The Member States' plans and achievements towards the implementation of Article 7 of the Energy Efficiency Directive

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The Member States' plans and achievements towards the implementation of Article 7 of the Energy Efficiency Directive

by Tina Fawcett and Jan Rosenow

Abstract
The study analyses the implementation of Article 7 and presents key findings on its application in Member States. It also recommends routes to improving the implementation and the application of the Directive.

Member States have used exemptions and exclusions within the Directive to reduce their annual savings targets to approximately 0.75%, compared with the headline figure of 1.5%. The largest share of the overall savings is expected from Energy Efficiency Obligation Schemes (EEOS) (34%), financing schemes or grants (19%), and taxes (14%). In total, 16 Member States now have or plan to introduce EEOS, but the several of the newer schemes are at risk of failing to deliver their expected savings.

Overall, a significant share of the expected savings is at risk of not being delivered in practice because of potential non-additionality; weak or absent monitoring and verification regimes; and methodological issues related to the calculation of energy savings from policy measures. However, there are several case study examples of good practice, and many opportunities for Member States to learn from each other.

Policy reform would strengthen the Directive and increase the reliability of the anticipated energy savings. Improvements could include more detailed provisions, extensive guidance and mandatory reporting templates.

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Executive summary

Article 7 is a key provision of the 2012 Energy Efficiency Directive (2012/27/EU) which established a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Each member state (MS) has to calculate its own savings target, and demonstrate how it will deliver the target between 2014 and 2020.

The findings in this report are based on publicly available data, including formal notifications by MS, additional information in National Energy Efficiency Action Plans and Article 7 annual reports from 2015. Article 7 is deliberately flexible; it allows MS to choose how to deliver their savings commitments. Each MS has chosen a different mix of policies to deliver savings. Further, even policies which might seem similar, such as Energy Efficiency Obligation Schemes (EEOS), can be very different in intent, design and delivery. This heterogeneity of policy responses necessarily makes any form of independent policy evaluation across MS very challenging - and the analysis can only be as good as the data provided by MS.

National savings targets for 2014-2020 must be based on a savings rate of 1.5% per year compared to the average energy consumption in the period 2010-2012. However, the final energy savings target may be lower than this headline rate for two reasons. Firstly, MS can exclude the energy consumption of particular sectors, most significantly the transport sector. Secondly, Member States can use exemptions, reducing the original target by up to 25%. The combined effect of these factors is that the notified saving targets are only about half of what they would be without those adjustments i.e. the annual saving rate of 1.5% is reduced to about 0.75%.

In total, Member States implemented or plan to implement 479 policy measures. Five Member States have notified a single policy measure for the implementation of Article 7: Denmark, Poland and Bulgaria, and Luxembourg notified only EEOS whereas Sweden exclusively uses an energy/CO_2 tax. In contrast, others such as Germany or Slovakia adopted 112 and 66 policy instruments respectively.

The largest share of the overall savings is expected to be generated by Energy Efficiency Obligation Schemes (34%), financing schemes or grants (19%), and from taxes (14%) - all financial measures. The remaining savings come from regulation / voluntary agreements (11%), standards and norms (9%) with smaller contributions from training, national energy efficiency funds, energy labels and any other policy measures. In terms of sectors, most savings are expected from multi-sector 'cross cutting' policies (44%), followed by buildings (42%), industry (8%) and transport (6%). Analysis shows that there are considerable uncertainties around the reliability of the energy savings estimates provided by Member States.

EEOS are a key policy tool being used to deliver Article 7 savings. There are sixteen member states with existing or planned EEOS, which include five longer-established EEOS. EEOS can be a very successful policy, delivering substantial savings at low cost. However, there is a risk that new EEOS will not have sufficient time to allow for the gradual introduction,

increasing of savings targets, learning by stakeholders, and re-design where necessary which were key features of the successful schemes in Denmark, France, Italy and the UK. On this basis, the following countries are risk of under-delivery: Bulgaria, Croatia, Estonia, Latvia, Lithuania and Spain. Given the problems with Phase 1 of its EEOS, that of Poland must also be at some risk. For countries where EEOSs are expected to deliver a considerable proportion of their savings, this matters.

Case studies of good and poor practice in meeting the requirements of Article 7 can help illustrate how MS can improve their reporting, compliance and policy design and implementation. A number of good practice and poor practice case studies are reported including examples relevant to additionality, double counting, monitoring and verification, and penalties.

An overarching energy efficiency target is an important part of EU policy but ultimately the efficacy of Article 7 of the Energy Efficiency Directive will depend on the policies implemented by MS to deliver those targets. There is uncertainty about the reliability of savings expected, with the main areas concern being: the risk of non-additionality; weak or even absent monitoring and verification regimes; and methodological issues related to the calculation of energy savings. A significant share of the expected savings is at risk of not being delivered in practice. This puts into question whether the EED will achieve its aims.

A number of suggestions for policy reform were developed that would strengthen the Directive and increase the reliability of the anticipated energy savings. Overall, the lack of clarity of the requirements with regards to what is required and how it needs to be reported can be addressed by more detailed provisions, extensive guidance, and reporting templates that ensure Member States follow a more consistent approach in calculating the savings and reporting them as well as outlining their monitoring and verification regimes.

Chapter 1: Introduction

What is Article 7?

Article 7 is a key provision of the 2012 Energy Efficiency Directive (2012/27/EU) which established a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain from its production to its final consumption. Article 7 sets out how countries are to calculate their national energy savings targets, notionally based on a rate of 1.5% savings per year, and the policy means by which this may be achieved. It differs from much earlier legislation on energy efficiency in its complexity and flexibility. EU countries were required to transpose the Directive's provisions into their national laws by 5 June 2014, with savings required 2014 - 2020, so Article 7 has a period of 7 years in which to deliver savings.

Objectives of this study

The study will analyse the implementation of Article 7 and will present key findings of the application of the Directive in different Member States, together with recommendations for improving the implementation and the application of the Directive.

The main research questions are:

- How have Member States used exclusions and options within the EED, and what has the effect been on savings targets, policy types adopted, and sectors to which policy applies?
- What is the expected impact of Article 7 of the Directive, based on Member States' plans?
- What is the credibility of the proposed national responses to Article 7 and the associated savings?
- How has the Directive changed the attitudes of Member States towards energy saving (e.g. as illustrated by changes to their policy measures and instruments)?
- What are the effects on energy demand of the increasing implementation of EEOSs in Europe?

In addition, the study will highlight good practices in the implementation of the Directive. This will include case study examples of good practice related to particular policies in a number of member states. The study will include recommendations for amending the Directive.

Scope of Article 7

In theory, Article 7 targets can be met by delivering energy savings from all sectors of the economy. However requirements within Article 7 mean that, in reality, savings are unevenly distributed between sectors (Chapter 4). Importantly, savings delivered by Article 7 policies have to be additional to those which are expected from existing EU energy efficiency policies. In practice, this means that efficiency improvements to products are largely outside the scope of Article 7, as these are delivered via other EU legislation (Ecodesign Directive 2009/125/EC). Therefore, most savings must come from efficiency improvements to buildings (beyond those mandated in the Energy Performance of Buildings Directive

2002/91/EC) or industrial processes and their management, with transport only playing a minor role. The approach which has been successful in delivering more efficient products - EU-wide or international test procedures, information labels and minimum standards / voluntary agreements - does not work in these sectors. Article 7 is trying to influence the more difficult areas for policy to reach, without a clearly defined route to doing so.

The policies used to deliver Article 7 will just be one part of the policy mix delivering energy efficiency (Figure 1). All EU countries also have an existing suite of EU efficiency policies, as mentioned above. In addition, in some countries with efficiency targets higher than those mandated in Article 7, there are additional national and sub-national efficiency policies, which do not need to be notified to the Commission, as Article 7 targets can be met without them.

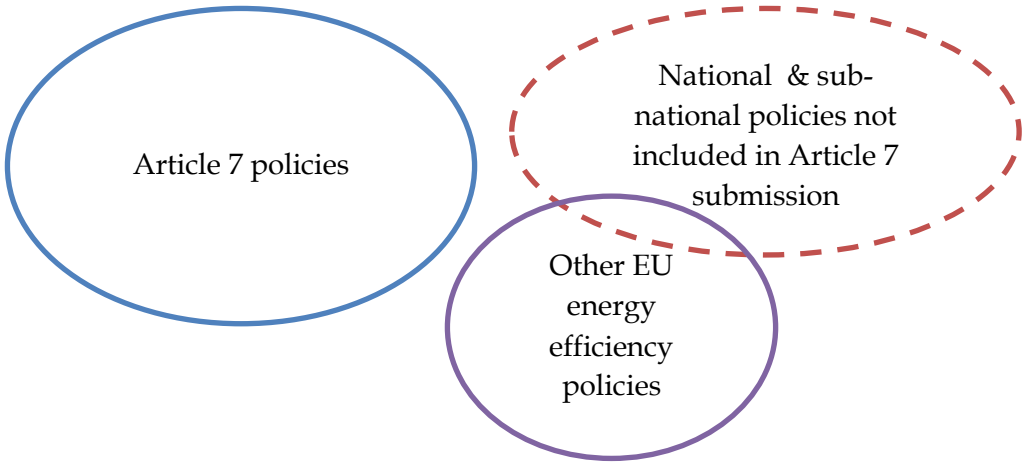


Figure 1: Groups of policies influencing national energy efficiency

The challenge of evaluation

Article 7 is deliberately flexible; it allows MS to choose how to deliver their savings commitments. As explained in Chapter 4, each MS has chosen a different mix of policies to deliver savings. Chapter 5 further shows that even policies which might seem similar, such as Energy Efficiency Obligation Schemes, can be very different in intent, design and delivery. This heterogeneity of policy responses necessarily makes any form of independent policy evaluation across MS very challenging.

MS themselves have submitted ex ante estimates of the savings expected per policy, with the exception of the Netherlands, which has estimated the savings expected from the policy mix as a whole.

Ideally, ex post evaluation would be used to determine the effectiveness of policies or policy packages. However, by definition, this can only occur after the policy has been implemented for some time, and so is difficult to use for mid-term policy reviews. Ex post evaluation can also be difficult, expensive and time-consuming, and thorough policy evaluation is the exception rather than the rule (Wade and Eyre 2015). One approach to evaluation could be to look at final energy use statistics from the MS. Eurostat data is available for energy use in

2014, the first year in which Article 7 should have had an effect. However, using these data would be far from straightforward, not least because energy use is influenced by a wide range of economic, climatic and social factors, as well as by energy efficiency policy, of which Article 7 policies form one part. Given these difficulties, Chapter 2 explains how this report makes best use of the available data and past policy experience, to give an expert view of the success of Article 7 to date, while recognising that this can only be a partial view at this stage.

Structure of the report

The remainder of this report is structured as follows. Chapter 2 describes the methodology used within the report, including the data sources and analytical methods used. In Chapter 3, the way in which national targets have been set is explained, with reference to exclusions and options within the EED. Chapter 4 presents a quantified description of the policies adopted by MS to date, including by sector, by policy type, looked at in terms of number of measures and percentage of expected savings. Chapter 5 focuses Energy Efficiency Obligation Schemes, the most important single Article 7 policy. In Chapter 6, case studies of good and poor practice in meeting Article 7 are presented. The report closes with conclusions and recommendations in Chapter 7.

Chapter 2 – Methodology

This report is based on existing evidence on Article 7. Sources used for this report include in particular:

- formal notifications of Member States' detailed plans to reach the energy savings target under Article 7 which had to be provided by 5 December 2013;
- the relevant additional information on Article 7 provided in the NEEAPs;
- data on progress provided in the Annual Reports that were due by 30 April 2015;
- reports produced as part of the ENSPOL project.[1]

In addition to these sources, the authors have made use of a range of academic and applied literature, and refer to analysis of Article 7 by other experts (e.g. the Coalition for Energy Savings).

Research commissioned by the European Commission, Directorate-General for Energy has systematically analysed submissions by Member States resulting in a study published in 2015 (Rosenow et al. 2015) which is now outdated. In a follow-on project the analysis was expanded based on replies by Member States to EU pilots requesting additional information on the implementation of Article 7. At the time of writing the results of this study have not been published. However, the European Commission Services have kindly provided the authors with an extract of this work so that the research can be used as part of this study ahead of publication.

[1] enspol.eu

Note that energy savings estimates provided by MS in their NEEAPs and notifications are highly uncertain for a number of reasons. One of them is that it is often unclear on which basis the expected savings have been calculated and only in some cases have Member States used ex-post evaluations of existing policies to inform estimates of the likely energy savings from future policies. It has not been possible for the authors to perform detailed checks of the calculations as most MS do not report the detailed calculations for savings from the different policy measures. For this reason the quantitative data on the expected energy savings presented in this report should be treated with some caution.

The uncertainty and reliability of policy impact estimates appears to be a general issue in European energy and climate policy - less than 10% of the entries in the 2011 reporting cycle of the Monitoring Mechanism on emissions reductions in Member States included quantitative data based on ex post evaluations (Hilden et al. 2014). This finding is consistent with the analysis by Stern and Vantzis (2014) who argue that most evaluations carried out in EU Member States rely on ex-ante estimates whereas the in the US the use of ex-post evaluations is much more common. There are also significant differences with regard to the professional evaluation capabilities in the Member States (Huitema et al. 2011) which partly explains the inconsistencies in Member States' approaches.

Chapter 3 - Setting national targets

Article 7 requires Member States to set an energy savings target for the period 2014-2020. Member States had to provide the calculation used to derive their cumulative energy savings target. This calculation needs to be based on a savings rate of 1.5% per year compared to the average energy consumption in the period 2010-2012. However, the total energy savings target may be lower than this savings rate for two reasons:

1) First, Member States can exclude the entire energy consumption of the transport sector, energy volumes transformed on site and used for own-use, and those that are used for the production of other energy forms for non-energy use.

2) Second, Member States can use exemptions. Four different exemptions may be used (Article 7(2)) with the possibility of using a combination of all four exemptions subject to the provision of Article 7(3), whereby the maximum threshold of the exemptions should not exceed 25% of the target, based on the 1.5% per year saving rate. These exemptions are:
   (a) phasing in of the energy savings (1% for 2014 and 2015; 1.25% for 2016 and 2017; and 1.5% for 2018, 2019 and 2020);
   (b) exclude final energy use in the ETS industry;
   (c) supply-side energy savings (efficient energy production and distribution); and
   (d) early actions (since 31 December 2008).

The effects of both possibilities to reduce the target are illustrated below.

Baseline

Table 1 provides an overview of the baselines used by Member States. The adjusted baseline represents the baseline actually used by the Member State for the purpose of calculating the target.

Table 1: Notified baseline calculations for each Member State

Member State	Final energy consumption (ktoe/yr)	Adjusted baseline (ktoe/yr)*	Transport excluded (ktoe/yr)	Energy production for own use, if excluded (ktoe/yr)
Austria	26,570	16,508	8,565	1,497
Belgium	30,171	21,940	8,231	yes, but not specified
Bulgaria	not provided	6,167	yes, but not specified	-
Croatia	6,148	4,112	2,036	-
Cyprus	1,863	767	1,023	73
Czech Republic	26,228	14,491	5,864	3,219
Denmark	15,086	10,113	4,973	-
Estonia	2,872	1,938	787	146
Finland	25,535	13,373	4,939	7,222
France	154,843	97,060	49,380	9,393
Germany	215,845	133,324	61,192	21,329
Greece	18,335	10,580	7,328	427
Hungary	15,850	11,675	4,170	5
Ireland	11,295	6,873	4,422	-
Italy	121,962	80,961	41,001	-
Latvia	3,970	2,702	1,109	159
Lithuania	4,744	3,188	1,556	-
Luxembourg	4,267	1,636	2,631	-
Malta	451	179	272	-
Netherlands	37,045	36,591	yes, but not specified	454
Poland	64,610	47,040	17,570	-
Portugal	not provided	8,038	6,903	2,629
Romania	22,752	17,495	5,257	-
Slovakia	9,466	7,252	2,214	-
Slovenia	4,910	2,999	1,911	-
Spain	85,965	50,727	35,239	-
Sweden	27,438	27,438	-	yes, but not specified
UK	142,132	88,392	53,740	-

Member State	Final energy consumption (ktoe/yr)	Adjusted baseline (ktoe/yr)*	Transport excluded (ktoe/yr)	Energy production for own use, if excluded (ktoe/yr)
Total	1,080,353 **	723,5592	332,313**	46,552**

* Adjusted means the value after subtracting 'energy use by transport' and 'production for own use', where relevant.

** Not specified by all Member States

Source: Commission services (2016)

The overview shows that all but one Member State (Sweden) have excluded energy use from the transport sector from the baseline used for target setting. 14 out of 28 Member States have excluded own energy use from the baseline used for target setting. The overall effect is that the target calculated before exemptions is about 1/3 lower compared to a situation where no exclusions take place.

Exemptions

Table 2 provides an overview of the amount of exemptions used by Member States. It shows that 24 out of 28 Member States use the maximum 25% exemptions. 21 Member States use exemption 7(2)(a) – phasing, 15 Member States use 7(2)(b) – exclude ETS industry, 5 Member States use option 7(2)(c) - supply-side energy savings, and 13 Member States use option 7(2)(d) – early actions. Overall exemptions lower the sum of all targets by 24%.

Table 2: Exemptions used and impact on energy savings targets

Member State	Energy savings target (ktoe)	exemptions used (%)	Type of exemptions used			
			Phasing in	EU ETS sector excluded	Supply-side savings	Early actions
Austria	5,200	25%				y
Belgium	6,911	25%	y	y		y
Bulgaria	1,943 *	25%			y	y
Croatia	1,295	25%	y	y		
Cyprus	242	25%	y	y		
Czech Republic	4,564	25%	y			y
Denmark	4,130	3%			y	
Estonia	610	25%	y	y		y
Finland	4,213	25%	y	y		y
France	30,574	25%		y		y
Germany	41,989	25%		?		y
Greece	3,333	25%	y	y		

[2] For comparison: The adjusted final energy use (average 2010-2012, all 28 Member States), according to Eurostat, with energy use by transport fully excluded and without exclusion of energy production for own use, is 764,588 ktoe/yr.

Member State	Energy savings target (ktoe)	exemptions used (%)	Type of exemptions used			
			Phasing in	EU ETS sector excluded	Supply-side savings	Early actions
Hungary	3,396	25%	y	y	y	
Ireland	2,164	25%	y	y		
Italy	25,502	25%	y			y
Latvia	851	25%	y	y		
Lithuania	1,004	25%	y		y	y
Luxembourg	515	25%	y	y		
Malta	56	25%	y			y
Netherlands	11,512	25%	y	y		
Poland	14,818 *	25%		y		y
Portugal	3,376	0%	n/a	n/a	n/a	n/a
Romania	5,817	21%	y			
Slovakia	2,284	25%	y			y
Slovenia	945	25%	y		y	
Spain	15,979	25%	y	y		
Sweden	9,114	21%	y			
UK	27,859	25%	y	y		
Total			**21**	**15**	**5**	**13**

* Target not explicitly notified, value is derived from the submitted information by the Member State.

Source: Commission services (2016)

The combined effect of the exclusions from the baseline and the exemptions is that the notified saving targets are only about half of what they would be without those adjustments i.e. the annual saving rate of 1.5% is reduced to about 0.75%.

Chapter 4 - Policy adoption by MS

In this section we provide an overview of the types of policy measures implemented across all 28 Member States. In total, Member States implemented or plan to implement 479 policy measures. Some countries notified very few policy instruments (e.g. Italy) whereas others such as Germany or Slovakia adopted 112 and 66 policy instruments respectively. Five Member States have notified a single policy measure for the implementation of Article 7: Denmark, Poland and Bulgaria, and Luxembourg notified only EEOSs whereas Sweden exclusively uses an energy/CO_2 tax. This shows that there are significant differences in how Member States comply with Article 7.

There have been attempts to develop criteria for selecting optimal policy measures for compliance with the Energy Efficiency Directive (Mikucioniene et al. 2014) but in reality Member States do not use a consistent approach when deciding on which policy measures to implement. In many cases existing policies determine the selection of policy measures for compliance with Article 7 (75% of all policy measures (Rosenow et al. 2015)), although some Member States have decided to follow the implicit recommendation of Article 7 to adopt EEOS as the analysis below illustrates.

For the 25% new policy measures it is not clear whether all of them have been introduced as a result of Article 7. It is likely that some policy instruments were already planned prior to Article 7 coming into force. However, without carrying out in-depth research in each Member State it is not possible to determine how many additional policy measures have been implemented as a result of Article 7. Furthermore, the available information on new policy instruments does not indicate whether the measure has already been implemented or not. The authors have analysed whether or not policy measures are operational for EEOS specifically (see section on EEOS) because a) they make by far the largest contribution to the overall savings (see below) and b) the number of EEOS is manageable within the scope of this study.

Categorisation

The Directive allows for the use of any policy measures (as alternative measures) that results in end-use savings equivalent to the target defined by Article 7. It provides a typology of policy measures that can be considered for implementation which has also been used in this paper:

- EEOS: EEOS oblige energy suppliers and/or distributors to deliver a specified amount of end-use energy savings within a defined period of time.
- Energy efficiency national fund: even though many MSs operate a national fund for financing energy efficiency measure, in this context it means a fund where obligated parties can make an annual financial contribution to fulfil their obligation under Article 7 as defined in Article 20(6).
- Energy or CO_2 taxes: a levy on the energy and/or carbon content of fuels above minimum EU-requirements that - by increasing the price of the fuels - incentivises fuel saving. Financial stimuli to energy efficiency investments through the taxation system (e.g. tax rebates for building renovation) are included in the financing and fiscal incentive policy group.
- Financing scheme or fiscal incentive: such schemes provide monetary support from public sources that are allocated either on the basis of application (e.g. applying for a grant under a renovation support scheme) or induce energy saving actions automatically (e.g. automatic eligibility to tax concession when purchasing an electric vehicle).
- Regulation or voluntary agreements: voluntary agreements are typically agreements by a sector - or group of similar actors - with public authorities in which they commit to a) reduce end-use energy consumption over time, b) design and implement an energy efficiency plan, or c) apply specific energy efficient technologies. Regulations – in this context - are obligatory and legally binding measures that do not belong in any of the other categories.

- Standards and norms: these administrative measures aim at setting minimum energy efficiency requirement of products and services in addition to mandatory EU requirements.
- Energy labelling schemes: energy labels provide easy-to-understand energy use information of products that facilitate energy-conscious consumer choices.
- Training and education: educational actions that results in the use of efficient technologies or behavioural changes reducing end use consumption.
- Other policy measures: this category comprises any other policy measures that do not fit with the main categories of policy instruments.

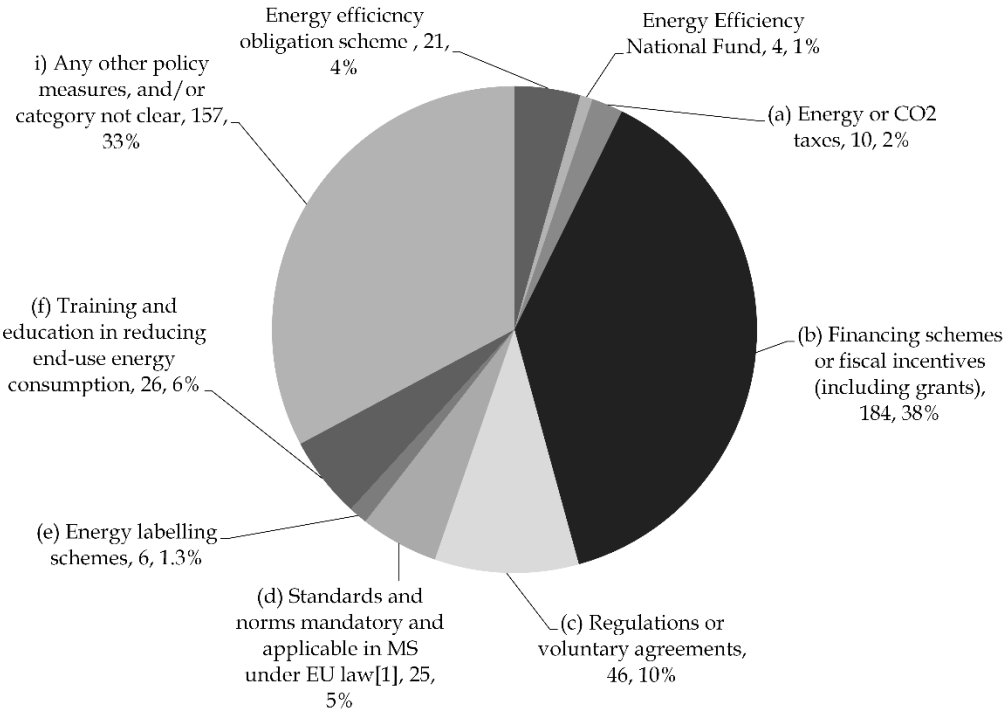
Share of different policy measures

Following the methodology set out in the methodology section we a) counted the number of policy measures by type and b) aggregated the notified energy savings by policy instrument type. Note that this data is purely based on what Member States expect and needs to be treated with some caution.

The largest share of the overall savings is expected to be generated by EEOS (34%), financing schemes or grants (19%), and from taxes (14%). Hence more than half of the savings are expected to be delivered by policy instruments that provide a direct financial incentive to the target group(s) in order to persuade the beneficiaries to invest in energy efficiency improvements. EEOS typically involve a financial contribution from the obligated parties to the overall investment cost of energy efficiency technologies/improvements. The remainder is paid by the beneficiary. Whilst there are exceptions to this, for example if EEOS target low-income customers (Rosenow et al. 2013), the majority of measures delivered by EEOS is only part-funded by the obligated parties (Rohde et al. 2014). From the perspective of the beneficiary EEOS provide them with an economic incentive to install energy efficiency measures. Taxation measures provide an indirect financial incentive to invest in energy efficiency as they increase the cost for using energy and reduce the payback periods of energy efficiency improvements. Together, the instruments changing the cost profile of energy efficiency investments are expected to generate about 2/3 of the overall savings.

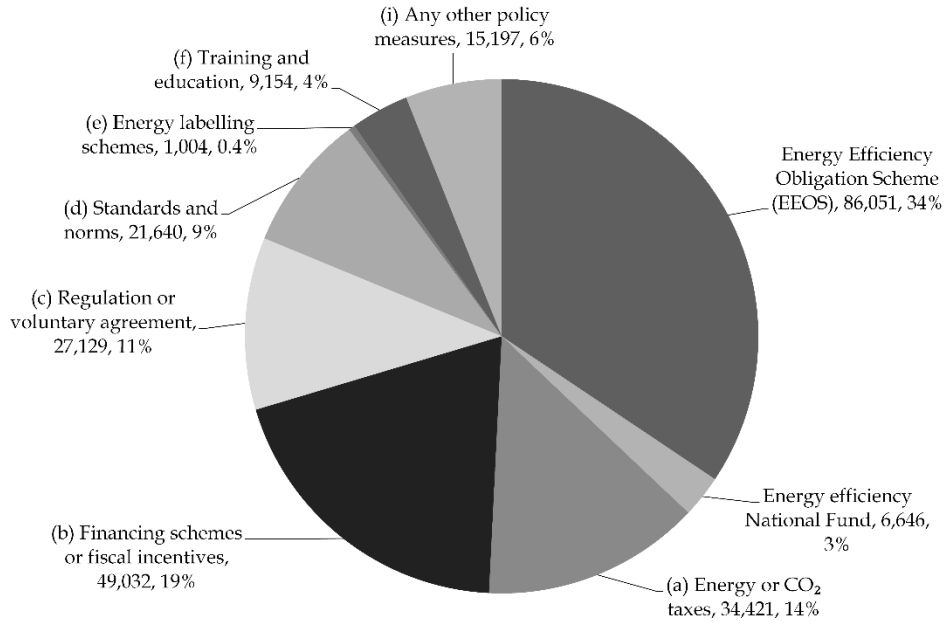
Figure 2 provides an overview of both the number of the different policy measures by policy instrument category. Figure 3 presents the share of the overall savings by policy instrument type.

Figure 2: The number of notified policy measures by policy measure type



Source: Commission services (2016)

Figure 3: The expected energy savings [ktoe] by policy measure type



Source: Commission services (2016)

The analysis shows that a small number of measures – essentially those genuinely horizontal in nature - deliver a large share of the total savings. In terms of the number of policy instruments, EEOS comprise just 4% of all policy measures whereas in terms of expected energy savings their share is 34%. Similarly, the 10 notified energy and CO_2 taxes (2% of the

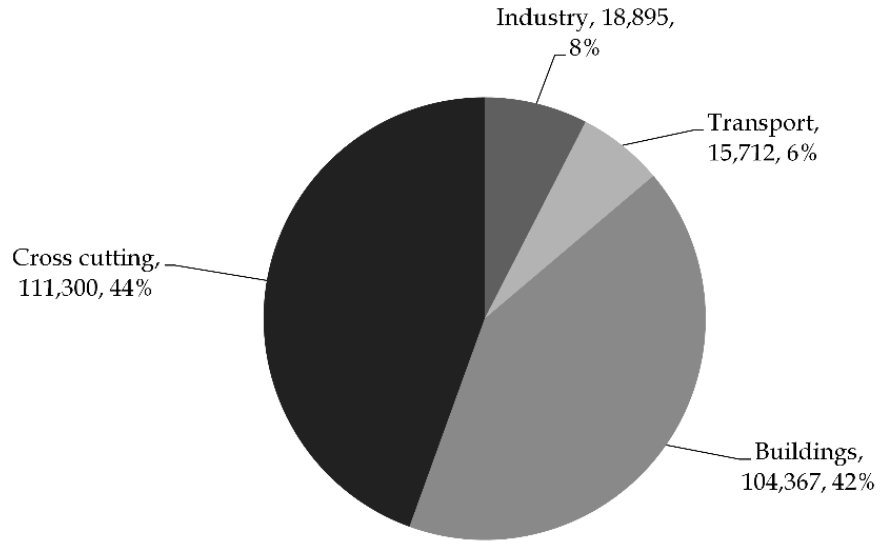
total number) are expected to deliver 14% of overall savings. On the other hand, the financing schemes and fiscal measures policy group is more fragmented (38% of policy measures deliver about 20% of savings): such support schemes are often very specific according to the type of support (e.g. grant or loan), the target sector and even subsectors (e.g. public buildings only).

Sectoral focus of policy measures

The energy savings can be split by sector, although for 44% of the notified savings it is not possible to attribute them to a specific sector because the policy instruments generating those savings are cross-cutting i.e. they deliver savings in a range of sectors.

The analysis in Figure 4 shows that most of the savings will be delivered in the buildings sector. Assuming the same split within the cross-cutting category as for the non-cross-cutting share of the savings, the total savings from the buildings sector amount to 75% of the total. This is in line with the large potential for energy efficiency improvements in buildings (Braungardt et al. 2014).

Figure 4: Sectoral split of notified savings



Source: Commission services (2016)

Assessment of the credibility of the notified savings

The energy savings presented above are based on the estimates provided by Member States in their notifications. However, it is necessary to consider whether these estimates of the energy savings are realistic and credible in all cases, and can be considered additional to what would have happened in the absence of the EED. In some cases, for example, Member States may have notified measures that are not eligible for meeting the Article 7 target. It is therefore necessary to make an adjustment of the overall savings to better reflect what is really expected to be delivered by Article 7, in terms of cumulative energy savings.

Four indicators can be used to assess the credibility of the notified energy savings:

- Eligibility: This indicator addresses the purpose of the policy measure, i.e. whether the measure is primarily targeted at achieving end-use energy savings or whether it mainly focuses on other objectives e.g. renewable energy deployment. Only policy measures that deliver end-use energy savings are eligible.
- Additionality: This indicator relates to the additionality of the policy measures to minimum EU standards and in particular whether or not the requirements of the EPBD have been taken into account when calculating the energy savings.
- Risk of non-delivery: This indicator addresses the risk on non-delivery of the notified amount of savings. This depends on a wide range of issues such as potential over-estimations of energy savings due to methodological shortcomings.
- Risk of double counting: This indicator encapsulates that potential for overlap between policy measures targeting similar sectors and, as a result, the risk for double counting of energy savings.

The results of the analysis for all indicators are presented in Table 3. It is clear that due to the process of the EU Pilots during 2015, there has been a significant improvement in the completeness and quality of the notified information.

Table 3: Credibility assessment of notified energy savings

Indicator	Result
Eligibility	
Fully eligible	68%
Mainly eligible (>50% of savings eligible)	26%
Mainly not eligible (>50% of savings not eligible)	5%
Unclear	1%
Additionality	
Fully additional	43%
Mainly additional (>50% of savings additional)	24%
Mainly not additional (>50% of savings not additional)	14%
Unclear	19%
Risk of non-delivery	
Low	57%
Medium (>50% of savings likely to be delivered)	13%
High (>50% of savings at risk of not been delivered)	6%
Unclear	24%
Risk of double counting	
Low	81%
Medium (>50% of savings not at risk of double counting)	12%
High (>50% of savings at risk of double counting)	1%
Unclear	6%

Source: Commission services (2016)

However, currently only 14% of all energy savings have been rated as fully eligible, fully additional, at low risk of double counting and at low risk of non-delivery. This means that 86% of all savings are at least partially at risk of not being realised.

Chapter 5 - Focus on EEOS

Overview

'Energy Efficiency Obligation Schemes' (EEOS) are a key policy tool being used to deliver Article 7 savings. The general definition of an EEOS is that it is an energy saving requirement placed on 'obligated parties' by government, where obligated parties are typically energy distributors or retail energy or fuel sales companies. Prior to the introduction of Article 7, there were six EEOS within the EU - in Denmark, Flanders (formally ceased 2011), France, Italy, Poland and the UK (for a detailed description of each individual scheme see ENSPOL (2015a). There are also several international examples of EEOS (ENSPOL 2015b). New EEOS are being introduced / planned in the following countries: Austria, Bulgaria, Croatia, Estonia, Ireland, Latvia, Lithuania, Luxembourg, Malta, Slovenia, Spain (as of October 2015, based on Member States' notifications and NEEAPs). This takes to sixteen the number of member states with existing or planned EEOS.

Obligation schemes differ strongly between countries, and no two EU EEOS are the same. They vary in many respects, including the number and type of obligated parties (distributors or retailers; type of energy supplied: electricity, gas, heating oil, district heating, transport fuel), eligible sectors, eligible projects, monitoring and evaluation, calculation methodologies, the fund-raising mechanism, policy goals and the metrics used for target setting. The longer-established EEOS also tend to have changed considerably over time (Rosenow 2012). This illustrates the flexibility of EEOS as a policy instrument, and its adaptability to national circumstances and policy priorities.

EEOS have a strong track record of success. Most of the established EU EEOS have demonstrably been important in delivering national energy efficiency improvement. Placing obligations on energy suppliers in a competitive market has been successful in that targets have, with rare exceptions, been delivered. In addition, EEOS have developed incrementally and grown steadily in scale, resulting in growing targets over the years (ENSPOL 2015a). Overall, the majority of savings have come from relatively low cost energy measures in the buildings sector. This has meant that the EEOS have delivered very cost effective savings, which have reached large numbers of householders and organisations. The approach has been different in Denmark, where most savings have consistently come from the industrial sector. The Italian scheme now largely delivers savings from the industrial sector, but in the earlier years (prior to 2010) considerable savings came from residential programmes.

However, two of the pre-Article 7 EEOS – those in Poland and the Belgian region of Flanders – had a different history. The scheme in Poland, introduced in 2011, has faced considerable criticism, and was completely revised in 2014. Weaknesses of the first phase included the lack of savings delivered, and, in particular, the overly-complex auctioning mechanism for

white certificates, a central part of the original scheme which has now been abandoned. The EEOS in Flanders was operational 2003–2011, after which it was replaced by 'action obligations' on electricity distributors. The new policy was introduced because it guaranteed more uniform responses from utility companies, involved a lower administrative burden and delivered certainty of savings (ENSPOL 2015a). Experience in Poland shows EEOS can fail to deliver the expected savings. Also, even if they do deliver the savings targets, they may be discontinued if they do not meet other policy goals, as happened in Flanders.

Thus far, 12 EU countries have chosen not to include an EEOS within their policy mix. There may be a variety of reasons for this. EEOS were considered as a policy option within Germany over a number of years, but rejected primarily because of the quantity and heterogeneity of their energy companies. In addition, Germany had an existing architecture for funding of energy efficiency, into which a new policy would need to fit, and there was concern that an EEOS might distort the existing market for energy services (Seefeldt, Pehnt et al. 2015). Portugal has several years' experience with voluntary involvement of utilities in delivering energy efficiency (Sousa, Gomes Martins et al. 2015), so might have been thought to be in a good position to adopt an EEOS, but has not done so according to its NEEAP and Article 7 notification. Although another source suggests Portugal does have an EEOS, just that it is not part of Portugal's route to Article 7 compliance (CES 2015).

Benefits of EEOS

In their recent consultation on the review of Directive 2012/27/EU on Energy Efficiency, the Commission asked consultees which of the following benefits EEOS could potentially deliver:

- lower bills for energy consumers;
- better awareness of energy efficiency;
- better relationships between energy suppliers, distributors and customers;
- lower generation costs;
- improved environment for innovative energy services; aggregation of small-scale investment;
- development of new financing models;
- stimulation of energy efficient renovation of buildings;
- increased competitiveness in energy markets.

In theory, all these benefits could be delivered, but experience of EEOS so far shows that different schemes have delivered a different set of benefits, because of the way they have been designed and implemented. For example, in the UK, the EEOS has been demonstrated to lead to lower energy bills for customers (on average) (ENSPOL 2015a), but there is much less evidence for the other potential benefits, and some have definitely not been delivered. For example, new financing models have not been delivered, largely because the UK scheme only applies to the residential sector, where new finance models have little salience. In terms of meeting the requirements of the EED though, only delivered energy savings are of interest.

There is an emerging body of evidence on the cost of EEOS. For four countries the cost (including capital cost and administrative cost) have been as following:

- France: 0.4 Eurocent / kWh
- Denmark: 0.45 Eurocent / kWh
- Italy: 1.7 Eurocent / kWh
- UK: 0.7 Eurocent / kWh

(Lees 2012, Rosenow and Galvin 2013).

The cost of EEOS are significantly below the price of energy which makes them highly cost-effective, although that depends of course on their technological focus and whether or not they support high- or low-cost technologies.

Designing EEOS

There is considerable high quality advice available about designing an EEOS from experience within the EU and beyond (RAP 2012, ENSPOL 2015a 2015c). Some of this has been developed by the ENSPOL project, which is also facilitating knowledge exchange between MS on EEOS and alternative policies.

There are a number of key design features of EEOS and, as mentioned earlier, no two EU EEOS are same. Full details of designs are available elsewhere (ENSPOL 2015a 2015c). A brief description of two key characteristics, the obligated parties and the sectors covered, are given below, to illustrate the diversity of choices made. In almost all countries, smaller organisations are excluded from the list of obligated parties - for brevity those limits are not described in the table. The number of obligated parties can range from one (in Malta) up to tens, hundreds, or even thousands, depending on scheme design. Most EEOS cover all sectors, but some focus more or exclusively on the residential sector.

Table 4: EEOS - obligated parties and sectoral coverage

	Obligated parties	Sectoral coverage
New and planned EEOS		
Austria	retailers of energy - including motor fuels and biomass	all sectors but mandatory minimum share for residential sector (40%)
Bulgaria	electricity, heat, natural gas, liquid and solid fuel traders. Excluding transport fuel retailers	all sectors incl. energy transformation, distribution and transmission sectors
Croatia	distributors of electricity, natural gas and thermal energy (gradual inclusion of obligated parties, first distributors of electricity from 2016, other parties from 2017)	all sectors
Estonia	energy network operators and retail energy sales companies	all sectors
Ireland	energy suppliers, importers of road transport fuel	mandatory split: residential (75%), residential (20%) and energy poverty (5%)
Latvia	electricity supplier AS "Sadales tikls", the operator of the national gas system, and heating supply companies or operators of district heating system	all sectors
Lithuania	electricity distribution network operator AB Lesto, the natural gas distribution network operators AB Lietuvos dujos and heating companies	all sectors
Luxembourg	all suppliers of electricity and natural gas serving residential, service sector and industrial customers	all sectors
Malta	Enemalta Corporation (monopoly distributor)	residential
Slovenia	suppliers of electricity, heat, gas and liquid and solid fuels to final customers	all sectors
Spain	suppliers of electricity and natural gas, and wholesale	all sectors

	retailers of oil products and LPG	
Established EEOS		
Denmark	The grid and distribution companies for electricity, natural gas, district heating and oil	all sectors except transport
France	suppliers of electricity, gas, LPG and district heating + transport fuels	all sectors except for actions in facilities subject to the ETS
Italy	electricity and gas distributors	all sectors
Poland	electricity, natural gas and district heating companies selling to final consumers, members of a commodities exchange, commodity brokerage houses	all sectors including transport distribution, and own energy use
UK	Electricity and gas retailers	Residential sector only with requirement that a high % of measures be delivered to vulnerable groups

Source: ENSPOL 2015a, 2015 c plus Member State notifications and NEEAPs

How successful are newer EEOS likely to be?

A key question is whether the new EEOS are likely to emulate the success of schemes in Denmark, France, Italy and the UK. Success is not determined by who the obligated party is, the way the targets are set, the sectors across which it operates, the degree of tradability of savings – which have varied between these countries. Factors that the successful schemes have in common are: (1) beginning with modest levels of savings; (2) increasing in ambition level over time; (3) learning from early phases and re-designing the EEOS to be more efficient and effective. The established schemes have proven that they can deliver high levels of savings, so there is evidence that EEOS of the right design and implementation can deliver up to 100% of a country's Article 7 savings.

Article 7 targets have to be met between 2014 and the end of 2020, giving a relatively short time for newly introduced EEOS to deliver significant savings. Successful schemes typically have limited savings targets on introduction. In France, the first three years of the EEOS (2006 - 2009) were treated as a trial period with low savings targets, so that obligated parties could acclimatise to the system and build relationships with the various stakeholders needed to deliver measures. The scheme was re-designed after experience in the first phase. There was a similar pattern of gradual introduction, learning and re-design in Italy and Denmark. In the UK, significant savings targets were only set after the first 10 years of the scheme. However, the time scale it typically takes before EEOS can deliver significant savings can be short cut in the new EEOS schemes.

Two ways in which the initial learning period could be shortened are:
(1) build on existing experience of a voluntary scheme for obligated parties;
(2) adopt (and adapt) a successful EEOS design from another country.

Of these approaches, Austria, Ireland and Slovenia have taken the first approach, and only Luxembourg has taken the second (Table 5).

Table 5: Selected characteristics of EEOS

	Contribution to overall Article 7 target	Date started	Comments
New and planned EEOS			
Austria	42%	2009 (voluntary) 2015 (mandatory)	Law came into force 2014 & start date of obligation is 1/1/15
Bulgaria	100%	2014	
Croatia	41%	expected to start in 2016	
Estonia	5%	expected to start in 2018	
Ireland	48%	Voluntary programme 2011 - 2013 Mandatory from 2014	
Latvia	65%[3]	Unclear	
Lithuania	77%	2015(expected)	
Luxembourg	100%	January 2015	Based on the Danish scheme, so direct experience to learn from.
Malta	17%	2009 smart meter roll out + behavioural change from 2016; 2014 for progressive tariffs	What is called an EEOS could equally be described as a collection of 'alternative measures' policies which affect the one public utility in Malta.
Slovenia	33%	2015	Builds upon experience in Eco Fund, which is longer-established
Spain	44%	July 2014	Introductory phase where money paid into a Fund (from 2014). First measures approved in 2015. (44% is Energy Efficiency Fund plus EEOS)
Established EEOS			
Denmark	100%	1995	
France	87%	2006	
Italy	62%	2005	
Poland	100%	2012	Completely revised in 2014. Little information available about new scheme.
UK	21%	1994	

Sources: ENSPOL 2015a, 2015c, Rosenow et al 2015 plus national NEEAPs and Annual Reports

There must be some delivery risk attached to newly introduced or planned EEOS which have not tried to shorten the learning period. Based on Table 5, EEOS in the following countries are at higher risk of under-delivery: Bulgaria, Croatia, Estonia, Latvia, Lithuania and Spain. Given the problems with Phase 1 of its EEOS, that of Poland must also be at some risk. For countries where EEOS are expected to deliver a considerable proportion of their savings, this matters.

[3] Though target for the EEOS not yet formally notified by Latvia

This analysis does not incorporate the many other issues of importance: additionality, materiality, monitoring and evaluation, savings estimation and double counting mentioned in Chapter 4.

The future of EEOS

The challenge for EEOS focused on the buildings sector is adapting to continue to deliver savings, as the low-cost mass market technological savings opportunities reduce. In some countries, the cheaper residential insulation options such as cavity wall or loft insulation have already been achieved in much of the building stock. Most efficient lighting and appliance options are now no longer 'additional' (with the exception of LED lighting). Increasing attention is focused on delivering 'deep' renovation, but it is difficult to see how EEOS could support deep and complex refurbishment, given the high capital costs and long payback periods.

One option is to move focus from the buildings sector, and look to delivering savings from industry and transport. Denmark and Italy have realized strong savings in the industrial sectors, France is one of the few that obliges suppliers of automotive fuel to achieve energy savings. Including them in the scope of the EEOS, allows targeting a more ambitious objective, while increasing the competition between obligated parties and the diversity of offers and business models developed to reach final consumers.

Chapter 6 - Case studies

Case studies of good and poor practice in meeting the requirements of Article 7 can help illustrate how MS can improve their reporting, compliance and policy design and implementation. A number of good practice and poor practice case studies are given below, including examples relevant to additionality, double counting, monitoring and verification, and penalties. In addition to the best practices highlighted here, a series of national good practice case studies related to the Energy Efficiency Directive as a whole are available on the Concerted Action Energy Efficiency Directive website - http://ca-eed.eu/country-information. The majority of these case studies do not relate to Article 7 however.

The most common 'poor practice' probably consists in insufficient information being provided to the Commission to determine whether and how Article 7 requirements are being met. In addition, evidence on widespread shortcomings around additionality, materiality, double counting and risk of non-delivery has been presented in Chapter 4, and is not repeated here. These poor practice case studies are intended to provide a snapshot of some issues in more detail, rather than re-stating the earlier findings.

Examples of good practice

<u>Case study 1: Additionality</u>

Demonstrating additionality is a key challenge for MS, and one which has to be considered separately for each policy. MS may demonstrate additionality clearly for some of their policies, but not for others.

Lablanca and Bertoldi (2016) suggest that the way in which Sweden has calculated savings from its energy tax can be considered best practice in terms of how additionality was taken into account. However, they also note that this example is unlikely to be directly relevant to other MS, as Sweden is the only country to wholly rely on taxation measures.

A building renovation policy in the Brussels region of Belgium, 'BATEX', can be regarded as illustrating best practice on additionality. The notification document explicitly states that only savings that go beyond the savings obtained by the cost optimum methodology are counted; these cost optimum methodologies are described in a so-called Cost Optimum study (Belgian Government 2013, Rosenow et al 2015). As noted in the section on poor practice, many countries have not shown how they will achieve additionality with similar policies.

Case study 2: Catalogue of deemed savings measures for EEOS

The catalogue of standardized operations listing best practices in terms of energy efficiency measures and the savings that can be expected from these measures is a strong characteristic of the French EEOS. It has proven to be easy to implement, cost-efficient and flexible regarding the scheme needs for evolution. Multiple stakeholders are involved in developing the technical content, which is verified by ADEME. As of July 2014, standard operations represented 95% of the savings delivered since the launch of the French scheme (ENSPOL 2015a).

The French administration regularly updates the list so as to account for technical progress by 1) removing measures that no longer provide significant savings as compared to the regulated standard, 2) modifying existing measures to better represent present circumstances, and 3) adding newly approved measures. In Phase 2 of the EEOS there were 304 standardised operations in the catalogue. For Phase 3, these data sheets have been updated where necessary, and 163 were in place from January 2016 (MEEM 2015). The data sheets define which measure is eligible, in which sector, note any necessary quality standards related to manufacture, design and installation, give a life time, and state the cumulative kWh savings which can be attributed to the measure in each climate zone, which may vary depending on the installation date. These data sheets are freely accessible on a government web site.

France is not the only country to publish details of deemed savings for individual technologies, these are also available, for example, from Denmark, Austria and the UK - and all of these countries' processes also have good features (ENSPOL 2015, Lablanca and Bertoldi 2016). However, what makes the French approach stand out is the combination of the involvement of a range of stakeholders in developing the data, the level of detail provided, and the process of ongoing revision.

Case 3: Avoiding double-counting

Double counting is a potential issue for all MS, although those who have just notified one policy (Bulgaria, Denmark, Luxembourg, Poland, and Sweden) face much less of a challenge.

Austria has introduced an EEOS and a range of alternative measures to meet its Article 7 commitments. Most of the alternative measures do not potentially overlap in terms of either geography (some policies are delivered by regional authorities) or sector. However, there are electricity and gas taxes which do overlap with other measures. The risk of double counting has been reduced because estimates for the energy savings from the taxation measures are based on short-term elasticity only. It is assumed that the short-term elasticities reflect short term behavioural changes of customers only and not decisions about mid- to long-term investments (which are caused by subsidy schemes) (ENSPOL 2015d).

The UK has an established process and detailed guidance in place to avoid double-counting of expected savings from energy and carbon emissions reductions policies, which applies to projects and policies both within and without the scope of Article 7 (DECC 2015). This gives guidance on issues including baselines, counterfactuals and the rebound effect, and has an accompanying spreadsheet tool which can be used by policy analysts. However, if the guidance is not followed double counting may still occur, as has been suggested in relation to one particular policy, Climate Change Agreements (CES 2015).

Case study 4 : Monitoring and Verification

Croatia is currently developing an ambitious national reporting system for monitoring, measuring and verification of energy savings (SMIV). The savings achieved (in kWh, CO_2 and per sector) through the implementation of the energy efficiency measures from the National Energy Efficiency Action Plan (NEEAP) will be measured via the SMIV. The system will be used by all governmental bodies, companies that implement energy efficiency service contracts and bodies that co-finance energy efficiency measures. The monitoring and verification platform itself is a web tool that is administered by one national administrator (CEI). In addition, the platform will be equipped with an 'alarm system', reporting potential risk of double counting of measures or individual actions. Workshops have been held with a number of stakeholders, in preparation for introducing this system (Republic of Croatia 2015, Thenius 2015).

Assuming this system is implemented successfully, it should provide a transparent and unified approach to monitoring and verification.

Case study 4: Penalties for failing to deliver savings

Penalties are an important part of effective policy design, where the policy is not delivered by central government (as a government cannot penalise itself). Within Article 7 policies, the importance of penalties is clearest for EEOS, as, without penalties, the private sector obligated parties may fail to meet their targets.

In the UK in 2013/14 the penalty regime was invoked for the first time in the EEOS' 20 year history. Participation in the EEOS are a licence condition for UK energy suppliers (above a certain size). The EEOS was expanded to include a number of electricity generators in the period 2008-2012 only. In the event of a failure to deliver the obligation, obligated parties face investigation and penalties from the scheme regulator (Ofgem). The maximum penalty for breach of a licence condition is 5% of company turnover. In practice, penalties are likely

to be substantially smaller, as Ofgem's stated policy is that the 'quantum of penalty must be reasonable', taking into account a number of factors, including the harm to customers and the gain to the licensee. In the 2008-2012 obligation period, of the ten companies with obligations, four met their targets but six did not (Ofgem E-Serve 2013). The companies were fined amounts between £450,000 (€570,000) and £28m (€36m) (Ofgem 2014). Energy suppliers were obliged to deliver the missing measures in addition to paying the fine. For the generators, recently enrolled in the EEOS with no long term record of delivery, the money levied in fines was used to deliver benefits to customers for whom the schemes were designed. Thus the regime worked well to ensure that obligated parties were penalised for failing to meet their targets, and, most importantly, customers got the benefits EEOS was designed to deliver. Thus it can be considered an example of good practice.

Examples of poor practice

This section presents a number of specific examples of poor practice, which apply to more than one MS.

Case study 6: Additionality of building renovations and construction of new buildings

Energy use in buildings is an important source of savings from Article 7. However, savings generated by major renovations or construction of new buildings can be counted only if they exceed cost-optimal levels of energy performance already required by Member States under the Energy Performance of Buildings Directive. Several Member States have not provided sufficient information in their notifications concerning whether and how they have taken into account cost-optimal levels as reference consumption baseline (Rosenow et al 2015). This means it is unclear whether savings included in notifications are eligible under Article 7, which is particularly important for countries which expect considerable savings to come from these policies, notably the UK.

Both Article 7 and EPBD are complex pieces of legislation, and only a small number of experts understand either well. There seems to be very little understanding of the relationship between the two, and what that means for MS submissions. This theme is addressed further in Chapter 7.

Case study 7: Taxation and price elasticity

In terms of expected savings, carbon or energy taxation policies are third most important policy type (after EEOS and financial incentives). Determining the savings from taxation requires careful attention to additionality and double counting, as well as country-specific elasticity data for the relevant fuels and sectors. At a minimum, the EED states that recent and representative official data on price elasticities shall be used for calculation of the impact. However, detailed analysis has shown that the use of inappropriate elasticities and the inclusion of non-energy taxes is a problem (Rosenow et al 2015). Even for Sweden, whose general approach to estimating the effects of taxation has been praised, there is concern about how short-run and long-run elasticities have been used (Lablanca and Bertoldi 2016).

Modelling the expected effects of taxation is challenging. It is recognised that price elasticity is a complex subject, with methodological questions still open (Boonekamp 2007) and that

good-quality data on price elasticity are hard to come by, even in developed countries (Gillingham, Rapson et al. 2016).

Case study 8: Policy coherence

An important issue which has been raised by the Coalition for Energy Savings (CES 2014) is that of coherence of policy – or its lack. The key example is that except for Sweden, all countries excluded transport from their baseline calculations, but several countries still count energy savings from transport policy measures towards the target. While this approach is allowed under the Directive, it does not provide for a coherent policy. This may be more a criticism of the framing of the Directive, rather than of the decisions of MS.

Chapter 7 - Conclusions and recommendations

Assessing the plans of Member States involves considerable challenges both in terms of the complexity of the subject matter as well as the quantity of material that needs to be assessed. MS submitted more than 5,000 pages of material as part of their NEEAPs and notifications to the European Commission (excluding any material referenced in the documents). Given that some MS, which did not yet have fully developed implementation plans, supplied only a minimal amount of information the volume of material is likely to increase over time.

The analysis above illustrates that there are considerable uncertainties around the reliability of the energy savings estimates provided by Member States. The issue of eligibility of notified savings (e.g. those from renewable energy technologies) can be expected to be resolved as this is a simple compliance question and can easily be checked. Double counting does not affect a large part of the notified savings as illustrated by the figures presented in Chapter 4. This means that additionality and the risk of non-delivery are key concerns. The risk of non-delivery identified here derives from the lack of a consistent approach to monitoring and verification systems set up by Member States, and multiple methodological issues often not addressed by Member States when it comes to calculating energy savings from specific policy measures.

Hence the main areas of concern include:

- risk of non-additionality of energy savings; and
- weak or even absent monitoring and verification regimes; and
- methodological issues related to the calculation of energy savings.

We address each of those areas in turn before we provide a number of suggestions for policy reform.

Additionality

A significant part of the savings is at risk of not being additional to energy efficiency improvements that would occur even in absence of the policy measures notified by Member States. Although some Member States designed robust and comprehensive policy packages, additionality appears to be the most important concern.

The additionality of energy efficiency programmes has been discussed in the literature for some time (Vine and Sathaye 2000). Given that additionality is recognised as being an important element of energy efficiency policy the EED makes important provisions for how additionality should be ensured: Member States need to take into account. First, any savings notified under Article 7 must be additional to existing EU minimum requirements. In particular, this includes the Energy Performance of Building Directive (Directive 2002/91/EC, and Directive 2010/31/EU) and the Ecodesign Directive (Directive 2009/125/EC). Second, when calculating energy savings Member States need to give consideration to the potential impact of free-riders i.e. beneficiaries of the policies that would have undertaken energy efficiency improvements even in absence of the policies. The issue of free-ridership has been discussed in the literature at length (e.g. Saxonis 1991) but in our analysis we found only very few Member States who appear to have systematically excluded free-rider effects from their estimates. This lack of a counterfactual appears to be a common problem in European climate policy evaluation (Haug et al. 2010).

One reason for the small number of Member States who addressed additionality comprehensively is likely to be the scarcity of detailed guidance on how to address additionality issued by the European Commission and, resulting from this, a lack of understanding by Member States of what is required.

Monitoring and verification

Whilst the information Member States submitted on their energy targets, the policy measures and the expected savings is relatively complete there are substantial gaps with regard to monitoring and verification regimes adopted across the EU. In many cases the monitoring and verification system is described in the NEEAPs and the Article 7 notifications at a very high level only whereas in other instances even the most basic information is missing. However, partial or missing information on monitoring and verification does not necessarily imply that there are no robust monitoring and verification systems. Still, there is a significant risk that monitoring and verification regimes are weak and do not ensure that the estimated energy savings will be delivered in reality.

Recent analysis by Schlomann et al. (2015) illustrates that this is largely a result of the lack of binding rules for monitoring and verification at the EU level that provide sufficient detail and clarity to Member States. While Annex V of the EED sets out the basic requirements for monitoring and verification and the guidance note on Article 7 provides further explanations of how the requirements can be addressed, they do not set out in detail how monitoring and verification need to be addressed. This lack of clarity provides potential loopholes and does not result in a consistent approach to monitoring and verification across the EU. Member States adopt different approaches to calculate their energy savings, and report on their methodologies in different ways. This may be well justified, since some calculation approaches are better suited to some policies than others. However, as a result of this flexibility, the energy savings that are notified by Member States, and the information reported on methodologies, are not fully consistent or comparable at an EU level. This inconsistency presents uncertainty about whether the EU is on track to deliver its target, and reduces the integrity of the savings that are claimed at an EU level.

Calculation of energy savings

Energy savings estimates often do not account for factors that reduce the estimated savings. It has not been possible to review if and how those factors have been accounted for in Member States' estimations for all policy measures but initial probing suggests that for a large proportion of cases this may not be the case.

In principle, energy efficiency improvements can be offset by increased demand for energy services due to the rebound effect (Greening et al. 2000, Sorrell 2007). There are two components. Direct rebound is caused by reduced energy costs for the service for which energy efficiency has been improved. Indirect rebound is due to spending of the financial savings and its spillover effects in the wider economy. Direct rebound effects tend to be in the range 0-30% for major energy services such as heating and cooling (Sorrell et al. 2009), but more prominent in lower income groups (Hens et al. 2009). Overall, it is a small, but not negligible, effect in EU countries and is increasingly accounted for in programme evaluation (Wade and Eyre, 2015). Knowledge about indirect rebound effects is much weaker and therefore it is generally neglected in programme evaluation. Evidence relies very largely on economic modelling and is very diverse. Indirect rebound effects may be very large for industrial technologies experiencing very rapid deployment (Sorrell 2007), but there is no basis for assuming large effects elsewhere. Declining energy consumption trends in the EU as energy efficiency has improved indicate very small indirect rebound effects.

Assessments of energy efficiency programmes in buildings need to take account of the energy performance gap, i.e. the growing body of evidence that energy efficiency projects reduce actual energy consumption by less than the prediction of simple building physics models (e.g. Wingfield et al. 2008). The effect is partly due to direct rebound, but also can be affected by the quality of building projects, (lack of) training of users with regard to their new technologies / measures, and by unrealistic assumptions about energy use in poorly heated buildings before retrofit (Sunikka-Blank and Galvin 2012). Techniques are under-development to address the effect, including post-occupancy evaluation, e.g. (Menezes et al. 2012) and feedback to building occupants. (Gupta and Chandiwala 2010).

Initial probing of Member States' calculation methods suggests that so far only few countries in the EU systematically account for the effects discussed above. The use of these factors should be taken into account in future programme evaluation (where this is not already the case) for the purpose of reporting on Article 7.

Suggestions for policy reform

As illustrated above, the key issues that affect the reliability of the expected energy savings include the potential non-additionality of energy savings, and the lack of robust monitoring and verification regimes. For each of those issues suggestions for policy reform are presented below. An overarching suggestion is to revisit the requirements in the Directive related to additionality, policy overlaps and monitoring and verification with the view of providing more clarity and detail. Alongside this, templates covering all of the requirements in a systematic manner accompanied by clear guidance would a) enable Member States to understand what exactly is required and how they have to report compliance and b) help the Commission with ensuring that the EED is implemented as intended.

Ensuring additionality

The intention of the EED is to deliver energy savings additional to the status quo. Therefore a number of provisions are made in the Directive to take into account existing EU minimum requirements and take free-rider effects into account in the calculation of energy savings from policy measures. In order to achieve this Member States need to estimate the savings from a policy instrument and subtract the portion of savings from the policy instrument that would be delivered by existing EU minimum requirements as well as the estimated free-rider effects. Only some Member States currently demonstrate they have a comprehensive methodology in place.

One reason for the inconsistent approach to additionality is that the requirements in the Directive are not always clear. For example, Annex V lists some existing EU minimum requirements explicitly but not others which has led to confusion and loopholes. For example, the Commission expects Member States to take into account the cost-optimal path for energy efficiency set by the EPBD when using building regulations. However, the EPBD is not mentioned in Article 7 and Annex V which is why some countries argued that there is no legal obligation to include the cost-optimal path of the EPBD in their calculations.

As a way forward, Annex V should state comprehensively which EU minimum requirements need to be considered. In addition, clear guidance on how to factor in EU minimum requirements in energy savings calculations with some worked examples would enable Member States to follow this approach more consistently. Finally, the EED should require Member States to report to the Commission in detail how they have ensured that savings from existing EU minimum requirements are not included in their estimates.

Strengthening the monitoring and verification regime

The inconsistent approach to measuring energy savings and monitoring and verification leads to considerable uncertainties as to whether the anticipated energy savings will be delivered. Following the implementation process of the Energy Services Directive in 2006 similar issues were discussed in the literature (Boonekamp 2006; Thomas et al. 2012). This literature can form the basis of a clear and consistent approach to monitoring and verification of energy savings across the EU. The Commission should establish more detailed guidance and clarify the requirements in Article 7 and Annex V to address the currently incomplete understanding amongst Member States.

Ensuring a more consistent calculation approach

Annex V of the Directive sets out the 'common methods and principles' to be used in measurement of savings. Subject to the issues addressed above, the principles, such as additionality and transparency, are adequate. However, the methods are less satisfactory. Of the four allowed 'methods, two are 'scaled savings' and surveyed savings'. These are not well-defined in comparison to the two well-established evaluation approaches of 'deemed savings' and 'metered savings', for which there is good practice relying on agreed monitoring and verification protocols that use statistically valid data from previous and current installations respectively. Well-established national obligation schemes (in Europe and elsewhere) have found it necessary to developed very detailed rules. It would not be

sensible for such set of rules to be fixed in a Directive, but some common basis is required if the savings rules are to be transparent across Member States. It would be appropriate to rely on the established EU procedure of 'comitology' under which experts from Member States could agree such rules. These could incorporate guidance, templates and examples, as well being open to amendment as schemes develop. However in all of these cases, countries have different evidence bases and different skills and traditions. Harmonisation might not always be appropriate, but certainly having a shared understanding of the different values and methods used, and the reasons for these, would be a helpful step towards understanding the degree to which harmonisation could help.

Final conclusions

Given that the Energy Efficiency Directive and particularly Article 7 will be the primary delivery mechanism at EU level to encourage energy savings, this paper assessed to what extent Article 7 is likely to fulfil these expectations. An overarching energy efficiency target is an important part of EU policy but ultimately the efficacy of Article 7 of the Energy Efficiency Directive will depend on the policies implemented by MS to deliver those targets.

Based on a vast amount of information provided by Member States to the European Commission, we analysed which types of policy measures Member States implemented or plan to implement in order to comply with Article 7. It is not clear how many new policies the legislation has inspired because we cannot be certain whether new policies were already planned before Article 7 came into force. Whether or not new policy measures in themselves are a proxy for policy success is also doubtful – in many cases upscaling established instruments may be the more effective and efficient option in the short- to medium-term as the institutional systems necessary already exist. Also, implementing new policy instruments can be challenging and savings may often fall below expectations. For example, we highlighted the fact that many of the new EEOSs are at risk of failing to deliver the projected savings due the lack of opportunities for policy learning and phasing in of the schemes.

The report illustrated that there are considerable uncertainties around the reliability of the expected energy savings resulting from the inclusion of non-energy efficiency measures, the potential non-additionality of savings, double counting, the risk of non-delivery, and the implications of weak monitoring and verification systems. For each of those issues we provided an indication of the share of the energy savings that could be affected. Our analysis illustrates that a significant share of the expected savings is at risk of not being delivered in practice, although it is impossible to calculate the effect at this stage. This puts into question whether the EED will achieve its aims.

A number of suggestions for policy reform were developed that would strengthen the Directive and increase the reliability of the anticipated energy savings. Overall, the lack of clarity of the requirements with regards to what is required and how it needs to be reported can be addressed by more detailed provisions, extensive guidance, and reporting templates that ensure Member States follow a more consistent approach in calculating the savings and reporting them as well as outlining their monitoring and verification regimes.

In addition to the need to increase the certainty of delivery of savings there is scope for simplification. Simplification is particularly applicable to the current rules around the target calculation. The target should be set much more clearly, and without numerous exemptions, so that it is clear what MS have to do but also to eliminate the potential for loopholes. In reality, after exclusions and exemptions have been applied, the 1.5% target is effectively around 0.75%. This lack of clarity does not help anyone involved in the policy process, and reduces the chance of effective democratic oversight by civil society.

The Commission will need to report to the European Parliament by June 2016 on the progress of the implementation of the EED and a proposal for any legislative changes. This is a unique opportunity for revisiting the requirements, reducing unnecessary complexities, and providing Member States with a clearer framework which will ultimately lead to higher energy savings.

In addition, Member States have a responsibility for refining their plans to address the issues discussed above – they need to respond to the spirit as well as the letter of the legislation. This includes a more systematic development of evaluation capabilities to reflect the ambitious requirements in the Energy Efficiency Directive.

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