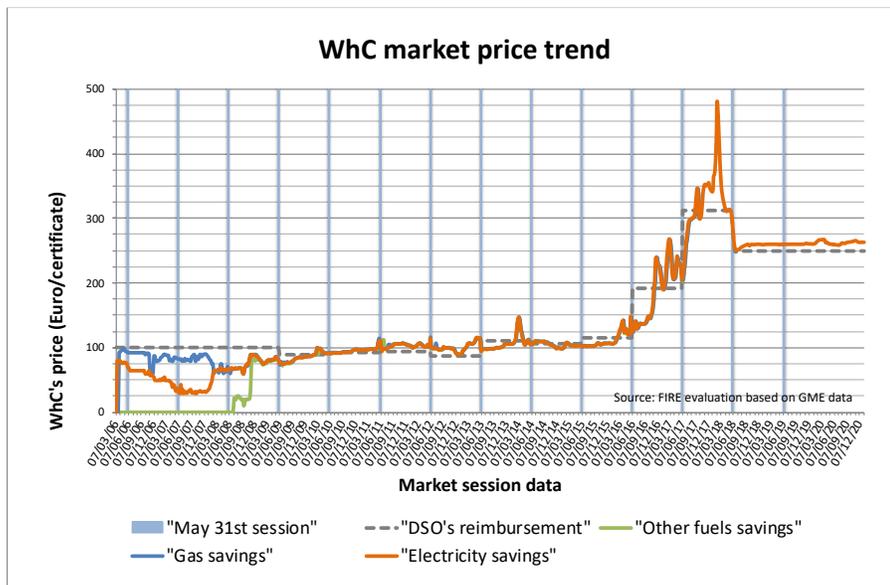


Figure 8 White certificates price trend

Four phases can be highlighted:

- o first phase of oversupply (WhC price ≈30-80 euro)

- o 2008-2014 slight undersupply phase (WhC price ≈90-110 euro)
- o 2015-2016 insufficient supply due to restrictions of eligible projects and more stringent rules (WhC price ≈110-240 euro)
- o 2017-2018 issues with frauds (WhC price ≈260-480 euro)

Starting from 2016 until 2018, the WhC market was characterised by a continuous rise in prices, which together with the tendency of obligated parties to fulfil their obligation by purchasing WhC on the market resulted in an increased impact on energy prices. One factor behind the rise in prices has been the expected increase in programme cost per (reported) energy saving, resulting from the improvement of M&V systems in the context of the Article 7 EED requirements. A revision of the rules was made in 2017 to minimise the impact on energy prices. The proposed changes aimed at modifying the methods of defining the tariff contribution without distorting what was in force. This decision was made to avoid too sudden changes in prices on the market. The mechanism to calculate the reference price from the market used to define the fee was changed. Only prices of certificates that fit in the interval of 12% less and 12% more than the reference price from the previous market session were used to set the new reference price. This was intended to decrease the price fluctuation on the market. However, undersupply of the WhCs on the market caused the continuation of price increase.

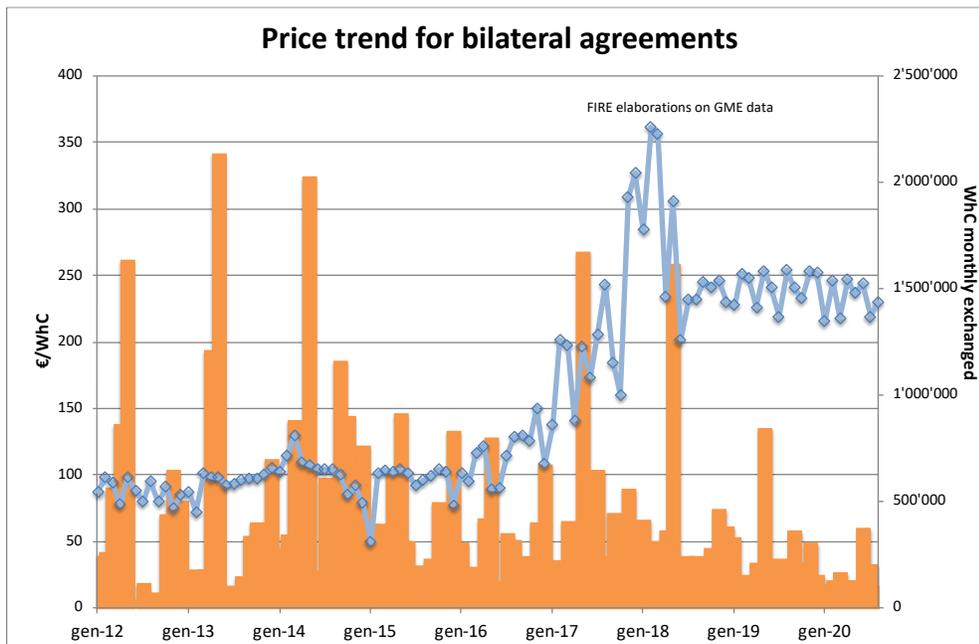


Figure 9 Bilateral agreements price trends

Cost distribution

The **Italian White Certificate** (WhC) scheme exploits financing through final consumers to cover the costs for the obligated parties. For this purpose, a regulated fixed fee included in the energy bill (electricity, natural gas, etc.) is used instead of direct reimbursement calculated by the obligated parties.

This mechanism has gone over a few changes to balance better the impact on energy prices for final consumers, increasing cost effectiveness and enabling obligated parties to recover significant part of their costs.

The cost of the scheme can be calculated as the product of the cancelled certificates and the tariff reimbursement component. The cancellation request consists in the obliged distributor asking GSE to use a certain number of owned certificates to achieve its target (totally or partially). Such certificates are then “cancelled” from the distributor’s GME registry, avoiding the possibility to trade or use them a second time.

Most of the costs incurred by the obliged distributors are recovered through a reimbursement covered by tariff components on electricity and natural gas bills. Every end-user thus contributes to the cost-recovery mechanism. Obligated DSOs obtain the reimbursement when they present certificates to GSE according to their specific targets. The reimbursement is set by ARERA and is linked both to the WhC spot market price in the previous year and to the bilateral trading average price. In 2018 a cap has been posed on the value of this tariff reimbursement, equal to 250 euro/cert.

More changes were introduced in the last months to incentivise obligated parties to minimise their costs. Those include the so-called *profit-sharing* principle, which encourages obligated parties to reduce the market price of the WhC, sharing with the consumers the benefits derived from a reduction in prices (in terms of lower system cost). This effect is achieved through a multiplicative ratio “ δ ” that increases the reimbursement for obligated parties for every WhC purchased to fulfil the obligation with a cost below the maximum cap. The lower the price of the WhC is on the market, the higher the “ δ ” ratio. This mechanism was only proposed as a future change, which is why the effects are difficult to evaluate.

Overall, the Italian example shows that the cost reimbursement mechanism based on the market costs as a reference is very sensitive towards changes on the market. The changes such as undersupply on the market can lead to a significant increase of costs for the final consumers. A set of protective measures with a similar aim as the previously mentioned setting of the intervals of 12% less and 12% more than the reference price from the previous market session in Italy should be incorporated to protect the final consumers and incentivise stakeholders taking part in the mechanism to decrease costs. Some changes in regulations could be introduced in a periodic manner to avoid disrupting the market. The impact of those modifications should be carefully monitored.

Qualitative data on measures

While some EEO and white certificate schemes deal mainly with the building sector; Italian WhC scheme has taken over time a different road. The first one (2005-2011) was dominated by projects related to the building and service sectors (easiness to propose projects in those sectors thanks to the larger availability of standard projects files). In the second phase (2012-2017) the industrial sector took the leadership, delivering most of the certificates. In industry, most of the savings comes from improvements in the manufacturing process.

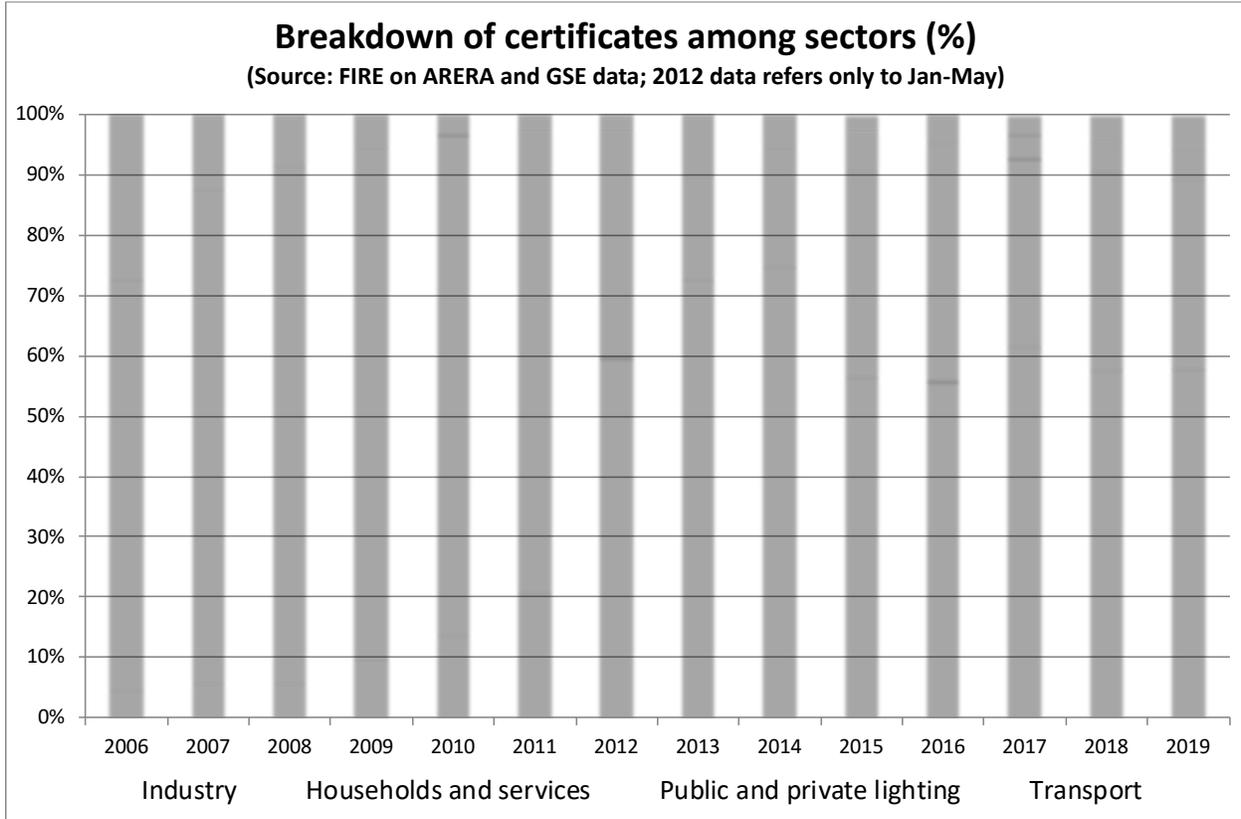


Figure 10 Certificates among sectors

Reduction of requests of certification in the last three years due to the evolution of the additionality requirements, the detection of large frauds and the increasing stringency of M&V rules.

Monitoring plan projects (MPPs) have a more stable trend, apart from the peak at the end of 2017 justified by the last opportunity to use the *tau* coefficient.

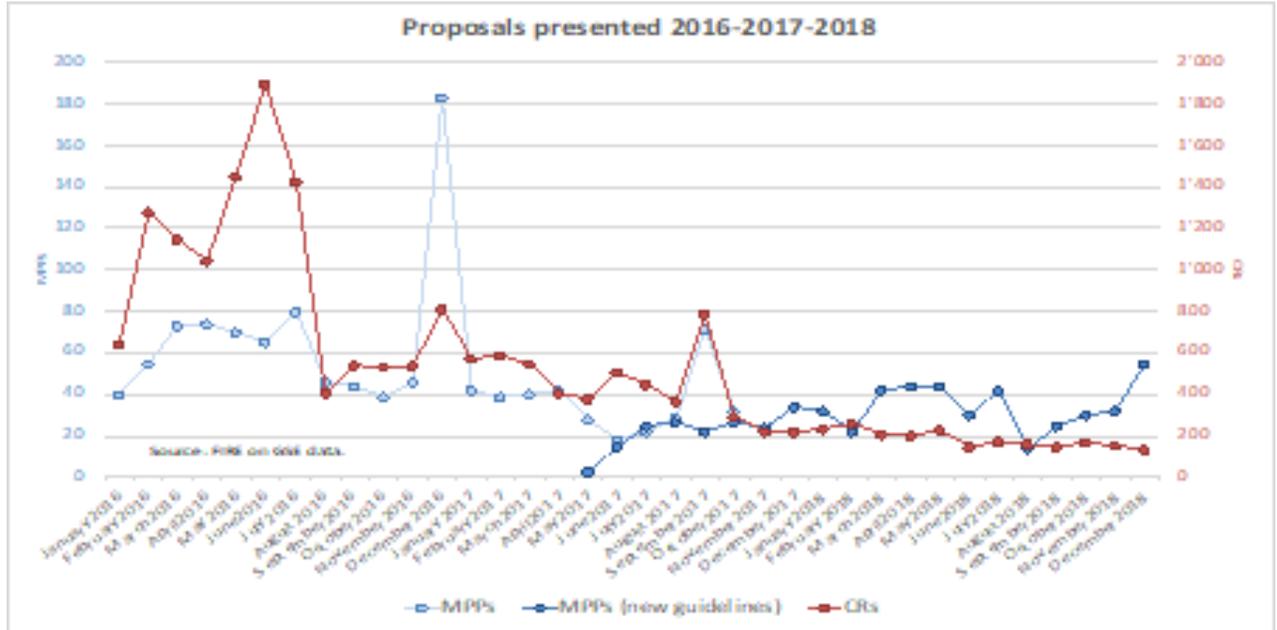


Figure 11 Proposals presented

Relevant documentation

https://www.gse.it/documenti_site/Documenti%20GSE/Rapporti%20Certificati%20Bianchi/Rapporto%20Annuale%202020.pdf

https://www.gse.it/documenti_site/Documenti%20GSE/Rapporti%20delle%20attività/RA2019.pdf

https://www.eceee.org/library/conference_proceedings/eceee_Industrial_Summer_Study/2016/1-policies-and-programmes/white-certificates-as-a-tool-to-promote-energy-efficiency-in-industry/

Slovenia

EEO costs

There are no publicly available data on costs incurred by the obliged parties. There are no publicly available data about administration costs for operating the EEOs.

EEO certificates

The scheme does not include a trading market. But OPs may fulfil their obligations by making a payment to the Eco Fund (fee equal to the average costs per kWh saved as observed for Eco Fund programmes). OPs may also have agreements to transfer projects between them or from ESCOs, before reporting to the Energy Agency.

Cost distribution

No information available

Qualitative data on measures

About 30 standardised actions (with deemed savings) cover all end-use sectors. Other actions can be reported through energy audits. Actions improving the efficiency of district heating, cogeneration and cooling installations are also eligible.

OPs made most of the savings in the industry. These savings are demonstrated by performing an energy audit. Lower savings were made in service sector, both private and public. However, in the public sector in 2018 significant progress in terms of savings has been made, mainly due to the involvement of OPs in public-private partnerships for the renovation of public buildings. Due to the implementation of many cogeneration projects in 2018, the savings in the energy transformation, transmission and distribution have also significantly increased.

Relevant documentation

Report on the energy sector in Slovenia –2018: <https://www.agencija.si/documents/10926/38704/Poro%C4%8Dilo-o-stanju-v-energetiki-2018/f0ee7a7a-3b8d-48b3-8a29-8cdc258d2e69>

Spain

EEO costs

The Ministry for the Ecological Transition set the general principles and targets of the scheme. The Ministry has also established the Energy Efficiency National Fund (EENF). The total contribution to the EENF amounted to 103 M€ in 2014 and then 207 M€ each year over 2015-2019 (i.e. about 1100 M€ in total so far).

The Obligated Parties (OPs) are the suppliers of electricity and natural gas, and wholesale retailers of oil products and LPG. They have to report each year about their energy sales to all their final customers the previous year, and then to pay in the year “n” in proportion to their energy sales in the year “n-2”.

The contribution fee has been set to 0.79 M€/ktoe (68€/MWh), taking into account the estimated average costs to achieve energy savings from the activities of the Energy Efficiency National Fund (EENF).

EEO certificates

There is no certificate market

Cost distribution

Fees are proportional to the energy sales (in energy unit). The largest OPs are multi-energies.

8 OPs paid an annual fee of more than 5 M€ in 2019, amounting to 137.7 M€ altogether (68% of the fees paid by all OPs in 2019).

Qualitative data on measures

The EENF implements programmes in all sectors. About 48% of the funding has been dedicated to programmes in industry, 36% for buildings, 10% for street lighting, 2.7% for cities, 1.7% for information, 0.46% for desalination plants and 0.7% for transports

Relevant documentation

Ministerial Order for 2019 : <https://www.boe.es/boe/dias/2019/03/26/pdfs/BOE-A-2019-4358.pdf>

Luxembourg

EEO costs

No information on the overall EEO system costs

EEO certificates

No trading is included, but **bilateral transfers** of energy savings certificates may be possible between obligated parties. Energy savings projects can be led by third parties (installers, energy advisors, etc.), but they have to be directly subcontracted by the obligated parties (through call for projects, bilateral contracts or simple negotiations).

Penalties may be applied in case of non-achievement of the target, but the penalties are **not in full discharge** (the missing energy savings have to be achieved the next year).

Cost distribution

The obligated parties may undertake measures in all sectors (including transport) and involving all types of energy in order to achieve energy savings with the best cost-benefit ratio.

The additional costs borne by obligated parties from making energy savings may be passed on to the final consumers, thus leading to an increase in electricity and gas prices. In order to avoid distortion of competition, a tax may be imposed on energy sources such as fuel oil, as the fuel oil suppliers are not included in the obligation scheme.

The obligation is defined as a mission of public service. This allows the scheme to be partly funded by the State budget.

Qualitative data on measures

Actions are eligible in **all end-use sectors** to save **all types of energy**. A catalogue of **40 standardised actions** (including deemed savings) has been prepared. A calculation methodology is available for other types of actions. Behavioural actions may be eligible under conditions.

The results are counted in **1st-year final energy savings**, taking into account that the actions have to deliver savings in 2020. In 2015, in number of measures, most of them were realised in buildings. But in terms of energy savings, half were achieved in the residential/commercial sector and half in the industry sector.

Latvia

EEO costs

Obligated party may choose to make a contribution to the State Energy Efficiency Fund according to the amount of its obligation. The contribution is fixed at 70 EUR/MWh. For the OP not achieving at least 80% of their target the payment is mandatory and covers 1,5 times the amount of energy savings not achieved.

Costs of the start period (2014-2017) cannot be recovered.

EEO certificates

Trading of energy savings was not predicted for the EEOS in Latvia.

Cost distribution

The costs incurred by the responsible party for energy efficiency Improvement activities at the end user and contribution country the energy efficiency fund can be recovered by including it in the energy charge. In its turn, the costs of information measures are considered as the economic activity costs of the obliged party.

The obligated party shall indicate on its website the costs incurred by the obligated party in the previous calendar year for energy efficiency improvement measures at the end user, as well as how these costs have been recovered and shared between households and other end users.