How is article 7 of the Energy Efficiency Directive being implemented? An analysis of national energy efficiency obligation schemes

Paolo Bertoldi & Luca Castellazzi
European Commission
DG Joint Research Centre
Italy
paolo.bertoldi@ec.europa.eu
luca.castellazzi@ec.europa.eu

Vlasis Oikonomou
Joint Implementation Network
The Netherlands
vlasis@jiqweb.org

Tina Fawcett
ECI, University of Oxford
UK
tina.fawcett@eci.ox.ac.uk

Niki Artemis Spyridaki
UPRC, University of Piraeus
Greece
nartemis@unipi.gr

Nele Renders & Ils Moorkens
VITO
Belgium
nele.renders@vito.be
ils.moorkens@vito.be

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Abstract

The Energy Efficiency Directive (EED) is the main policy instrument at the EU level to reach the 20 % energy saving goal in 2020. Article 7 is a key pillar of the EED, which requires Member States (MS) to introduce energy efficiency obligation schemes (EEOSs). Under the EEOS, energy companies must save an annual 1.5 % of their energy sales with additional energy efficiency projects. This Article also offers MS the option to introduce alternative policy measures to EEOS, provided that these measures deliver equivalent energy savings.

In December 2013, MS reported to the European Commission the implementation plans for Article 7 and they have or are planning to introduce EEOS and/or alternative measures to reach the 1.5 % energy saving goal. Four MS are planning to rely on EEOS alone, 14 will use a mixture of EEOS plus alternative measures, and 10 MS will use only alternative measures. The paper describes the EEOS introduced and planned by MSs in terms of sectoral coverage, obligated actors, eligible projects, monitoring and verification (M&V), baseline and additionality, sanctions, trading rules if any, and public authorities' role. A comparison among the different national EEOS is made, and their common features highlighted. Key issues including the time scale needed to introduce an effective EEOS, type and number of obligated partners, changing business models of energy companies and scale of expenditure are discussed.

EEOS are expected to deliver more savings, in more countries, at the same time as the opportunities to install low cost, mass-market, 'additional' efficiency options are reducing. This challenge will affect all MS, and to meet it they are encouraged to keep learning from each other.

Introduction

The 20 % energy saving target for 2020 was first introduced by the European Commission (EC) in its Green Paper on "Energy Efficiency or Doing More With Less" of 2005 (European Commission 2005), where it was indicated that this was the cost-effective potential supported by several studies. The 2006 Action Plan (European Commission 2006) proposed a set of energy efficiency policies at EU level to reach the 20 % energy saving target by 2020.

The Energy End-use Efficiency and Energy Services Directive 2006/32/EC (ESD) (EU 2006) introduced the indicative energy saving target of 9 % by 2016. Each MS had to adopt an indicative target for end-use efficiency of at least 9 %. This target has been set and calculated in accordance with the method set out in Annex I to the Directive, i.e. it is based on the average final energy consumption of five past years (2001–2005). The target excludes some end-use sectors, such as the industry sector under ETS. A number of MSs introduced targets for 2016 higher than 9 %. It is important to notice that this is a target for final end-use that is expressed in final energy normally, but that could also be expressed in primary energy using a fixed national conversion factor (the European Commission recommended using a factor of 2.5). The target does not include efficiency improvements in the energy supply (e.g. generation), although some renewable energy sources and cogeneration where included.

Another very important measure introduced by the ESD is the National Energy Efficiency Action Plans (NEEAPs). NEEAPs

were introduced as a way to present how a MS was introducing (or relying on existing) new policies and programme to reach the 9 % ESD energy saving target. At the time of the ESD adoption only a few MSs had the experience to prepare and adopt NEEAPs. Three NEEAPs were foreseen by the ESD, one in 2008, one in 2011 and a final one in 2014. The NEEAP[1] should be a strategic document showing a coherent set of policies and measures needed in a specific MS to reach the 9 % target (see also discussion in the next section). In addition, the second and third NEEAP should include the calculation of the energy savings achieved in the past three years (and including early actions when these are allowed).

In March 2007, the EU leaders committed themselves to transform Europe in a highly energy-efficient, low carbon economy and agreed on the so-called "20-20-20" targets. This includes three key objectives for 2020:

- a 20% reduction in EU greenhouse gas emissions from 1990 levels[2];
- raising the share of EU energy consumption produced from renewable resources to 20 %;
- an improvement in the EU's energy efficiency to achieve a 20 % savings on the EU primary energy consumption (The Conclusions of the European Council of 8 and 9 March 2007).

The targets were set by, and were enacted through, the Climate and Energy Package in 2009. The Climate and Energy Package is a set of binding legislations which aim to ensure that the European Union meets its ambitious climate and energy targets for 2020.

In order to meet the EU 2020 target and given the somewhat slow progress by MSs in implementing energy efficiency policies to meet the 202 target, the Commission proposed on 22 June 2011, a new Directive to step up MSs efforts to use energy more efficiently in all sectors including the energy production, transformation and distribution to final consumers. The Energy Efficiency Directive (EED) (EU 2012) was adopted in December 2012. The EED contains several measures, such as: legal obligations to establish energy saving schemes in MSs, public sector to lead by example, energy audits, energy services, efficient CHP, energy efficiency funds, metering, consumer behaviour, etc.

One of the key articles of the EED is Article 7, introducing Energy Efficiency Obligation Schemes (EEOS). Article 7 of the EED requires MSs to achieve a certain quantity of final energy savings in end-use sectors. This is to be an important element contributing to achieving the overarching 20 % target.

Article 7 of the EED requires MSs to establish Energy Efficiency Obligation schemes (EEOs) mandating energy retail energy sales companies or distributors to reach energy savings targets or use alternative policy measures to deliver a targeted amount of energy savings amongst final energy consumers. The energy savings to be achieved by EEOs must be at least equivalent to achieving new savings each year from 1 January 2014 to 31 December 2020 of 1.5 % of the annual energy sales to final consumers of all energy distributors or all retail energy sales companies by volume averaged over the previous three consecutive years where data is available (baseline).

The EED required the MSs to submit plans for EEOs and/or equivalent alternative measures by 5 December 2013. The reports from the MSs have been published on the DG ENER website.[3]

MSs are allowed to exclude all sales from transport from the baseline, and all but Sweden did so. Furthermore, countries are allowed to use exemptions up to reduce their target by a maximum of 25 %. The 25 % exemptions include 4 specific elements:

1. progressive phase-in of the target;
2. exclusion of energy sales in the ETS sector;
3. energy savings from early actions[4];
4. energy savings achieved in the energy transformation, distribution and transmission sectors implemented under Articles 14 and 15 of the EED.

As an alternative to setting up an EEOS, MS may opt to take other policy measures to achieve the same savings among final customers. Also, a combination of EEOs and other policy measures is possible; this is in fact the solution chosen by the majority of MSs. This present paper focusses only on the EEOs introduced by MSs and not on the alternative measures.

The authors analysed the MSs Communications related to the implementation of EED Article 7 as well the NEEAPs submitted in April 2014[5]. The paper describes the EEOS introduced and planned by MSs in terms of sectoral coverage, obligated actors, eligible projects, monitoring and verification (M&V), baseline and additionality, sanctions, trading rules if any, and public authorities' role. More detailed description and analysis of each MS plans will be available via the ENSPOL project web site (enspol.eu) – the project funding the research of many of this paper's authors. A comparison among the different national EEOS is made, and their common features highlighted. Key issues including the time scale needed to introduce an effective EEOS, type and number of obligated partners, changing business models of energy companies and scale of expenditure are discussed in the conclusions.

Suppliers Obligations

The role of energy companies in providing energy efficiency solutions and financing to their clients started in the 1990s through Demand Side Management (DSM) programmes. In the early 2000s, in some EU MSs, the role of energy companies in providing energy efficiency were regulated by law and targets were introduced. This market-based policy oriented towards end-use energy efficiency is based on energy-savings quota (obligations) for some categories of energy

1. The evaluation of the quality of NEEAPs and the saving reported in not in the scope of the present paper.

2. The EU is also offering to increase its emissions reduction to 30 % by 2020 if other major economies in the developed and developing worlds commit to undertake their fair share of a global emissions reduction effort.

3. Available at http://ec.europa.eu/energy/en/topics/energy-efficiency-directive/obligation-schemes-and-alternative-measures.

4. Savings resulting from energy saving actions newly implemented since 31 December 2008 that continue to have an impact in 2020.

5. Available at http://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive/national-energy-efficiency-action-plans.

market operators (usually energy distributors or suppliers.) The savings would normally be verified by the regulator (or the national authority charged with this role) and in some national schemes are certified by means of the so-called 'white' certificates (certificates for energy savings). In some national schemes the certificates could be part of a trading system for energy-efficiency measures resulting in energy savings, in this case other parties that are not subject to an energy-saving quota can also be allowed to certify the energy savings from eligible projects implemented and sell the white certificates, thus generating an additional stream of revenue for themselves, increasing the certificate market liquidity and allowing the operators under obligation to reach their obligations at lower cost. In this way tradable white certificates allow greater flexibility and the implementation of the most cost effective measures, thus potentially – at least in theory and assuming perfect markets – minimizing the overall costs of compliance for obligated parties.

In principle a portfolio or obligation for energy savings involves four (five in case of trading) key elements (Bertoldi and Rezessy 2006):

- Creation and framing of the demand (obligation);
- Processes to support the scheme and the market (measurement and verification, evaluation methods and rules for issuing certificates, a data management and certificate tracking system and a registry);
- Cost recovery mechanism in some cases;
- Enforcement mechanisms and sanctions;
- And in the case of tradable certificates: Tradable instrument (certificate) and the rules for trading.

The first scheme in the world with a white certificate trading element was introduced in New South Wales (Australia). It is however a greenhouse gas trading system that has an end-use energy efficiency element. Many US States have introduced similar obligations also known as Energy Efficient Resource Standards (EERS). Similar policy portfolios have been introduced in Italy, Great Britain, France, Denmark and the Flemish region of Belgium. Poland introduced a white certificate scheme in 2009.

The ESD defined white certificates as: "certificates issued by independent certifying bodies confirming the energy savings claims of market actors as a consequence of energy efficiency improvement measures". The same Directive confirms the interest for this policy instrument stating that "the Commission shall examine whether it is appropriate to come forward with a proposal for a directive to further develop the market approach in energy efficiency improvement by means of white certificates."

EEOS were implemented in a number of MSs before the adoption of the ESD or the EED. The next section summarises briefly the EEOs in these MSs. These have been described in several reports and papers. Similarly to other policy measures these schemes have been modified and updated several time since their introduction. The following section describes the EEOs planned in other MSs that decided to introduce this policy mechanism to meet all or part of the EED Art. 7 obligation.

Member states with existing suppliers obligations

UK

Great Britain (England, Scotland and Wales) has had an EEO since 1994 (England and Wales) and 1995 (Scotland). There is also an EEO in place in Northern Ireland – the Northern Ireland Sustainable Energy Programme, which focusses very largely on fuel poverty objectives. The Great Britain (GB) scheme has had four different names: Energy Efficiency Standards of Performance (1994–2000); Energy Efficiency Commitment (2000–2008); Carbon and Energy Reduction Target (2008–2012) & Community Energy Saving Programme (2009–2012); Energy Company Obligation (ECO), due to continue until 2017.

The GB obligation started at a relatively low level but eventually became a major climate change mitigation policy for the domestic sector. It has focussed solely on the residential sector for most of its life, with a small amount of activity in the SME sector in the early years. The scheme has been re-designed approximately every three years, some of these revisions involving major changes, including the most recent revision in 2012. Re-designs prior to 2012 were primarily aimed at increasing the savings delivered. The success of early phases of the scheme led to confidence that suppliers could reach higher targets. The implicit annual target of energy savings, calculated on a lifetime basis, has increased from 1.5 TWh in 1994, to reach a high point of 119 TWh in the period 2009–2012 (Rosenow 2012, Rosenow et al 2013).

The obliged parties have been electricity and gas supply companies with customers above a certain number, with the qualification number generally rising over time. Within the current scheme, only suppliers with over 250,000 residential customers have an obligation – in practice this means there are seven obligated parties. Four independent power companies were given an obligation within the CESP scheme (2009–2012), but this experiment has not been repeated.

During all phases of the EEOS, the vast majority of qualifying measures have been efficient appliances, boilers and CFLs. The list of allowable technologies has varied over time. For example, from 2011 CFLs were no longer included in the EEOS because the government judged that this market had already been transformed. There has been a consistently strong focus on delivering a significant proportion of subsidised or free measures to low income groups, in order to offset the regressiveness of raising revenue via energy bills. This has enabled all income groups to benefit (Eoin Lees Energy, 2008).

ECO is significantly different from earlier iterations of the EEOS. It was designed to complement Green Deal, which is a financing programme for energy efficiency measures. As such, it targets higher cost measures and lower income households. Measures which were very significant in delivering targets in earlier phases, including loft and cavity wall insulation, were largely excluded from ECO initially. The expectation (yet to be realised) was that these measures would continue to be installed, but with householders accessing Green Deal finance, rather than relying on EEOS-funded subsidies. ECO also has one strand whose goal is solely to reduce heating costs, thereby helping to tackle fuel poverty, but not saving carbon. Savings targets, set in terms of lifetime CO_2, are currently less than a quarter of the annual target during the previous phase, 2008–2012.

Italy

In Italy the energy saving obligation (expressed in primary energy [toe]) was introduced by law in 2004. The annual saving obligation started only in 2005 and was imposed on electricity and gas grid distribution companies with more than 100,000 customers. In 2008 the obligated parties' threshold was reduced to 50,000 customers. This resulted in an increase of the number of obligated companies from 30 to 75 in 2008. The targets are for savings achieved each year (annual savings). The mechanism was planned to deliver energy savings equivalent to 6 Mtoe in 2012, with different specific targets for electricity and natural-gas distributors (i.e. 3.5 Mtoe/y and 2.5 Mtoe/y respectively). As of 2008 an automatic adjustment of the annual saving target has been introduced, whereby in year t the target will be increased by an amount corresponding to the number of tradable certificates not withdrawn and possibly still owned by ESCOs and energy managers on 1st June of year t if the amount of oversupplied certificates exceeds 5 % of the saving target for year t-1.

In Italy national targets are apportioned each year among electricity and gas distributors on the basis of the quantity of electricity and gas distributed to final customers compared to the national total in year t-2; the targets are directly proportional to the market share. Prior to the legislative changes in 2008, 21 % of the total obligation in Italy was not distributed, which corresponded to the volume of small suppliers (below 100,000 customers). The legislative changes of 2008 establish that the target assigned to a given obligated actor is calculated by multiplying the total saving target by the ratio of the energy distributed by this obligated actor and the total energy distributed by all obligated actors. As of 2008 all the saving target is hence being distributed.

Each certificate is worth one tonne of oil equivalent (toe) saved. Energy efficiency projects in all end-use sectors are eligible for certification in Italy, along with some supply options (such as combined heat and power – CHP).

Electricity and gas distributors may fulfil their obligation by implementing energy efficiency projects entitling to white certificates or by buying white certificates from other parties in the Energy Efficiency Certificates Market that is organised by the GME.

Starting from 2011 a multiplication durability coefficient "tau", has been introduced in the Italian scheme; since savings are recognised for the duration of the useful life (typically 5 years), account is taken of the savings generated up to the end of the technical life (i.e. "the number of years after implementation of the project during which the installed equipment or devices are expected to reduce energy consumption) by multiplying the annual savings (in toe) by a durability coefficient 'tau'.

The applicable legislative/regulatory framework was recently changed by the Decree of 28 Dec. 2012 (the so-called "white Certificate decree). The decree sets national quantitative energy-saving targets – incremental over time - for electricity and gas distributors for the years from 2013 to 2016. The decree also introduces new parties eligible to submit projects with a view to obtaining white certificates.

Parties eligible to submit projects for accruing white certificates are: i) electricity and gas distributors with more than 50,000 final customers ("obligated parties") and their controlled companies; ii) non-obligated distributors; iii) companies operating in the sector of energy services (ESCOs); and iv) companies or organisations having an energy manager or an ISO 50001-certified energy management system in place. The new targets for the period 2013 to 2016, have been adopted based on the number of white certificates to be issued (i.e. 3.03 million White certificates for electricity distributors and 2.48 million for natural-gas distributors by 2013).

Moreover, the decree approves 18 new technical datasheets, that may be used to submit standardised and analytical requests for verification and certification, to quantify primary energy savings Finally the decree introduces the "large-scale projects", defined as projects in the infrastructure sector, transport sector and industry sector resulting into yearly estimated savings of more than 35,000 toe and having a technical lifetime of over 20 years; these projects are under the direct control of the Ministry and, under some conditions (i.e. implemented in metropolitan areas or involving significant technological innovations) can be eligible for premiums, expressed in terms of multiplicative factors of the number of white certificates to be issued (i.e. 30–50 % of the value of the project).

France

France is in its third period of the "Certificats d'Economies d'Energie", "CEE" or EEC, scheme (2015-2017). During the first period of the French white certificate system (2006–2009) saving obligations were set for energy suppliers delivering electricity, gas, domestic fuel (not for transport), cooling and heating for stationary applications. A threshold for the imposition of a savings target is set at 0.4 TWh/year except for LPG where it is 0.1 TWh cumac[6]/year and domestic fuel where there is no threshold. The total target for the first three years was 54 TWh cumac (in final energy) cumulated over the life of the energy efficiency actions with a 4 % discount rate from the second year.

Apart from plants under the EU ETS and fuel substitution between fossil fuels, no other restrictions on energy efficiency actions are foreseen in the French scheme. The scheme is strongly based on "ex ante" deemed savings, but specific actions are also possible. Only obliged entities and so-called "eligible" entities (local authorities, National Agency for the Habitat (ANAH), social housing bodies and energy efficiency semi-public companies) can claim certificates. Any moral person can partner with and obliged or eligible entity, and buy or sell certificates.

The national energy saving target for the second period (2011–2013) was 345 TWh cumac. It has been extended for one year (2014) with an extra 115 TWh cumac to save. In the second phase the suppliers of the transport fuel were included with a proportionally smaller share of obligations than other energies.

In the first obligation period obligated actors have received targets based on a combination of their physical energy and value of sales in the residential and commercial sectors. They were based on turnover (75 %) and market shares of energy sales (25 %) in the residential and tertiary sectors. Électricité de France (EDF) accounted for approximately 55 % of the obliga-

6. Cumac means cumulated and discounted (4 % annual discount rate) saved final energy during of the operation.

tion and GDF SUEZ for 26 %. In principle, the apportionment of the total target is done on annual basis to take into account new market players and variations in sales volumes/customer market shares.

The third period of the energy saving certificates scheme, EEC, started on 1 January 2015 for a period of 3 years, with a requirement to 700 TWh cumac. This goal, which represents an increase of the saving obligation compared with the previous period, should enable France to fulfil its commitments to energy savings. Specifically, the EEC will contribute to significantly fulfil Art 7 objective, reach each year until 2020 energy savings equivalent to 1.5 % of volumes energy sold in the period 2010–2012.

Transport fuel is now obliged according to the common rule based on turnover (75 %) and market shares of energy sales (25 %). As a consequence its share as increased and Total has become the major obliged company, before EDF and GDF SUEZ.

Deemed saving values have been cancelled and new values set for the third period. As of the beginning of the third period, 89 revised actions had been validated. They correspond to 112 previous actions and over 90 % of the certificates attributed in the first two periods. The other actions should be updated during 2015. The application documents for deemed savings have been strongly standardized. The certificate claiming process has become declarative with reinforced *a posteriori* controls (Jandel 2015).

Denmark

In Denmark, electricity and gas distributors (grid companies), as well as heat distributors, were subject to annual energy saving targets in the period 2006–2013. The targets were expressed in final energy and only first year savings from projects were taken into consideration. The total annual obligation was 2.95 PJ/year for 2006–2009 (0.7 % of total final consumption); 6.1 PJ/year for 2010–2012 (1.2 % of total final consumption); 10.7 PJ/year for 2013–2014 and 12.2 PJ/year for 2015–2020.

In Denmark the targets are set as an agreement between the Minister of Energy & Climate Change and the Danish Energy Association, the Danish Petroleum Industry Association, Dong Energy, Naturgas Midt Nord/HNG and Naturgas Fyn. In the case of district heating, there is no voluntary agreement; instead every single DH follows an executive order and has an individual target set. Targets are set at sectoral level for electricity and gas and are subsequently apportioned on the basis of average market share of electricity or gas distribution in the three preceding years. Savings in all end-use sectors apart from transport are allowed; no supply side and network-related measures are allowed at present and fuel switch is only allowed if it reduces consumption. Transport-related projects are not allowed, unless they concern internal transport consumption of a company.

Article 7 to a large extent built on Danish experience with an energy efficiency obligation scheme, which means that article 7 is already implemented in Denmark. The energy efficiency obligation scheme is set by law but is implemented by a voluntary agreement between the minister of climate, energy and building and the branch organisations. The Grid and distribution companies are obligated to deliver energy savings each year; in 2014 the target is 10.7 PJ reduction and from 2015–2020 the annual target is 12.2 PJ. The agreement is managed by the Danish Energy Agency in collaboration with representative from the branch organizations. Denmark will note use any alternative policy measures.

Belgium

Belgium is divided into three regions: the Flemish region, the Walloon region, and the Brussels-Capital region. In Belgium, responsibility for crafting energy policy relating to the rational use of energy falls to these regions. The Flemish region of Belgium introduced an EEO in 2003. The Flemish regional government's Decision of 29 March 2002 concerning public service obligations for the promotion of rational use of energy (RUE Regulation) placed an obligation on electricity distributors as of 2003 to meet annual primary energy savings targets. The RUE Regulation was amended several times, like in 2007, and fully replaced in 2011. The latter amendment changed the RUE obligation completely. As of 2012, the energy saving targets for electricity distributors were eliminated and replaced by specific "action obligations," specific actions set forth by the Flemish Government that distributors must implement.

Concerning the energy targets, the targets were differentiated for energy supplied to low- and high-voltage end-users before 2008. From 2003 to 2007, the primary savings goal for supply to high-voltage users was one percent of the electricity consumed two years earlier. Only first- year primary energy savings were credited toward energy saving targets. The target for low voltage end-users started at one percent, and by 2007 grew to 2.2 percent of electricity consumed two years earlier. In absolute terms, the primary savings goals (low and high-voltage users) amounted 381 GWh in 2003, 551 GWh in 2004, 606 GWh in 2006, 605 GWh in 2007 (first-year primary energy savings). In 2008 and 2009, targets were set for residential and non-residential users (instead of low- and high-voltage users). Primary energy saving targets rose to two percent of electricity consumption two years earlier for residential users, and 1.5 percent for non-residential users. In 2010 and 2011, electricity distributors had to comply with one single target, but with the obligation to undertake actions for both residential and non-residential users. The combined single target was set at 3.5 % of electricity consumption two years earlier for most electricity distributors and at 2.5 % for those distributors with 2,500 end-users or fewer. Eligible actions refer to residential, non-energy intensive industry and services and can involve saving fuel from any sources. The Flemish obligation had no trading option of any type.

Poland

In Poland an EEO has been introduced in 2011 by the "energy Efficiency Law", after long discussion with stakeholders, but came into force in 2012. Energy enterprises selling electricity, heat or natural gas to end users connected to the network in the Polish Republic have the obligation to purchase and redeem white certificates. Energy Regulatory Office (ERO) selects projects to improve energy efficiency, which can obtain the certificate of energy efficiency. To this end ERO, at least once a year, announces, organizes and conducts a tender. Projects which achieve savings in the amount equivalent to at least 10 toe on average per year, may participate in the tender, including ESCO projects. ERO grants the white certificates only

to the enterprises who win the tender. The enterprises, which obtain white certificates, are obligated to complete the project stated in the tender. ERO send information about the realized projects to the Polish Power Exchange. ERO will carry out random verification or verify compliance of energy savings achieved as a result realization of project. When white certificates will be registered on the Polish Power Exchange databases, they will have the property rights. The property rights arising of the certificate are transferable and constitute an exchangeable commodity. Upon a motion of the energy enterprise (which sells electricity, heat or gas to the final customers on the territory of the Republic of Poland) which is holder of the property rights arising of the certificate, ERO will redeem the certificate. Redemption decision confirms fulfilment obligation regarding energy efficiency completely or partially. In the case of non-compliance there are penalties. This measure is defined as the "flagship measure" of the 2014 NEAP and it is supposed to cover the 60 % of Art. 7 energy saving target. Nevertheless, this White Certificate Scheme is not yet working well and it is not providing the expected energy savings. (Personal Communication.)

Member states with new energy efficiency obligations introduced following the EED

Ireland

In Ireland there has been a Voluntary Agreement (VA) between the government and the energy sector to implement a kind of energy efficiency obligation. The VA included all fuel sectors – metered and non-metered. The target was based on final sales by sector and supplier and project could be implemented in all sectors: Residential, Industrial, Commercial and Public Sector. The targets were annual, but included in an Indicative three year target 2011–2013 set at 2,000 GWh (PEE). Ireland is opting to combine alternative policy measures and an EEO to meet article 7 obligations.

Starting from January 2014, Ireland transformed its voluntary energy savings programme to a mandatory EEO to deliver 50 % of the target (i.e. 550 GWh per year, 15,400 Gwh cumulative).

The EEO will apply to all energy suppliers, regardless of sector (electricity, gas, oil and solid fuel sectors), that sell more than a certain minimum threshold of energy in 2012. The threshold is indicatively set at 600 GWh. The anticipated savings from the EEO are 550 GWh (Primary Energy Equivalent) per annum in the period 2014–2020. This is approximately half of the net annual savings to be achieved. The target allocated to obligated parties is sub-sectoralised as 75 % non-residential, 20 % residential and 5 % fuel poverty residential. In the residential sector projects are stimulated mainly by grants. In the non-residential sector projects are stimulated via the Energy Efficiency National Fund. Detailed scheme rules including control and compliance, calculation methods, verification, flexibility and monitoring are developed. For residential measures there is a list with approved measures and associated deemed energy savings. Non-residential projects are evaluated on a project-by-project basis. Discussions are ongoing on creating a private trading platform for energy savings similar to the French model. It is not yet sure that this will be implemented. It is not yet clear how costs will be divided over final consumers and parties. The expectation is that costs will be passed through via the energy price and that there will be not too much passed through since the Irish energy markets are competitive.

Slovenia

The planned EEOS (from 2015 onwards), is linked to a financial mechanism in place, the so – called Eco-Fund (Eko sklad)[7], which was established by the new Energy Act (entered into force in March 2014 and currently under adoption by the Slovenian parliament). This Eco-Fund is in fact a Slovenian public environmental fund, which aims at improving energy efficiency through financing investments in energy efficiency. In essence, the original fund is made up by the energy consumption fee on solid, liquid and gaseous fuels, district heating and electricity and those who benefit from the fund must pay back the financing, in the forms of energy savings they carry out. The two measures thus (EEO and Eco-Fund) will be responsible for achieving the 1.5 % target annually, or 1 % in 2014 and 2015 and 1.25 % from 2016–2018. The obligation will be divided in half of the 1.5 % to the Eco-Fund and the other half on EEOs, while not reducing the savings target that the Eco-Fund must achieve in the initial years (therefore the target will be 0.75 % per year, amounting to 262 GWh per year). The EEO in Slovenia sets the obligation to suppliers of electricity, heat, gas and liquid and solid fuels to final customers (estimated 16 electricity suppliers, 19 gas suppliers and several fuel suppliers (n/a)). The main measures are: efficient energy use measures and greater use of renewables in heat generation in the public and service sectors and for industry and households, efficient energy use measures in buildings, efficiency energy use measures in transport, measures to increase the efficiency of district heating systems and Energy Survey programs. Measures that in addition to lower energy consumption also make a relatively large reduction in primary energy use will be given greater weight. These measures are primarily reducing electricity consumption, producing electricity from renewable energy sources for own use and cogeneration of heat and power. In this dual scheme, energy suppliers face the option of a) carrying out energy savings to their final customers, and b) In place of actual energy savings, the obligated parties may fulfil their obligations by making a payment to Eco Fund in an amount equal to the product of: the savings they were required to achieve among final customers; and the specific costs of achieving the Eco Fund energy savings.

Austria

The Austrian EEOS will cover all energy sectors, with the provision that 40 % of savings must be achieved in the residential sector. It will apply to all energy retailers selling more than 25 GWh in the previous year. Retailers of all fuel types are included – electricity, gas, liquid and solid fuels, including transport fuels, and district heating. The annual saving target per company will equate to 0.6 % of energy sold in the previous year. Detailed scheme rules including control and compliance, calculation methods, verification and monitoring are still un-

7. Slovenian Environmental Public Fund, established by the Environmental Protection Act (Uradni list RS, nos 39/06 – official consolidated text, 49/06 – ZMetD, 66/06 – Constitutional Court Decision, 33/07 – ZPNačrt, 57/08 – ZFO-1A, 70/08, 108/09, 108/09 – ZPNačrt-A, 48/12, 57/12 and 92/13).

der development. Energy retailers will be permitted to comply with their obligations via savings delivered by third parties. However, there is no intention of creating a tradable certificate scheme. Households in fuel poverty will be prioritised, by allowing retailers to multiply savings achieved in these homes by 1.5. The possible effect of this policy on energy bills has not been estimated.

Bulgaria

Bulgaria is planning to introduce an EEO to help meet its Article 7 obligations. The EEO will cover all energy sectors. It will apply to electricity retailers and heat transmission companies selling more than 75 GWh in the previous year, to natural gas traders selling more than 8 million cubic metres, liquid fuel traders selling more than 6,500 t, and solid fuel traders selling more than 13,000 t. Retailers of transport fuels are not included as obligated parties, but savings can be made in the transport sector. The overall savings target is 1.5 % of annually of the average energy sales of obligated parties, 2010–2012. Technical, organisational and behavioural measures can be included in the scheme. Scheme rules around control and compliance, calculation methods, verification and monitoring are being developed in accordance with the requirements of Article 7. There are no plans to take account of social equity within this EEO. The possible effect of this policy on energy bills has not been estimated.

Spain

Spain has adopted an EEO scheme to meet the remaining requirements[8] of Article 7 of Directive 2012/27/EU. Obligated parties under the EEO scheme are considered to be all the traders of electricity, gas, liquefied petroleum gases and wholesalers operators of oil products inclusive of their transport[9]. Obligations will be annually set on all legally bound parties on a linear basis over the entire period. Obligated parties will implement the saving objective according to their market shares as a reference, using baseline information that will rely on the sales during tax year 2013. In future years, baseline information for the distribution of the energy savings target shall be the sales in year N-2. A standardized energy savings certificate scheme has also been developed based on a catalogue of measures and savings associated with each of these energy efficiency actions and measures. However, it was decided that the Obligation scheme should initially operate without the certificates. Thus obligated parties will be able to fulfil their obligation only by providing the equivalent amount of compensation to the Energy Efficiency National Fund, at least during the first stage of the scheme's implementation. Nevertheless, the scheme's implementation rules regarding institutional set-up, control over compliance, verification and monitoring issues have been developed regarding both operational options of the Obligation (i.e. with or without the certificates). Verification and monitoring requirements are envisaged to be limited during the first stage of the scheme's implementation, since compliance with the scheme will be imposed automatically trough the financial payments by legally bound parties to the National EE fund. Concerns by regulators have been expressed regarding the ability of obligated parties to correspond to their obligations. Yet no information is yet provided regarding a potential cost-recovery mechanism and no further analysis is available about the final effect on energy prices. At a later implementation stage, the scheme is envisaged to function combined with the more flexible energy savings certificate.

Lithuania

The introduction of an EEO in Lithuania has proved to be a major challenge. The Law that will establish the EEO is still being drafted and because the first draft was rejected resulting in cautiously openness about final results of the legislative process there is very limited information available about the expected setup of the EEO in Lithuania. The information below reflects what stakeholders could share about the expected setup at the time of writing but this might differ from what will be passed as law in 2015. Lithuania is primarily based on savings realized through the Obligation to meet with Article 7 requirements (80 % of total savings to be achieved). Ancillary financial measures will cover the remaining target. The total target of the EEO is divided into two periods: 45.92 ktoe, measured as life-time savings, are estimated from 1/1/2014 until 31/12/2016 and 183.68 ktoe over the period 1/1/2017 until the 31/12/2020.

During the first phase of the EEO Scheme, the obligated parties in Lithuania will be, two electricity distributors (including the largest one supplying 44.2 % of all electricity), one gas company (distributing 97.3 % of the total amount of natural gas) and ten heat supply companies that sell more than 90 GWh of heat. There is still no decision on how to distribute the target among obligated parties. But it is expected that it will be based on the share of total energy consumption. A catalogue of standard energy efficiency enhancement measures and achievable savings is to be compiled. Finally the Ministry of Energy was still in the process of drafting the scheme's rules regarding control and compliance measures, verification and monitoring as well as flexibility and additionality provisions at the time of writing. Therefore no information was available. The only information available is that the Ministry of Energy expects that fines are needed to ensure compliance. Finally defining how money is to be collected over the tariffs and how distributors would be allowed to cover their costs still remain major unresolved issues at the time of writing. As reported in the NEEAP: the final energy savings target of supplier obligation schemes is 11,677 TWh (from 2015 to 2020 calculated using the cumulative method). A general description of the scheme is provided, including the obligated parties. The categories of energy efficiency measures are not specified. The obligation scheme focuses on the implementation of energy efficiency improvement measures in the sectors of buildings and the industry (however no further details are provided). Alternative measures, aiming to save about 20 % of the target, include renovation of multi apartment building and public buildings.

8. To meet with Article 7 requirements, Spain has opted for the implementation of an EEO scheme supplemented by a set of alternative measures, chosen in line with article 7, section 9 of Directive 2012/27/EU, including the creation of a National Energy Efficiency fund. Spain's cumulative energy saving's target over the period 2014–2020 (excluding the transport sector), is thus distributed among the set of alternative measures, the EE fund and the Obligation scheme. The estimated total savings to be achieved under the EEO scheme are equal to 6.356 final energy (ktoe), relating to the 2014–2020 period (almost 63 % of the total savings to he achieved).

9. Even though the transport sector is excluded from the calculation of the savings, sellers of petroleum products for transport are consider as obligated parties.

Malta

Malta, defined several policy measures[10] outlined as part of the Maltese National Energy Efficiency Action Plan (NEEAP) in order to comply with the obligations defined in the article 7 of the Directive 2012/27/EU. An EEO scheme will complement those measures set upon the only electricity distribution system operator (DSO) and the only licensed electricity supply company in Malta, the Enemalta Corporation. According to the provisions in sub-paragraphs (a) and (d) of paragraph 2 of Article 7, the total target to be achieved resulted in 673 GWh (final energy) over the period 2014 to 2020 and 111.56 GWh are estimated to be saved through the obligation scheme on Enemalta Corporation. 45 % of the target should be achieved until December 2017, while the rest ought to be achieved by December 2020. The DSO is obligated to: (i) to instruct consumers in wise energy use via smart meters (smart meter roll-out), (ii) use the monitors of the roll-out innovatively (e.g. educational programmes the for increasing end-users' awareness), iii) to use a progressive rising block tariff system aiming to discourage overuse by penalizing energy consumption and finally iv) to offer incentives through the same tariff structure by rewarding economy in energy consumption. Implementation rules of the EEO scheme are described in some detail, yet clarifications regarding additionality, and materiality criteria and calculation methods of proposed measures are needed, while no penalties are mentioned so far. Finally there seems to be no direct impact of the obligation schemes on the energy tariffs and prices, since Enemalta will finance the smart-meter roll-out as commercial venture, through its own funds.

Latvia

Latvia plans to reach the Art. 7 target, 9,897 GWh cumulative energy savings (or 2,472 GWh in 2020), combining an EEOS with alternative measures. The establishment of an EEOS was approved by the Latvian government in December 2013, but it was not yet implemented due to legal issues that need to be further clarified and agreed. The obligated parties will be energy suppliers: 28 suppliers of electricity and 9 of natural gas. The obligated parties could achieve energy savings in all end-user sectors, either directly developing energy efficiency measures or through third parties.

Estonia

In Estonia the introduction of an EEO is currently under discussion, in the frame of the "organisation of Energy Management Act", the legislative act for the transposition of the EED. A target of 7,101 GWh[11] *cumulative* energy savings has been set in order to meet the requirements of Art. 7. Estonia plans to reach this target through alternative measures (e.g. energy and CO_2 taxes, covering about 67 % of the total target) and through the introduction of an EEO. According to preliminary calculations, the energy efficiency obligations to be applied to Estonian energy utilities could amount to 1,200 GWh, over the entire obligation period (about 17 % of Art. 7 target), which is equivalent to the obligation of each energy utility to achieve a saving of 1 % in the annual final energy consumption of its customers. The obligated parties are limited to energy distributors that sell more than 100 GWh per year.

In an initial phase of the Scheme, energy efficiency obligations could be achieved by contributing annually to an Energy Efficiency National Fund. The Estonian Competition Authority will be in charge of monitoring the EEO implementation, which will be based on obligated parties' annual report, verified by an independent expert. It is still not clear when this EEO will be implemented.

Hungary

Hungary is examining the potential implementation of an EEOS on the energy distributors and retail energy sales companies. The potential administrative bodies of such a scheme will be the Hungarian Energy and Public Utility Regulatory Authority and the Ministry of Energy. The energy savings target to be covered under the EEOS is 2,001 GWh/year and the basis for determining the obligation is the annual energy sales to final customers by volume averaged over the 2010–2012. The transport sector is excluded from the target setting. The potential EEO could take place from 2015–2020 and the energy saving rate could grow at a steady, linear rate with the obligation period. It will be split in two periods: 2015–2017 and 2018–2020. The savings are being calculated ex post and ex ante, via metered and deemed savings, respectively. The lifetime savings calculation of each measure is established by metering the savings between the completion of the measure and the end of the obligation period. Currently an updated notification to the EC from the Hungarian authorities is expected where the EEOS modalities will be explained.

Luxembourg

Luxembourg intends to introduce a national energy efficiency obligation scheme into its legislative system. After studying the various schemes in place in other MSs, the Danish scheme was used as a model.

All suppliers of electricity and natural gas to residential, service sector and industrial customers are obligated parties by law regardless of size or client base (28 suppliers of electricity and 9 suppliers of natural gas). Obligated parties will be assigned the public service task of achieving the energy savings objective. To that end, the obligation scheme will be defined in Luxembourg law as a service of general economic interest, which the obligated parties will be mandated to provide. Such an arrangement will make it possible to finance the obligation scheme at least partly through the national budget. Obligated parties incurring additional costs could pass these costs on to the final customers, which may lead to an increase in the price of electricity and natural gas. In order to avoid distorting competition among different suppliers and different types of energy, there is a plan to impose a tax or charge on non-obligated suppliers. The obligated parties may undertake measures in all sectors (including transport) and involving all types of energy. This flexibility will allow the obligated parties to achieve energy savings with a favourable cost-benefit ratio. The obligated parties will be allowed considerable flexibility in actions with regard to the end clients. For instance, the obligated parties may

10. The energy efficiency obligation scheme is supplemented by financing schemes and fiscal incentives, training and education, government leading by example, direction to the public sector through the budgeting process; and regulation.

11. In the calculation of the target, transport sector and ETS industrial installations have been excluded, and an overall reduction of 25 %, as allowed by Art. 7(3), has been applied.

grant financial assistance, offer information/consultations/audits or offer a combination of financial assistance and advice. The obligation scheme will allow the obligated parties to count energy savings achieved through executing parties towards their obligation. Executing parties may, for instance, be installers, energy consultants, etc. The obligated parties will be free to choose executing parties either through a tender process or through negotiations and bilateral contracts.

There are no plans at present to employ other public policy measures to achieve the energy efficiency objective of Art. 7.

Croatia

Croatia stated in the 2014 NEEAP: "In order to achieve the specified target, the Republic of Croatia has opted for a combination of the two (energy efficiency obligation scheme and the application of alternative measures)." In addition the Croatian NEEAP specifies that "the cumulative national energy savings target for the 2014–2020 period is 54,250 PJ. Savings amounting to 32,094 PJ are planned to be achieved through the application of alternative policy measures, and the target difference of 22,156 PJ is planned to be achieved through the energy efficiency obligation scheme." And "the Republic of Croatia plans to define a cost-effective and institutionally implementable energy efficiency obligation scheme by the end of 2014, and provide information about it in the next annual report. The obligated parties (energy distributor or retail energy sales company) will be determined pursuant to objective and non-discriminatory criteria. The method of establishing the energy efficiency obligation scheme will also be defined. The introduction of the energy efficiency obligation scheme is planned for 2015."

Discussion

Overview

Member states have planned a variety of routes to meeting the energy saving target of Article 7:

EEOS only: Bulgaria, Denmark, Luxembourg and Poland (of these countries, only Denmark has long and successful experience of an EEOS policy).

EEOS plus alternative policies: Austria, Belgium, Croatia, Estonia, France, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Slovenia, Spain, UK.

Alternative policies only: Cyprus, Czech Republic, Finland, Greece, Germany, The Netherlands, Portugal, Romania, Slovakia and Sweden.

So, while the majority of member states are using EEOS, they are not universally seen as an important means of making energy savings, with 10 MSs choosing not to adopt an EEOS for a number of reasons including the overlap with already existing or planned policies and the potential increase of energy prices for consumers.

Timescale

EEOS are not an immediate means to delivering energy savings. It usually takes a number of years from design of an EEOS to delivery of significant savings, due the following elements: discussion with relevant stakeholders, learning by the obligated parties how to implement energy efficiency projects, sector delivering energy efficiency services needs to be built up establishing the relevant M&V procedures, establishing the overseeing authority and enabling it to verify projects, savings and possibly issue sanctions. Both in Italy and in Poland it took several years before the scheme was up and running after the adoption of the relevant legislation. Several of the MSs investigated in this paper have not yet completed the detailed design of their EEOS (Austria, Bulgaria, Estonia, Hungary, Latvia and Lithuania), it may well be that the scheme will take off only in 2016 or later thus reducing the cumulative savings by 2020. Many of the existing schemes started with low targets (e.g. Italy, France, Flanders). The targets in these schemes were increased over time, allowing a "learning" period.

Similarities and differences

As for the existing schemes, all the planned EEOs have differences in design as allowed by the EED: e.g. obligated parties (distributors or retailers; type of energy supplied: electricity, gas, heating oil, district heating, transport fuel), eligible sectors, eligible projects, M&V, the fund raising mechanism. Design is driven by a combination of national circumstances (e.g. policy priorities and baselines), long discussions / negotiations with stakeholders, and, perhaps, the 'not invented here' syndrome (i.e. the perceived need to put a national stamp on an idea established elsewhere). All schemes have in common the provision of subsidies for end-use efficiency, but the level of subsidies varies a lot.

Obligated parties

There is no evidence that distribution or retail companies are better suited to carry out the energy saving obligation. Distribution companies are still regulated monopolies (for gas and electricity) and the cost recovery mechanism could be easily implemented in the distribution tariff, while retailers are free to set their tariff and decide on how to recover their costs. In addition, it may well be that the obligated parties are a mix of regulated and un-regulated organisations.

Sectors, technology and measures

MSs' EEOS cover different sectors, technologies and measures. Common to all schemes is energy use in buildings, while industry and transport are only included in a limited number of EEOs (e.g. Italy, France, Denmark, Poland, etc.). In the residential sector, there has been very successful experience of delivering high volumes of low cost measures (e.g. efficient lighting, efficient appliances, efficient boilers) in a number of MSs. Now with the progresses in the Eco-design and the additionality criteria this option is almost gone. Therefore most EEOS will need to address higher cost measures (e.g. solid wall insulation, etc.) or to be implemented in other sector where possible (e.g. industry). This marks a very significant change, and there are questions as to whether a policy which has been successful in delivering low-cost measures is equally appropriate for higher-cost measures. With a focus on a smaller number of higher cost measures, the distributional issues over who pays and who gains a benefit from the EEOs can become more contentious. In addition, the cost per kWh/kg CO_2 saved is also usually higher. In order to use EEOS successfully for higher cost measures, most MSs will need to combine EEOS with other incentives (e.g. tax rebates as in France) – and this is a new challenge for EEOS.

Scale of expenditure

Is there a limit to the amount of money which can be raised via an EEO? And how might this vary by country/energy prices/economic cycle? The evidence so far is mixed.

Some of the long-established schemes, e.g. Denmark and the UK, have increased the amount of savings to be delivered, and thus expected expenditure considerably over time. In the UK (where the EEOS operates in the residential sector only) this became politically contentious, coming as it did at a time of rising energy prices and stagnating household incomes. As a result of political and public debate during 2013, the EEOS was altered to reduce savings and the consequent expected impact on household energy bills.

In Denmark, the effect has been that due to the high costs the (considerably increased) targets in 2013 were not met – the first time this has happened in the scheme. However, this is not necessarily seen as a long-term problem, with the regulator taking the view that the flexibility of the scheme allows under-delivery in some years, and that in the first year of increased targets under-delivery might be expected. This fits with UK experience, where for multi-year obligation periods, lower savings were made in the earlier years, with larger savings in later years (Ipsos MORI et al, 2014).

Learning from experience

MSs which are late adopters of EEO schemes can benefit from other countries' experience. For example, Luxembourg has decided to model its planned EEO on the Danish scheme. Before designing its own EEO, Poland studied the schemes in Italy, France and Denmark. However, learning from experience does not necessarily ensure that the EEO will be problem-free. In Poland's case, there has been a negative reaction to the EEO scheme introduced in 2012, and it is currently being extensively re-designed.

Number of obligated parties

The number of obligated parties can range from less than 10 (e.g. the UK) to several hundred (e.g. Denmark) or even thousands (e.g. France). Schemes that include district heating companies and/or heating oil or transport fuel retailers tend to have higher numbers of obligated parties. It would seem possible that schemes with lower numbers of obligated parties, which are therefore likely to be larger organisations with greater administrative and management capacity, could develop more complex designs, reporting and verification systems. But it is not clear this has been the case – and it may be that the size and number of obligated parties is not a major constraint on scheme design. Having said this, in countries that have a dominant gas and electricity supplier (e.g. France), even though there are thousands of obligated parties, most savings may be delivered by a very small number of organisations. This is because obligated parties' savings targets are set relative to their number of customers/amount or value of energy sold, and the dominant market players have the greatest obligations.

The business model of energy companies

Does having an EEOS change the role of energy companies? There is no uniform answer to this. The UK and Denmark both have around 20 years' experience of EEOs. In the UK, the energy suppliers have not become ESCOs and seldom deliver energy efficiency programmes or measures themselves. They contract out the delivery of measures to insulation, building and energy system businesses. However, in Denmark, the electricity distribution companies (which have had an obligation the longest) have used the new market for energy efficiency services to establish energy service companies. In Denmark, the EEO has delivered innovation in business models. There are many differences between the Danish and UK schemes, not least the early Danish focus on improving efficiency in industry, and also differences in national energy markets, which may have helped shape the response of the obligated parties. Nevertheless, there was the expectation in the UK, that the EEOS would result in changes to the suppliers' business models – and it has not (Roberts et al 2014).

Re-designing schemes

Most of the schemes are adapted and modified during their "life". For example in the French scheme the transport oil suppliers were added to the scheme, while in Italy the energy saving evaluation has been modified. For the Flemish and Danish systems which have developed over time, some of the same issues have faced regulators who have responded in different ways. For example – the issue of whether energy audits for companies deliver savings, and the scale of savings, was managed differently. In Flanders, because of doubts about this, energy audits were no longer counted towards energy savings targets from 2007. However, in Denmark the response was to ensure that DSOs had to prove savings measures were actually installed from 2006, with the documentation process increasing in stringency and sophistication over time.

Conclusions

This paper has presented the developments and implementation of EEOS adopted in MSs to meet the obligation of Art. 7. A majority of MSs plan to continue to use or to introduce new EEOS, but 10 MSs intend to meet their savings targets without EEOS. Out of 18 MSs using EEOS to meet the Art. 7 obligations, only 4 MSs plan to use only the EEOS, while the remaining 14 MS will combine it with alternative measures. EEOS mainly cover buildings, with some schemes also covering industry and transport. While established schemes have a good record of meeting their savings targets, for "newcomers" the EEOS have just been implemented or are still in the design phase and therefore it is still impossible to judge their effectiveness and the added value compared to other existing policy instruments. It is important that EEOs are carefully monitored to see whether the ambitious Art. 7 target will be met and to ensure that the cumulative savings will be delivered by 2020.

Introducing a new EEOS is a challenging process. The established schemes have developed and changed over time, with the energy saving targets increasing as the obligated parties and regulators gained experience with this policy mechanism. While countries can learn from others' experience (and indeed the ENSPOL project is part of this process), inevitably each country will face unique issues and has its own priorities. EEOS have to fit into the existing policy landscape and are often used to meet multiple goals, rather than simply delivering energy savings. They can be used to help transform the business model of energy companies, to develop the supply chain and improve

the installation quality of particular measures, to prioritise vulnerable customers or to encourage new actors into the energy efficiency market (e.g. ESCOs in Italy).

EEOS are at a time of transition. Many of the lower cost, mass-market efficiency opportunities in the buildings sector have either already been taken, or can no longer be counted as 'additional', due to the requirements of other EU legislation. This implies that EEOS will need to target higher cost measures or other sectors, e.g. industry, where allowed - a very different proposition in terms of distributional impacts and cost per kWh saved. Co-funding measures with other policy instruments may be part of the answer, as may focusing more effort on the transport and industrial sectors. All MS will need to consider how EEOS can best be used under these new conditions, and should continue to learn from each other.

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