Implementation of the Energy Efficiency Directive (2012/27/EU): Energy Efficiency Obligation Schemes

European Implementation Assessment

STUDY

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In June 2015, the Committee on Industry, Research and Energy (ITRE) of the European Parliament decided to undertake an implementation report on the application of Energy Efficiency Directive 2012/27/EU. MEP Dr Markus Pieper was appointed rapporteur.

Implementation reports of European Parliament committees are routinely accompanied by European Implementation Assessments, drawn up by the Ex-Post Impact Assessment Unit of the Directorate for Impact Assessment and European Added Value, within the European Parliament's Directorate-General for Parliamentary Research Services.

Abstract

In its 'Energy 2020 strategy' in 2010, the European Commission stated '*Energy efficiency is the most cost effective way to reduce emissions, improve energy security and competitiveness, make energy consumption more affordable for consumers as well as create employment, including in export industries*'. A year later, the Commission presented a proposal for a Directive on energy efficiency, which entered into force on 4 December 2012.

A further three years later, the European Implementation Assessment was launched to accompany the ITRE Committee in its scrutiny of the implementation of the directive.

Input was received from three independent groups of experts representing: CPMC SPRL, the University of Oxford and the University of Sussex, and Fondazione Eni Enrico Mattei.

The first research paper presents opinions of national stakeholders' at Member States' level, gathered during interviews and surveys.

The second research paper presents the Member States' plans and achievements towards the implementation of obligation schemes under Article 7 of the Directive (Energy Efficiency Obligation Schemes, EEOS).

The third research paper presents the implementation of Article 7 of the Directive in the household and building sectors specifically.

The introduction to this European Implementation Assessment presents the overall legal and political context of energy policy in the EU, as well as of the Energy Efficiency Directive and its implementation in particular. Key findings present main elements of the analysis provided by the external experts in the three research papers, which are included in full as annexes.

AUTHORS:

- Introduction by **Dr Anna Zygierewicz**, Ex-Post Impact Assessment Unit.

- Research paper analysing the stakeholders' opinions on the implementation of Article 7 of the Energy Efficiency Directive (2012/27/EU), written by **Professor Christian Egenhofer, Dr Jorge Núñez Ferrer** and **Monica Alessi** of CPMC SPRL.

- Research paper analysing the Member States' plans and achievements towards the implementation of Article 7 of the Energy Efficiency Directive (2012/27/EU), written by **Dr Tina Fawcett** of the Environmental Change Institute, University of Oxford and **Dr Jan Rosenow** of the Centre on Innovation and Energy Demand, University of Sussex.

- Research paper analysis of the implementation of Article 7 of the Energy Efficiency Directive (2012/27/EU) in the household and the building sectors, written by **Dr Andrea Bigano** and **Marinella Davide** of Fondazione Eni Enrico Mattei

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Introduction

1. Legal and political basis for energy policy and energy efficiency in the EU – *selected documents*

Article 4 of the Treaty on the Functioning of the European Union (TFEU) placed energy policy within the *competences shared* between the European Union and the Member States.

Article 194 of the TFEU sets the objectives of the energy policy to:

a) ensure the functioning of the energy market;
b) ensure security of energy supply in the Union;
c) promote energy efficiency and energy saving and the development of new and renewable forms of energy;
d) promote the interconnection of energy networks.

1.1. Before the Energy Efficiency Directive entered into force

Energy Policy for Europe[1], announced by the European Council in March 2007, set ambitious objectives (also known as '20/20/20 targets') with the aim to:

- reduce greenhouse gas emissions by 20% (including an increase to 30% of emissions reduction if the conditions are right);
- increase the share of renewable energy to 20%;
- improve energy efficiency by 20% and to make good use of the National Energy Efficiency Action Plans (NEEAPs) for this purpose.

The Energy 2020 Strategy[2], published in March 2010, underlined the predominant role of energy in our lives:

> '*Energy is the life blood of our society. The well-being of our people, industry and economy depends on safe, secure, sustainable and affordable energy.*'

and, in particular referring to energy efficiency, it stated that:

> '*Energy efficiency is the most cost effective way to reduce emissions, improve energy security and competitiveness, make energy consumption more affordable for consumers as well as create employment, including in export industries.*'

In the strategy, the Commission criticised the NEEAPs for their lack of success in achieving energy efficiency goals:

> '*The quality of National Energy Efficiency Action Plans, developed by Member States since 2008, is disappointing, leaving vast potential untapped. The move towards renewable energy use and greater energy efficiency in transport is happening too slowly. While we are broadly on track for the 20% target for renewable, we are a long way from achieving the objective set for energy efficiency.*'

[1] Presidency conclusions of 8-9 March 2007

[2] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Energy 2020, COM(2010) 639

Their future role was seen by the Commission as more important:

> '*The National Energy Efficiency Action Plans provide comprehensive benchmarking on energy efficiency, including measurable objectives and indicators to monitor progress, taking into account the relative starting positions and national circumstances. An annual review mechanism should feed into the Europe 2020 objective for energy efficiency.*'

The Energy 2020 strategy called for enhanced further studies into 'the potential of market-based and other policy instruments, including taxation, to enhance energy efficiency'' and stressed the need for a new energy efficiency strategy, which would enable all Member States to further decouple their energy use from economic growth and which would take into account the diversity between Member States in terms of energy needs.

The Europe 2020, strategy for smart, sustainable and inclusive growth[3], also published in March 2010, put energy efficiency at the centre of attention. Within the flagship initiative 'Resource efficient Europe', the Commission plans:

> '*to help decouple economic growth from the use of resources, support the shift towards a low carbon economy, increase the use of renewable energy sources, modernise our transport sector and promote energy efficiency.*'

The planned activities within the flagship initiative 'Resource efficient Europe' were announced in more detail in the communication of January 2011[4], while the Commission underlined that:

> '*improving energy efficiency reduces the need to generate energy in the first place and the need for infrastructures. This, in turn, eases pressure on land resources. For example, decreasing EU energy consumption by 1% would mean that we would not need the equivalent of 50 coal power plants or 25 000 wind turbines.*'

The Commission also announced medium-term measures:

> '*an energy efficiency plan with a time horizon of 2020 which will identify measures to achieve energy savings of 20% across all sectors, and which will be followed by legislation to ensure energy efficiency and savings.*'

The Energy Efficiency Plan 2011[5], provided for by the Energy 2020 strategy and adopted in March 2011, stated in its opening paragraphs that:

> '*Energy efficiency is at the heart of the EU's Europe 2020 Strategy for smart, sustainable and inclusive growth and of the transition to a resource efficient economy. Energy efficiency is one of the most cost effective ways to enhance security of energy supply, and to reduce emissions of greenhouse gases and other pollutants. In many ways, energy efficiency can be seen as Europe's biggest energy resource. This is why the Union has set itself a target for 2020 of saving 20% of its primary energy consumption compared to projections, and why this objective was identified in the Commission's Communication on Energy 2020 as a key step towards achieving our long-term energy and climate goals.*'

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[3] Communication from the Commission: Europe 2020. A strategy for smart, sustainable and inclusive grow, COM(2010) 2020

[4] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Resource-Efficient Europe – Flagship Initiative Under The Europe 2020 Strategy, COM(2011) 21

[5] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Energy Efficiency Plan 2011, COM(2011) 109

1.2. After the Energy Efficiency Directive entered into force

In the communication on the policy framework for climate and energy 2020-2030[6] presented in January 2014, the Commission stressed that:

> '*the 2030 policy framework should be based on full implementation of the 20/20/20 targets.*'

Addressing the energy efficiency target, the Commission stated that:

> '*Improved energy efficiency makes an essential contribution to all of the major objectives of EU climate and energy policies: improved competitiveness; security of supply; sustainability; and the transition to a low carbon economy. There is broad political consensus about its importance.*'

The Commission also added that:

> '*The EU needs to continue to complement national efforts with ambitious EU-wide energy efficiency standards for appliances, equipment, buildings and CO2 standards for vehicles.*'

In the Communication on energy efficiency and its contribution to energy safety[7], published in July 2014, the Commission stated that:

> '*Energy efficiency has a fundamental role to play in the transition towards a more competitive, secure and sustainable energy system with an internal energy market at its core. While energy powers our societies and economies, future growth must be driven with less energy and lower costs.*'

To support Member States in their national efforts the Commission planned, *inter alia*, to evaluate and review the Energy Efficiency directive (EED) and the Energy Performance of Buildings Directive in the framework of Article 7 of the EED, and the next National Energy Efficiency Action Plans (NEEAPs) in 2017, aiming to:

> '*consider what policy elements would be necessary to drive sustained investments in energy efficiency, especially in light of the currently planned phasing out of some key elements of the EED in 2020.*'

In the conclusions, the Commission stated that:

> '*Current forecasts imply that the current 2020 target for energy efficiency is on the way to being achieved. The Commission does not intend to propose new measures but calls on the Member States to step up their current efforts to ensure collective delivery of the 2020 target.*
>
> *The Commission will complement these efforts with appropriate guidance and dissemination of best practice to ensure full exploitation of the available Union funds.*
>
> *The Commission's Communication on a 2030 policy framework for climate and energy identified a level of energy savings of 25% as part of a strategy to deliver the 40% greenhouse gas emission reduction target in the most cost-effective manner. However, given the increased relevance of bolstering EU energy security and reducing the Union's import dependency, the Commission considers it appropriate to propose a higher target of 30%. This would increase the costs of the 2030 Framework by €20 billion per annum but would still deliver tangible economic and energy security benefits.*'

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[6] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A policy framework for climate and energy in the period from 2020 to 2030, COM(2014) 15

[7] Communication from the Commission to the European Parliament and the Council: Energy Efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy, COM(2014) 520

The 2030 Climate and Energy policy framework, presented by the European Council[8] in October 2014, set the long term targets for energy efficiency and renewable energy:

- at least 27% for improving energy efficiency in 2030, with revision in 2020, with an EU level of 30% in mind;
- at least a 27% share of renewable energy consumed in the EU in 2030.

These targets are planned to be achieved with respect to the Member States' (MSs) freedom to determine their energy mix, without setting nationally binding targets and allowing the MS to set their own higher national targets. A binding target for an EU-wide reduction in greenhouse gas emissions of at least 40% by 2030 was also established in the policy framework.

Referring to energy security, the Council underlined that moderating energy demand through enhanced energy efficiency may contribute to reducing the EU's energy dependence and to increase its energy security for both electricity and gas.

The Energy Union Strategy[9], announced in February 2015, presented five 'mutually-reinforcing and closely interrelated dimensions designed to bring greater energy security, sustainability and competitiveness'. Within the dimension 'Energy efficiency contributing to moderation of demand', the Commission announced that:

> '*The EU has already put in place the world's leading set of measures to become more efficient in our energy consumption. Through energy labelling and eco-design legislation, consumers can make informed energy consumption choices. While all economic sectors must take steps to increase the efficiency of their energy consumption, the Commission will pay special attention to those sectors with a huge energy efficiency potential, in particular the transport and buildings sector. The Commission will further establish synergies between energy efficiency policies, resource efficiency policies and the circular economy. This will include exploiting the potential of "waste of energy".*'

The Communication on the State of the Energy Union 2015[10], published in November 2015, presented the Commissions' plans for the near future:

> '*In 2016, the Commission foresees legislative proposals to align the Energy Efficiency Directive to the 2030 indicative EU-level target of at least 27% (to be reviewed by 2020, having in mind an EU level of 30%). Equally important is a particular focus on buildings, whose energy use represents about 40% of the EU's total final energy consumption and about a quarter of non-ETS direct greenhouse gas emissions. A thorough evaluation of the Energy Performance of Buildings Directive is being carried out in view of its revision.*'

underlining also that:

> '*To reach an ambitious level of energy efficiency by 2030, the Commission has started to put in place tools and instruments treating energy efficiency as a source in its own right. As a first step, in July 2015, the Commission proposed a revision of the Energy Labelling Directive. This proposal makes the existing acquis on energy labelling more efficient and will strengthen enforcement. Also*

[8] European Council (23 and 24 October 2014) – Conclusions

[9] Energy Union Strategy and Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank: Energy Union Package: A Framework Strategy For A Resilient Energy Union With A Forward-Looking Climate Change Policy, COM(2015) 80

[10] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank: State of the Energy Union 2015, COM(2015) 572

in 2015, a number of eco-design and energy labelling measures entered into force, with the potential to further reduce household's energy consumption and thereby bills. Later this year, the Commission intends to come forward with a new Eco-design working plan that - in addition to improving energy efficiency - will in the future support the circular economy.'

2. The provisions of the Energy Efficiency Directive (2012/27/EU)

The Directive 2012/27/EU (2011/0172(COD)) of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14 November 2012. p. 1) came into force on 4 December 2012[11]. Member States had to transpose the obligations of the Directive by 5 June 2014. In this assessment the Directive will be henceforth referred to as: 'Energy Efficiency Directive', 'Directive on energy efficiency', 'Directive 2012/27/EU' or 'EED'.

The Energy Efficiency Directive is a step in the achievement of the Europe 2020 strategy for smart, sustainable and inclusive growth, within which the promotion of energy efficiency was planned. The strategy identifies energy efficiency as a major element in ensuring the sustainability of the use of energy resources, confirmed in Recital 6 of the EED.

Directive 2012/27/EU establishes a common framework of measures for the promotion of energy efficiency within the European Union in order to ensure the EU 2020 20% headline target on energy efficiency is achieved, and to pave the way for further energy efficiency improvements beyond that date. It also lays down rules designed to remove barriers in the energy market and overcome market failures that impede efficiency in the supply and use of energy, and provides for the establishment of indicative national energy efficiency targets for 2020. The requirements laid down in the EED are minimum requirements for Member States (Article 1).

The Commission's projection, expressed in the *ex-ante* impact assessment to the EED proposal (COM/2011/370), shows that reducing energy consumption by 20%, by 2020, means a saving of 368 million tons of oil equivalent (Mtoe) of primary energy (gross inland consumption minus non-energy uses) by 2020 – 1 474 Mtoe (instead of 1 842 Mtoe) of primary energy consumption. The consumption should also amount to no more than 1 078 Mtoe of final energy. To achieve this, each Member State must set an indicative national energy efficiency target, based on either primary or final energy consumption, primary or final energy savings, or energy intensity (Article 3).

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[11] Implementing acts:
- Commission Implementing Decision of 22 May 2013 establishing a template for National Energy Efficiency Action Plans under Directive 2012/27/EU of the European Parliament and of the Council (2013/242/EU);
- Communication from the Commission to the European Parliament and the Council on Implementing the Energy Efficiency Directive – Commission Guidance (COM/2013/0762 and SWD/2013/445-451);
- Communication from the Commission to the European Parliament and the Council on Energy Efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy (COM/2014/0520 and SWD/2014/255-256).

Related act:
- Council Directive 2013/12/EU of 13 May 2013 adapting Directive 2012/27/EU of the European Parliament and of the Council on energy efficiency, by reason of the accession of the Republic of Croatia (OJ L 141, 28.05.2013, p. 28).

Under the Directive, each Member State must meet certain energy savings targets between 1 January 2014 and 31 December 2020. Member States have to do this by using energy efficiency obligations schemes or other targeted policy measures to drive energy efficiency improvements in households, buildings, and the industry and transport sectors. Other requirements in the Directive include: energy audits for big companies every four years; increased rights for consumers regarding metering and billing of their energy consumption; renovation of at least 3% of central government buildings every year and energy efficient public purchasing[12].

Article 7 of the EED obliged Member States to set up an energy efficiency obligation scheme (and/or alternative policy measures), which will ensure that energy distributors and/or retail energy sales companies operating in each Member State's territory achieve a cumulative end-use energy savings target by 31 December 2020. That target shall 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 customers of all energy distributors or all retail energy sales companies by volume, averaged over the most recent three-year period prior to 1 January 2013. The sales of energy, by volume, used in transport may be partially or fully excluded from this calculation. Member States decide how the calculated quantity of new savings is to be phased over the period.

To calculate the overall amount of savings required, the average of the annual energy sales, by volume, to final customers of all energy distributors or all retail energy sales companies for the three years before 1 January 2013, i.e. for 2010, 2011 and 2012 must be calculated first. Energy sales for the transport sector can be partially or fully excluded from this calculation (SWD/2013/451[13]).

Further details on Member States' plans and achievements for the implementation of Article 7, can be found in Annex II.

Basic terms concerning energy efficiency:

1. Definitions used in e Energy Efficiency Directive:

- *Primary energy consumption* equals gross inland consumption, excluding non-energy uses;
- *Final energy consumption* signifies all energy supplied to industry, transport, households, services and agriculture; it excludes deliveries to the energy transformation sector and the energy industries themselves (see graph 1);
- *Energy efficiency* means the ratio of output of performance, service, goods or energy, to input of energy;

2. Definition used by the International Energy Agency[14]:

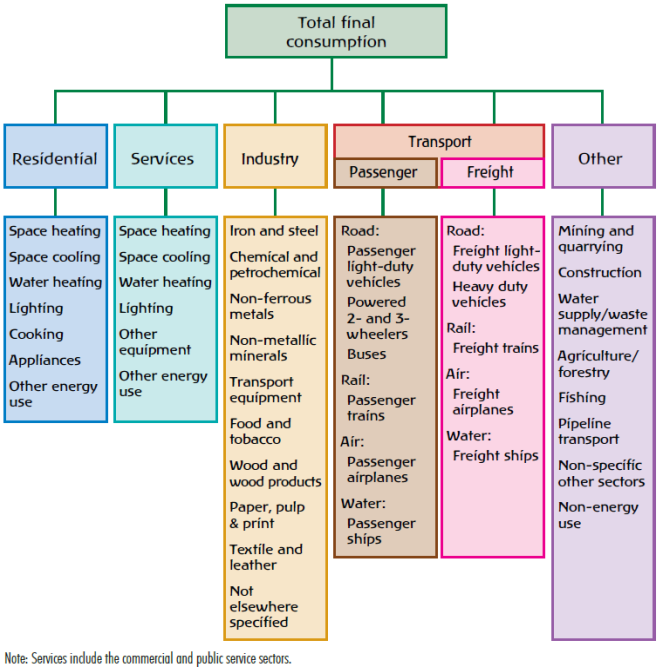
- *Energy efficiency* means using less energy input to provide the same, or more, services for the same energy input.

[12] Energy: Commission refers Hungary to Court and proposes fines for failing to fully transpose EU energy efficiency rules.

[13] Commission Staff Working Document. Guidance note on Directive 2012/27/EU on Energy Efficiency, amending Directives 2009/125/EC and 2010/30/EC, and repealing Directives 2004/8/EC and 2006/32/EC, Article 7: Energy Efficiency Obligation Schemes. Accompanying the document communication from the Commission to the European Parliament and the Council implementing the Energy Efficiency Directive – Commission Guidance (SWD/2013/451)

[14] Energy Efficiency Indicators: Essentials for Policy Making, International Energy Agency (p.17)

Graph 1: Final energy consumption



Source: Energy Efficiency Indicators: Essentials for Policy Making, *International Energy Agency (p.22).*

3. The Commission assessment of Member States progress towards the energy efficiency 2020 targets

In November 2015, the European Commission presented a report assessing the progress made by Member States towards the national energy efficiency targets for 2020 and towards the implementation of the Energy Efficiency Directive 2012/27/EU as required by Article 24 (3) of the Directive[15].

The Commission stressed in the report that:

> '*There has been significant progress in reducing energy consumption at EU level. Overall, final energy consumption decreased by 7% between 2005 and 2013. Primary energy consumption decreased by 8% in the same period and preliminary estimates show a continuation of this declining trend to 1516 Mtoe in 2014.*'

In the conclusion, the Commission also noted that:

> '*The NEEAPs show that most Member States have increased their effort and either strengthened existing energy efficiency measures or introduced new ones.*'

Nevertheless, the Commission pointed out that:

> '*Member States need to increase their energy efficiency efforts to ensure that they achieve their indicative targets by 2020 or go even beyond them to ensure that the European Union meets its*

[15] Report from the Commission to the European Parliament and the Council: Assessment of the progress made by Member States towards the national energy efficiency targets for 2020 and towards the implementation of the Energy Efficiency Directive 2012/27/EU as required by Article 24 (3) of Energy Efficiency Directive 2012/27/EU, COM(2015) 574

20% reduction target by 2020. This underlines the need to fully implement the European legislative framework for energy efficiency. This enables energy efficiency service markets to develop the removal of existing market barriers for energy efficiency investments. But also the implementation of the legislative framework related to greenhouse gas reductions e.g. in the non-ETS sector or the recently adopted Market Stability Reserve for the ETS sector are key as the two policy areas are interlinked and are reinforcing each other.'

The Commission also announced the revision of the EED to be made in 2016:

'*With a view to the 2030 targets, the Commission will assess in 2016 how the energy efficiency framework can be further improved, building on the already-reviewed product efficiency framework and with a view to the significant contribution of (i) the Energy Performance of Buildings Directive and (ii) the Energy Efficiency Directive (especially Article 7). This review should help all stakeholders (national governments, regions, local authorities, energy efficiency companies, financial institutions, consumers, etc.) exploit cost-efficient energy saving potentials in the long-term with regard to the 2030 and 2050 EU climate and energy targets and objectives.*'

4. Abstract from the results of the Commission's public consultation on the EED

The Commission's public online consultation[16] on the EED showed that 62% of those who participated in the consultations were aware of energy efficiency measures that were carried out in their country in response to an EEOS, versus 23% who were not and 15% who did not comment. The high level of averages may be related to low representativeness of the group, as generally only those interested in the energy efficiency participated in the consultation.

The consultations also showed that 68% of all participants shared the view that Article 7 is an effective instrument to achieve final energy savings, versus 32% who did not share that view.

56% of all participants disagreed (39%) or strongly disagreed (18%) that the current 1.5% savings level is adequate, versus 23% who did believe that it is adequate. 17% had no view. Only 3% strongly agreed that the 1.5% level is adequate.

The participant's opinions on the need for specific rules about energy savings for vulnerable consumers were mixed: 35% shared the view that they should not have such rules, versus 30% who stated that they should, and 35% voiced no opinion.

71% of participants shared the view that most of the measures introduced under Article 7 have long lifetimes (20-30 years) and will continue to have an impact beyond 2020. A further 18% had no view, and 11% opposed this view. Additionally, 63% shared the view that the Article 7 obligations should continue beyond 2020 in view of the new energy efficiency target for 2030, versus 28% who opposed this view, and 9% who had no view.

[16] Public Consultation for the Review of Directive 2012/27/EU on Energy Efficiency. Final Synthesis Report. Directorate-General for Energy, Unit C.3 Energy Efficiency, Brussels, 26 February 2016 and raw data from public consultation

Main challenges and barriers in implementing Article 7	Number of times marked
Limited timeframe (2014-2020) that makes it hard to attract investment for long term measures	115
High administrative burden	113
Ensuring sound and independent monitoring and verification of energy savings	104
Lack of effective enforcement	99
Lack of awareness (by the end-users) of the energy efficiency obligation schemes or alternative measures	89
Developing the calculation methodology in line with the requirements of Annex V	75
Ensuring consistent application of the requirements with other energy efficiency legislation (e.g. building codes)	73
To select or introduce the right set of measures for achieving 1.5% energy savings (annually)	71
Lack of sufficient knowledge and skills of involved parties	70
Too great flexibility to use wide range of measures: energy efficiency obligation scheme and alternative measures	55
Strong opposition from energy suppliers and distributors to set up an energy efficiency obligation scheme	55
Avoiding double counting	36
Other *Selected answers given by respondents:* - *limited time for setup and implementation of energy efficiency measures;* - *lack of a long-term vision;* - *too many exemptions and alternatives add complexity and are detrimental to transposition and implementation;* - *lack of economical attractiveness of EE measures influenced by low energy prices and support schemes;* - *overlaps with ETS, RES, EPBD;* - *for competitiveness reasons, industry covered by ETS should remain out of EED;* - *low interest of housing sector and related industries;* - *EEOS is not compatible with open electricity market*.	84

5. Role of the European Parliament in energy efficiency policy – *selected documents*

The European Parliament resolution of 5 February 2014 on a 2030 framework for climate and energy policies (2013/2135(INI) in relation to energy efficiency notes, *inter alia*, that:

- energy saving and energy efficiency are the fastest and cheapest routes to addressing issues such as energy security, external dependence, high prices and environmental concerns;

- the EU is on track to achieve its binding 2020 targets (for reducing greenhouse gas emissions and improving its renewable energy share), but not its indicative energy efficiency target of 20%;
- improving energy efficiency is the most cost-effective and fastest way to reduce the EU's energy dependence, while at the same time alleviating high energy bills for end users and creating jobs and growth for local economies;
- studies indicate that improving energy efficiency reduces costs, benefiting both industry and individuals;

The European Parliament, in its resolution, called on the Commission and the Member States to set a binding EU 2030 energy efficiency target of 40%, in line with research on cost-effective energy saving potential. The EP also stressed that such a target should be implemented by means of individual national targets, taking into account the individual situation and potential of each Member State.

The Industry, Research and Energy (ITRE) Committee prepared an own-initiative report (2015/2113(INI)) on the Energy Union strategy, with MEP Marek Józef Gróbarczyk as rapporteur. The report was adopted by Parliament on 15 December 2015. In relation to energy efficiency the report notes, *inter alia*, that[17]:

- Parliament has repeatedly called for binding 2030 climate and energy targets of at least a 40% domestic reduction in GHG emissions, at least 30% for renewables and 40% for energy efficiency, to be implemented by means of individual national targets.
- Energy efficiency contributing to moderation of demand: gains in energy efficiency both reduce energy bills for households and industries and have the potential to create two million jobs as a result of energy efficiency measures by 2020, in particular in the building sector, which accounts for 40% of total EU energy demand.
- Parliament called on the Commission and Member States to apply the 'energy efficiency first' principle and remove remaining barriers to energy efficiency measures, and to develop a genuine market in energy efficiency.
- It stressed the need to increase both the depth and the rate of building renovation and the use of sustainable energy sources in heating and cooling, through the right incentives, in order to reduce energy demand. Parliament underlined that a revision of existing energy efficiency legislation, including the Energy Performance of Buildings Directive and the Energy Efficiency Directive, alongside proper implementation of such legislation by Member States.

Finally, at the time of drafting, the ITRE Committee is working on its own-initiative report (2015/2232(INI)) on the Energy Efficiency Directive, with Dr Markus Pieper as rapporteur. On 5 February 2016, the draft opinion of the ENVI Committee was prepared and on the draft report of the ITRE Committee on 18th February 2016. The latter was presented during the ITRE Committee meeting on 16 March 2016.

[17] 2015/2113(INI)

Key findings on the implementation of Article 7 of the Energy Efficiency Directive

The three research papers in annex may be helpful in understanding the implementation of Article 7 the Energy Efficiency Directive. They analyse various aspects of this implementation and were commissioned specifically for this European Implementation Assessment. They were written by the following experts who have a sound track of professional expertise in the fields of their contributions:

- Professor Christian Egenhofer, Dr Jorge Núñez Ferrer and Monica Alessi of the CPMC SPRL analysed stakeholders' opinion on the implementation of Article 7 of the EED;

- Dr Tina Fawcett of the Environmental Change Institute, University of Oxford and Dr Jan Rosenow of the Centre on Innovation and Energy Demand, University of Sussex analysed Member States' plans and achievements towards the implementation of Article 7 of the EED;

- Dr Andrea Bigano and Marinella Davide of the Fondazione Eni Enrico Mattei analysed the implementation of Article 7 of the EED in the households and the building sector.

The research papers were presented and discussed at the ITRE meeting of 16 March 2016.
This chapter reproduces their key findings and recommendations in one condensed text. The quotes/pages refer to the respective full papers in the annex.

1. Stakeholders' opinions on the implementation of Article 7 (Egenhofer et al.)

1.1. EU-level (page 35)

- EEOS are a suitable tool to deliver savings in a cost-effective way and to create a market for energy efficiency. At the same time, many implementation issues need to be solved. It is still difficult to make a business out of energy efficiency.
- Stakeholders agreed that Member States should signal that EEOS continue beyond 2020. Otherwise there is a risk that stakeholders will lose their interest.
- More attention to implementation will be required. Many stakeholders felt that Member States' discretion was too high, notably but not only when it comes to additionality. Stakeholders saw the need for the European Commission to provide additional support to Member States through platforms (formal and informal) for the exchange of information, guidance materials or technical assistance.
- Energy poverty has been identified in some Member States as a possible barrier to EEOS and will need to be addressed where this is the case.

1. 2. Member States' findings (page 45)

- Almost all stakeholders have identified consumer information as an essential element for the success of both EEOS and Alternative Measures. Most stakeholders felt that not enough resources are dedicated to this. Stakeholder consultation has been identified as another important component. Consultation and negotiations between the government and the obligated parties on the design has been identified as success factor in some cases.
- EEOS offer the possibility for Member States to design an efficient instrument, yet adapted to national circumstances. Precondition is acceptability of the concept to go ahead via a market-based solution.
- Other factors for success: EEOS are more likely accepted if governments can 'threaten' with Alternative Measures; simple and transparent procedures; credible compliance mechanisms; flexibility tools such as banking, borrowing or combination with trading mechanisms, provided they are properly implemented.
- Factors for failure: lack of political will; lack of government capacity; lack of support instruments for obligated parties; lack of compliance mechanisms; high complexity; lack of suitable monitoring mechanisms.

2. The Member States' plans and achievements towards implementation of Article 7 (Fawcett et al.)

2.1. Setting national targets (page 83)

- Member States are entitled to use exclusions and exemptions in calculating their national savings targets.
- All Member States, apart from Sweden, have excluded energy use from the transport sector and 14 Member States have excluded own energy use from the baseline used for target setting.
- 24 Member States have used the maximum 25% exemptions, with only Portugal not claiming any exemptions.
- The combined effect of exclusions and exemptions is that the notified saving targets are only about half of what they would be without those adjustments: the annual saving rate of 1.5% is reduced to about 0.75%.

2.2. Policy adoption by Member States (page 87)

- In total, Member States have implemented or plan to implement 479 policy measures - with the number of policies per country ranging from one to 112.
- The largest share of the overall savings is expected from Energy Efficiency Obligation Schemes (34%), financing schemes or grants (19%), and from taxes (14%) - all financial 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%).

- The credibility of savings has been assessed in terms of eligibility, additionality, risk of double counting and risk of non-delivery. Policies score least well on additionality and risk of non-delivery.
- 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.

2.3. Focus on the Energy Efficiency Obligation Schemes (EEOS) (page 93)

- There are 16 Member States with planned or existing EEOS.
- Evidence shows that EEOS can be a successful policy, delivering substantial savings at a cost which is significantly below the price of energy.
- No two Member State EEOS have the same design. The number of obligated parties can range from one up to tens, hundreds, or even thousands. Most EEOS cover all sectors, but some focus more, or exclusively, on the residential sector.
- Successful EEOS have been introduced gradually, with a period of learning and re-design in the early years.
- For those countries with new EEOS and which have not taken steps to shorten the learning period, Bulgaria, Croatia, Estonia, Latvia, Lithuania and Spain, there is a risk of under-delivery.
- For EEOS focused on buildings, continuing to deliver savings is challenging, as the low-cost, mass market, technological savings opportunities reduce.

3. Implementation of Article 7 in the households and the building sector (Bigano et al.)

3.1. Key findings (page 121)

- The rebound effect implies that the savings directly generated by energy efficiency policies will free financial resources for the consumers, and a fraction of these extra resources will turn eventually into additional energy consumption.
- The energy efficiency gap implies that households adopt energy efficiency technologies at a sluggish pace and forgo opportunities to save on energy costs through investments that make economic sense.
- The presence of free-riding can seriously reduce the cost-effectiveness of financial incentives for energy efficiency upgrades.
- The quality of the information about the advantages of energy efficiency upgrades and the opportunities offered by related policy initiatives can have an important impact on the effectiveness of the main policy actions planned for the implementation of Article 7.

3.2. Key findings for energy efficiency policy design (page 128)

- Only few MS provide an explicit sectoral split of the expected savings in the notifications that they submitted under the Article 7 of the EED.
- The analysis of EEOs and alternative measures illustrates that the residential sector is likely to be responsible for the largest share of the 1.5% annual energy end-use savings required by the EED.
- Overall, most measures included in the EEOs focus on implementation of 'low-hanging fruits', in the residential sector, such as efficient light bulbs and roof insulation.
- Best practices can be useful to highlight replicable approaches. In particular, flexibility (both in terms of diversity of offers and freedom of methodology) emerges as key to ensure cost-effective energy savings and adaptability to technology markets, national circumstances and policy priorities.
- Measures jointly addressing financial incentives and information/education campaigns turned out to be more effective that the two approaches taken individually.
- Simple implementation rules complemented by a transparent process (e.g. calculation methods, detailed results per sector), as well as an effective and periodic evaluation of the scheme can result in higher effectiveness of measures.

Recommendations

I. *(Egenhofer* et al.*)* (page 64)

- The design of EEOS should be based on observed consumer behaviour.
- EEOS should take into account the need to support low-income households, but without imposing excessive burdens on energy companies.
- EEOS need to be combined with other policy measures, such as publicly funded grants and subsidised loan programmes.
- Rather than targeting low-income or fuel poor households, EEOS should focus on housing with very low energy efficiency standards.
- Minimum standards for social and private rented housing are needed.
- Local authorities should have a larger role in overseeing the delivery of programmes.

II. *(Fawcett* et al.*)* (page 104)

- A significant share of the expected savings is at risk of not being delivered in practice because of non-additionality, weak monitoring and verification regimes, and methodological issues related to the calculation of energy savings.
- Member States would benefit from more advice and guidance on additionality, monitoring, evaluation and methodologies for calculation of energy savings. National experts could work together to develop guidelines and rules under established 'comitology' procedures, where appropriate.
- Templates covering all reporting requirements in a systematic manner accompanied by clear guidance would enable Member States to understand what exactly is required and how they have to report compliance, and help the Commission with ensuring that the EED is implemented as intended.
- The Directive itself should be reviewed to provide more clarity and detail. Its requirements should be simplified where possible, particularly in relation to calculating national targets.

III. *(Bigano* et al.*)* (page 160-161)

- Consider setting moderately more ambitious energy saving targets in the course of the revision of the Directive. Among the many merits of such effort, there is the fact that it would help counteracting the rebound effect, although only an economy-wide policy action directed to all sectors in which consumers' spending can generate extra energy consumption, has a chance of counteracting indirect rebound effect. This however would call for broad measures whose implementation may not be straightforward. An indirect, and still politically complex solution would be a carbon tax.
- Support the adoption of known best practices or their strengthening where they are already in place: in particular market-based, cost-effective policies such as the Italian White Certificates and the Danish EEO approach are particularly promising.

- Stress the importance of long term commitment in policy action, and promote national initiatives which demonstrate the adoption of clear, fair, transparent rules of the game for a reasonably long time horizon.
- Take full advantage of the benefit of a correct use of information and information-enhancing technologies. A correct understanding of the benefits of energy efficiency schemes have the potential to raise the salience of this matter for consumer, and hence the likelihood of responding positively to policy stimuli. Proper two way communication interfaces for smart meters could boost the impact of behavioural policies such as nudging initiatives.

Annex I

'Stakeholders' opinions on the implementation of Article 7 of the Energy Efficiency Directive (2012/27/EU)'

Research Paper

by Christian Egenhofer, Jorge Núñez Ferrer and Monica Alessi

Abstract

This report summarises the results from a survey on the experiences with the implementation of Article 7 of the Energy Efficiency Directive, notably on energy efficiency obligations schemes and related regulations. During January and February 2016, more than 50 stakeholders have been asked via telephone or questionnaires to provide their views on achievements and obstacles to the implementing of Article 7. To guarantee a broad perspective, interviewees were from all major stakeholder groups. Results are not necessarily representative. Instead they are meant to give a flavour of what stakeholders think of Article 7. In addition, they provide a host of practical ideas on how to improve its implementation. Findings are presented separately for the EU as a whole on the one hand, and for the following Member States on the other: Bulgaria, Denmark, Germany, Greece, Hungary, Poland, Spain, the Netherlands and the United Kingdom with additional information from responses gathered from Austria and Italy.

AUTHOR

This study has been written by **Prof. Christian Egenhofer**, **Dr Jorge Núñez Ferrer** and **Monica Alessi** of CPMC SPRL at the request of the Impact Assessment Unit of the Directorate for Impact Assessment and European Added Value, within the Directorate General for Parliamentary Research Services (DG EPRS) of the General Secretariat of the European Parliament.

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Executive summary

The purpose of this Research Paper is to assist Members of the European Parliament (MEPs) via interviews and questionnaires in their consideration of the transposition and implementation of Article 7 of the Energy Efficiency Directive (EED) (2012/27/EC). Particular focus has been on Energy Efficiency Obligations Schemes (EEOS) and related regulations.

The Research Paper summarises the responses of more than 50 stakeholders, who have been interviewed on their assessment of the national plans, notably the achievements and obstacles encountered during the implementation process. The objective was to gather the views of both EU-level and Member States' experts and stakeholders. Given the limited time frame, i.e. two months, the Research Report focuses on:

- Giving a sense of stakeholder sentiment towards Article 7 EED; and more importantly;
- Understanding from practitioners, which are the concrete obstacles, and collect ideas on how to remove them.

This Research Report therefore should be seen as an attempt to gather expert and stakeholder opinions on the reasons for the successes and difficulties with the actual implementation of Article 7. It collects practical suggestions by affected stakeholders. It is not, however, offering a comprehensive assessment of each aspect of national policy. Stakeholders have been asked about 'what works and what does not', 'best and worst practice' and 'what should be done'. The Report summarises their answers.

Interviews have been carried out with EU-level and national stakeholders, with representatives of the following Member States: Bulgaria, Denmark, Germany, Greece, Hungary, Poland, Spain, the Netherlands and the United Kingdom, complemented by surveys. Additional information and responses have been gathered from Austria and Italy.

Main results

- The interviews confirm that many Member States risk not achieving the envisaged savings. This is due to a mixture of delayed implementation, complexity of implementing EEOS or Alternative Measures but sometimes also lack of administrative capacity or lack of political will. The Member States, which are seen as being on track are the ones that had implemented effective energy efficiency measures prior to the EED, be they EEOS or Alternative Measures.
- Not all Member States see the value of EEOS for creating energy efficiency markets, for example as a means to unlock new revenue streams and achieve the reductions cost-effectively. On the other hand, there is considerable awareness of and knowledge from past experiences with EEOS for example from Denmark, UK, Italy or France.
- The interviews and surveys showed that although markets for energy efficiency emerge, it is still difficult to make a business out of it. Energy Performance Contracting seems to be the dominant business model.
- Results from interviews and surveys confirm the findings of existing empirical studies; stakeholders strongly believe that EEOS implementation needs significant improvement.

Member States' discretion is generally seen as too high. We only found few stakeholders, which were opposed to EEOS on grounds of principle.

- Guidance by the European Commission generally was seen as adequate. Stakeholders however felt that Member States would not sufficiently follow European Commission Guidance. Some stakeholders saw the need for the European Commission to provide additional support to Member States through platforms for the exchange of information, guidance materials or technical assistance.
- Most stakeholders agree that Member States should signal that EEOS continue beyond 2020 to keep the actual and potential obligated parties focused on EEOS and also incentivize them to implement longer-term measures.
- Almost all stakeholders agree on the importance of consumer information and marketing, for both EEOS and Alternative Measures. They also felt that not enough is done in these areas.
- There was a strong sense of need for stakeholder consultations prior to the design and implementation of EEOS. Voluntary or negotiated agreements on design and targets seem to be success factors.
- Many stakeholders highlighted that EEOS, often in combination with Alternative Measures, allow Member States to design and implement policies best adapted to national circumstances.
- Numerous other success factors have been mentioned: i) EEOS are more likely to be acceptable if governments can 'threaten' with alternative measures; ii) simple and transparent procedures; and iii) credible compliance mechanisms.
- The most important factors for failure that have been mentioned were the lack of i) political will; ii) government capacity; iii) support instruments for obligated parties; iv) compliance mechanisms; v) high complexity; vi) suitable monitoring mechanisms.
- Flexibility tools such as banking, borrowing or combination with trading mechanism was seen both as a factor for success and as a threat, depending on the stakeholder. For most stakeholders, precondition for adding flexibility mechanisms was that the EEOS is well functioning and is mature.
- Energy poverty has been identified as fundamental barrier for some Members States and is in need of being addressed.
- Stakeholders consider Alternative Measures to be important for complementing EEOS when these are not the most appropriate instrument, for example to address deep renovation or fuel poverty.

1. Objectives and background

The purpose of this Research Paper is to assist MEPs in their consideration of the transposition of the Energy Efficiency Directive (EED) (2012/27/EC) into national laws and its implementation by Member States in relation to the Directive's goals, with special attention to Article 7 – Energy Efficiency Obligations Schemes (EEOS) and related regulations. The objective is to gather the opinion of specialist stakeholders at the EU-level and in selected Member States on the progress of the implementation of Article 7. The study summarises the responses of the stakeholders interviewed on their assessment of the national plans, and on achievements and obstacles encountered during the implementation process. The Research Report focuses on i) practical solutions to real and encountered problems, i.e. 'what works and what does not', ii) actual measures taken by different Member States, 'best practice' and iii) suggestions by affected stakeholders, i.e. 'what should be done'.

Interviews have been carried out with EU-level and national stakeholders, with representatives of the following Member States: Bulgaria, Denmark, Germany, Greece, Hungary, Poland, Spain, the Netherlands and the United Kingdom, complemented by surveys. Additional information and responses have been gathered from Austria and Italy.
This Research Report is organised as follows:

- Chapter 1 outlines the Report's objectives and describes the background, including a brief overview of existing literature and a detailed description of the methodology;
- Chapter 2 reports on the common messages, which can be derived from the responses;
- Chapter 3 describes in more detail the Member States' findings; and
- 4 Annexes follow.

Annex 1 provides an overview of measures by Member States. Annex 2 and 3 reproduce the questions for EU-level stakeholders and from the questionnaire, respectively. Annex 4 lists the names and the detailed breakdown of interviews.

1.1. Background

The EED amends and strengthens the 2006 Energy End-Use Efficiency and Energy Services Directive (2006/32/EC). It is one of the legal pillars identified in the EU 20-20-20 Strategy, with the core objective to achieve a 20% reduction in projected primary energy consumption by 2020.

Article 7 requires that Member States achieve energy savings 'by having in place or establishing one or a combination of the following policy measures: (i) Energy Efficiency Obligation Schemes or (ii) alternative policy measures' (SWD(2013) 451 final, p.9).

Energy Efficiency Obligation Schemes (EEOS) are mandatory schemes placing an obligation on energy distributors and/or retail energy sales companies[18] to achieve savings amongst end users, i.e. consumers. The target is to achieve new savings each year from 1 January 2014 to 31

[18] 'Obligated parties' are to be designated by each Member State, on the basis of objective and non-discriminatory criteria, amongst the energy distributors and/or retail energy sales companies operating on its territory (Article 7(4)).

December 2020 at least equivalent to 1.5% of the annual energy sales by volume to final consumers. The reduction is based on a baseline calculated from the average volume over the past three years where data is available. Article 7 is key within the Directive, as it is expected to deliver more than half of the required 20% energy savings of the Directive, i.e. approximately 10,5% by 2020 (according to figures by Ricardo-AEA, 2015).

EEOS and Alternative Measures can also be based on existing practices, in which case only reductions, which are a result of a strengthening of existing measures.

EEOS are a market-based obligation, which requires energy companies to provide energy savings' solutions to their customers. EEOS have only been introduced in a limited number of countries, namely Denmark, France, Ireland, Italy, Poland and the UK. However, Austria, Bulgaria, Croatia, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Slovenia and Spain have announced plans to introduce EEOS, mostly complemented with Alternative Measures. This brings to 17 the number of Member States that will use EEOS. The remaining eleven Member States plan to use Alternative Measures only. Only Bulgaria and Luxembourg propose to rely exclusively on EEOS, while Hungary has not clarified whether it will propose Alternative Measures.

The share of total energy savings, which should result from EEOS is expected to approximate 40%, with the remainder coming from a mix of Alternative Measures (Ricardo-AEA, 2015).

Alternative Measures can cover the following areas (Article 7 (9)):

- Energy or CO_2 taxes;
- Finance and fiscal incentives schemes;
- Energy Efficiency National Funds, whereby obligated parties are offered the option to achieve their energy savings by contributing to a National Fund, rather than directly investing in energy efficiency measures;
- Regulations or voluntary agreements;
- Minimum standards for products (including buildings) and services;
- Energy labelling schemes; and
- Training, education and advisory programmes to encourage the use of more efficient technologies and practices.

1.2. Legal provisions on the calculation of reductions from EEOS and Alternative Measures

The European Commission's guidance note (SWD(2013) 451 final) details the methodology to calculate reductions from EEOS and Alternative Measures. The requirements are complex, and the rules allow for a certain flexibility to account for savings achieved by existing measures, provided they are additional.
The savings have to originate from 'individual actions', i.e. '*an action that leads to verifiable, and measurable or estimable, energy efficiency improvements and is undertaken as a result of a policy measure*' (Article 2 of the EED).

Activities also need to be '*demonstrably material to the achievement of the claimed savings*' (Annex V, part 2, point (c)). This means that the measures carried out by entrusted or obligated parties must have a verifiable effect in making end-users undertake energy efficiency investments. In addition, the measures must lead to results that go beyond minimum EU standards. This applies to both EEOS and Alternative Measures, whereby savings originating from actions that only fulfil minimum EU requirements cannot be accounted.

In case an EEOS is implemented, the obligated parties can account for energy savings from energy generation, transformation and transmission, but only to a maximum of 25% of the total savings achieved. The remaining 75% must be obtained through end-use energy savings.

Article 7.7(c) gives 'additional flexibility to obligated parties to count towards the required amount of energy savings they have to achieve, energy savings from individual actions obtained four years before or three years after the year in which they are actually realised' (SWD(2013) 451 final, p.17). This allows for the 1,5% yearly savings to be fulfilled on average. The 1,5% yearly target itself can benefit from a derogation allowing Member States to shift up to 25% of the savings to another year, subject to prior notification to the Commission.

The methodology to count the savings from individual actions is specified in the framework set by Article 7 as well as in the rules laid out in Annex V of the Directive. There are four types of calculation methods:

- Deemed savings (a specific value for each measure)
- Metered savings
- Scaled savings (based on engineering estimates)
- Surveyed savings (based on consumer response)

These calculations have to be based on methodologies and benchmarks recognised nationally and set up by experts which are 'independent from the obligated parties or entrusted parties'.

In case a country has also chosen energy or CO_2 taxation as an Alternative Measure, the calculation of energy savings has to be based on elasticities of demand with respect to price to estimate to what extent the price increases due to the tax (and not to other factors) affect consumer behaviour (p.18).

A key requirement is that if different types of measures are used in combination (also with actions from other Articles of the EED, such as Article 4, the individual savings can only be attributed to one individual action, so as to avoid double counting.

The calculations must also take into account the 'lifetime of actions', in order to avoid that temporary actions are accounted beyond their duration.

Finally, the Energy Efficiency Directive requires that all savings are monitored, verified and recorded to satisfactory standards, and that the results are reported annually.

1.3. Status of implementation in the existing literature

Key findings

- The main evaluation reports and surveys indicate that the majority of countries risks failing to achieve Article 7's targets.
- The quality of the plans and the potential of achieving the targets are dependent on not only Member States' capacity, but also political will.
- Many Member States seem unaware of the economic and social potential of an effective energy efficiency market, the creation of which is a key aim of Article 7.
- All studies consider the article important, but need to be strengthened and kept beyond 2020.

Ricardo-AEA, 2015

The most comprehensive analysis on the status of implementation of Article 7 is the February 2015 Ricardo-AEA report prepared for DG Energy of the European Commission. The analysis mainly tests the solidity of the national notifications submitted by Member States by 5 December 2013, as well as the National Energy Efficiency Action Plans (NEEAPS) submitted on 30 April 2014, and the additional documents updating notifications up to 20 November 2014. The review is thus based on the proposed measures and estimated impacts by Member States and not on actual implementation. This is because 2014 was the year in which Article 7 schemes were to start and results were either too young to be interpreted, or still not fully implemented.

The Ricardo-AEA report presents a subdivision of proposed measures per country. 17 countries have planned for EEOS, four of which have already implemented them. The remaining eleven countries intend to use only alternative measures.

Annex 1 lists the measures per country.

The Ricardo-AEA analysis undertakes a credibility test of the documents submitted by the Member States and not a review of the background studies leading to the proposed measures, which due to their volume were impossible to survey. The criteria included:[19]

- Whether eligible measure categories and/or individual actions have been specified clearly;
- Whether the calculation methods are transparent and in line with Article 7 and Annex V;
- Whether intermediate periods have been provided for policy measures;
- How the issue of additionality has been addressed;
- How the issue of materiality has been addressed;
- Whether double counting is avoided;
- Whether the lifetimes of measures have been specified and are not too long; and

[19] Ricardo AEA, 2015, op cit. p. 28

- Whether the monitoring, verification, control and compliance regime is robust.

According to the results of the study, the assessment of the proposed EEOS and/or Alternative Measures is not very encouraging, and only eight countries submitted credible policy action plans. Out of these eight countries, six use only Alternative Measures, meaning that only two countries out of 17 countries that have proposed or have already introduced EEOS offer credible instruments.

As regards Alternative Measures, all country plans show flaws, although minor in certain cases. The Czech Republic, Germany, Ireland, Lithuania, Portugal, Romania, Slovakia, Slovenia and the UK are considered to have major issues.

The analysis also expresses concerns about the methodology used in all countries to estimate the impacts of EEOS and alternative measures (with the notable exception of Denmark). The authors conclude that only Denmark, Finland and Ireland have provided plans with none or minor credibility issues.

The report therefore expresses concern that the energy efficiency targets will not be met. It concludes that most Member States need to strengthen their policies and their monitoring, verification, control and compliance regimes in order to reach the objectives of the Directive. It also provides some recommendations to strengthen the Directive in the future by imposing more mandatory legislation, including renewables, defining clearer boundaries of what can and cannot be included (such as energy production for own use), and better clarifying which sectors are to be included in the baseline.

Energy Efficiency Watch Survey Report, 2015

Another key study is the 2015 Energy Efficiency Watch Survey Report, which is a valuable complement to Ricardo-AEA's analysis. This project collected the views of stakeholders and experts through 1096 filled questionnaires and a qualitative survey using interviews with three experts per Member State. The report reviews progress of the Energy Efficiency Directive in general; it does not focus exclusively on the implementation of Article 7, but dedicates to it a part of its analysis.

The report shows that for most countries, stakeholders consider that the quality of the National Energy Efficiency Action Plans and the progress in the last three years are insufficient. The comparison of progress between Member States has been highly variable and the report considers that political factors are key causes, i.e. whether or not energy efficiency has been prioritised in national policy. The economic crisis is also singled out as having had a significant impact on the measures and funding programmes, as energy efficiency tends to become less of a priority despite the potential benefits it could bring to the economy. In this respect, the report highlights the lack of awareness or understanding on the part of a number of Member States of the economic returns and employment effects that energy savings through energy efficiency measures can generate.

However, the report highlights that the weaknesses in the implementation of Article 7 may to a significant extent be due to its novelty in most Member States.

The results of the Ricardo-AEA report and the Energy Efficiency Watch survey reach similar conclusions despite the different approach taken. From both a quantitative and qualitative viewpoint, the progress towards achieving Article 7 objectives is insufficient in most Member States. Both reports show that a lack of political prioritisation of energy efficiency and a lack of awareness of the potential benefits of energy efficiency are hampering progress. The reports also identify similar weaknesses in the area of exemptions, such as the exclusion of the transport sector.

The reports do, however, consider Article 7 important and positive, and advise that it should continue beyond 2020 albeit strengthened and with further clarifications. Experts concluded that due to the exemptions and the use of alternative measures, one of the key objectives of Article 7, namely the one of creating a functioning energy service market, has hardly progressed in the majority of countries.

Other reports: Bertoldi et al., 2015 and Coalition for Energy Savings, 2014

Other reports have analysed the Energy Efficiency Obligation Schemes of Article 7, mainly by reviewing the National Energy Efficiency Action Plans. Bertoldi et al. (2015) describe the EEOS planned or in place, and compare their ability to deliver. The report explains the difficulties encountered in setting up such obligations, and concludes that the schemes will encounter design problems for some time. This has led a number of Member States to prefer Alternative Measures.

The Coalition for Energy Savings (2014) reaches similar conclusions to Ricardo-AEA. In addition it focuses on policy proposals to strengthen the implementation of Article 7. A key concern is the need to improve monitoring of progress and enforcement, partly due to the fact that Member States have exaggerated the expected savings using overly optimistic assumptions, for example on price elasticities. Amongst other recommendations, the report calls for a strengthening of Article 7, a political commitment to prolong it beyond 2020, and measures to better involve key stakeholders.

1.4. Methodology

This Research Paper, while not as wide in scope as the studies by Ricardo-AEA and Energy Efficiency Watch, provides the first survey-based analysis exclusively dedicated to the implementation of Article 7 of the Energy Efficiency Directive, with questions specific to this Article.

It is exclusively based on a qualitative expert survey and therefore does not focus on the quantification of the progresses in the implementation of Article 7.

Interviews have been undertaken among stakeholders at both EU and Member State levels (representing amongst others governments, regional and local authorities, business, NGOs, customers). Eight Member States were selected, as per the list below.

Information on the choice of Member States:

- Bulgaria: Member State with implementation shortcomings;
- Denmark: a Member State with highest saving planned;
- Germany: biggest energy consumer in the EU;
- Greece: Member State with lowest savings planned;
- Poland: biggest Member State with EEOS only;
- Spain: Member State with high level of decentralisation;
- The Netherlands: Member State with second biggest (and varied) number of measures in the EU;
- United Kingdom: Member State with only residential sector coverage.

The report also adds information on Austria and Italy.

Interviews were undertaken as follows:

- *EU-level stakeholders*: 26 EU level stakeholders were interviewed in a first stage. Theses interviews were conducted by telephone or in person focusing on eight broad questions (see **Annex 2**). EU-level stakeholders were asked to help refining the questions used during stage 2 for the survey and interviews with national specialists (see **Annex 3**), as well as identifying suitable interview partners at EU, national and local levels.
- *Key stakeholders from the public and private sector of selected Member States*: The most prominent specialists have been interviewed in person while some of the other interviews were carried out by the means of the web-based survey tool, SurveyMonkey. The tool allows customizing the questions and provides a clean and user-friendly layout. It provides space for additional comments, in order to encourage the participants in giving their opinion and share their experiences with the implementation of Article 7 in more detail. We interviewed or received feedback through the survey from at least two or three stakeholders for each of the eight Member States.

The survey was undertaken in confidentiality. The interviewees are acknowledged in Annex 4, unless they specified the contrary. No statements have been attributed to any specific respondent.

2. EU-level messages

Key findings

- EEOS are a suitable tool to deliver savings in a cost-effective way and to create a market for energy efficiency. At the same time, many implementation issues need to be solved. It is still difficult to make a business out of energy efficiency.

- Stakeholders agreed that Member States should signal that EEOS continue beyond 2020. Otherwise there is a risk that stakeholders will lose their interest.

- More attention to implementation will be required. Many stakeholders felt that Member States' discretion was too high, notably but not only when it comes to additionality. Stakeholders saw the need for the European Commission to provide additional support to Member States through platforms (formal and informal) for the exchange of information, guidance materials or technical assistance.

- Energy poverty has been identified in some Member States as a possible barrier to EEOS and will need to be addressed where this is the case.

This chapter presents and discusses the main findings from the interviews, which by and large are applicable to all or almost all stakeholders in all Member States. They respond to the principal questions we have submitted to stakeholders in the interviews and questionnaires, essentially

- Whether Article 7 is achieving its objectives;
- Circumstances in which EEOS or Alternative Measures work best;
- Reasons for choosing EEOS or Alternative Measures;
- The Member States with the biggest problems;
- Best and worst practice;
- The obstacles to implementation; and
- How they can be overcome.

In this report EEOS are defined in line with the EED and describe obligations, which are put on distribution or retail/sales companies (Article 7). The way the EEOS can be designed for these companies can take different forms, and entail a trading element such as the White Certificates (e.g. in France, Ireland, Italy, Poland and the UK), partial systems such as bilateral transfers (Austria, Denmark, Luxembourg, and the UK), or are without any kind of certificate or trading (Bulgaria, Croatia, Estonia, Hungary)[20].

[20] Note: In these countries EEOS are only at the state of proposal, and they may decide to introduce trading in future.

2.1. EEOS can work but it is too early to say

All respondents have expressed the view that EEOS in principle are a suitable instrument. EEOS are seen as having significant potential to be an affective tool for achieving energy savings and could even have a transformative effect on energy efficiency markets. It is seen as 'generating' markets for energy services, which to date are nascent at best with few exeptions. Markets are seen by many – although not all – as a means to drive cost-effective energy efficiency and conservation measures. Additional advantages associated with EEOS were that they provide for binding measures thereby allowing to design nationally adapted schemes and that they include the full value chain of energy delivery, including energy suppliers, owners, invstors or managers. At the same time, most respondents acknowledged that implementation of the EED is underway just 1.5 years and many Member States having not yet implemented it in full. As a result, experiences with EEOS are mainly based on previous policies, i.e. those implemented prior to the EED. Whether EEOS in the end work or not, depend on their actual implementation.

In summary, the main merits, which were associated with EEOS have – at least theoretically – been that they:

- Include the full value chain of energy delivery;
- Create markets for new business streams;
- Are more efficient than alternative measures;
- Do not require funding;
- Allow Member States setting own priorities; and
- Focus on the customer interface, a critical area, which for many years has been neglected.

The main shortcoming of EEOS identified by stakeholders, has been the slow implementation. Some stakeholders expressed the view that EEOS have been designed in such a way by some governments to de facto buy time or avoid action. Other stakeholders expressed the view that in some Member States the Alternative Measures chosen have also been designed to avoid ambitious action or target mainly non-energy efficiency priorities.

2.1.1. Balance between short and long-term focus

There were different views on the role of EEOS for the long term. Some stakeholders held that EEOS' principal objective is to achieve cost-effective short-term reductions, i.e. economic efficiency. Views were divied on the role of EEOS for the longer term. All agreed that governments need to signal that Article 7 will continue beyond 2020.

Many respondents and all those representing buildings found that EEOS to date are too much focused on short-term targets. This typically means that simple and low-cost measures are implemented such as changing light bulbs or boilers. Whilst this is in itself positive and an expected result, they argued that insufficient attention is been given to the use of EEOS as a driver to energy efficiency strategies on the long term. Current implementation is thought to be still far away from incentivising the transformation that is required in the longer run.

This view was expressed notably by stakeholders, which were associated with the building sector. According to this view, a more credible strategy towards a transformational shift would be required. This would, for example, include an assessment of long-term potential and the design of a suitable policy and instruments' package such as funding, regulation, information and or ensuring that administrative capacity is available. These stakeholders expressed concern that piecemeal renovation – as is driven by existing EEOS – remains inefficient and will miss out on fulfilling the full potential.

Some stakeholders argued for developing a long-term framework for energy efficiency, possibly in the context of the EU 2030 framework and governance.

2.1.2. Buildings: what is the relationship between Article 7 and Article 4?

Existing EEOS generally have not triggered action in building structures except in the UK where it resulted in some roof renovation and Denmark, which due to its long history of EEOS is a special case. The relationship between Article 7 on the one hand and Article 4 on the other has been particularly controversial.

Stakeholders working on energy efficiency in buildings argue for making a stronger link between EED Article 7 and Article 4, which demands the establishment of 'a long-term strategy for mobilising investment in the renovation of the national building stock'. The importance of a long-term strategy for buildings is particularly significant due to the size of investments needed and the integration and optimisation of renovation driven by comfort, efficiency at the point of energy supply, demand etc. Some argued that Article 7 could be re-designed as a tool to deliver the renovation strategies of Article 4, for example also using Article 20. However, other stakeholders were weary of using Article 7 to deliver on Article 4. One concern has been the risk of dilution of the additionality of Article 7. Another reason given was that a stronger link would dilute the respective objectives; Article 4 essentially focuses on innovation and deep renovation while Article 7 was seen as about creating a market in energy efficiency.

2.1.3. A signal to continue EEOS beyond 2020 is required: revoking the sunset clause is an option

All interviewees made the point that Member States need to signal that EEOS will continue beyond 2020. Almost all stakeholders saw the value of EEOS in the long term, i.e. to create a robust market for energy-related services. This however will require a long-term continuous framework. Given that the EED will expire in 2020, stakeholders felt that there is no certainty on the future of EEOS. Therefore, it will be important that governments signal their willingness to continue with EEOS beyond 2020, for example by revoking the sunset clause.

2.1.4. The 1.5% target

There was little comment on the level of the target (1.5% p.a.) in Article 7, except where there was opposition or uneasiness with the instrument. Those supporting EEOS, however,

mentioned that the primary targets for energy efficiency (20% in 2020 or 27% in 2030, respectively) would not be enough to provide confidence in EEOS.

2.1.5. Overlapping policies and double regulation

With the exception of some respondents from industry, there was little mention of the fear of double regulation although some power sector stakehdolders made the case that the Emission Trading Scheme (ETS) is their instrument of choice.

2.1.6. Should EEOS address energy poverty?

Some stakeholders mentioned energy energy poverty as an issue in relation to EEOS and Article 7. Details are provided in the Member State reports. Some mentioned the importance to monitor impacts on energy prices. Several stakeholders said that although energy poverty is a relevant topic, it should be avoided that EEOS address too many objectives at the same time. It seems to be difficult for energy companies to identify energy poverty in low-income households. Energy companies in general do not have access to the income information of their customers.

2.1.7. EEOS are best embedded in a policy mix

The barriers to energy efficiency are well known and do not need to be repeated here. For the transition period, in the absence of a robust ex-post analysis of the workings of EEOS, most stakeholders generally were in favour of a mix of measures. Such a mix typically includes an EEOS combined with a fund and regulation. Given today's limited practical experiences most stakeholders were not confident to bet on EEOS as the sole instruments. Yet most argued that as experience with implementation grows, EEOS may gradually take a bigger role.

2.2. The choice between EEOS and Alternative Measures depends on many factors

The Directive leaves it up to Member States to make a choice between the instruments. While the choice is influenced by political preferences, a number of other factors also matter.

2.2.1. Effective and efficient EEOS require experience and capacity

Those Member States, which have emphasised EEOS to achieve energy efficiency improvements such as Denmark[21], UK, France and Italy, have had extensive previous experience. Stakeholders believe that on average it takes three to five years before an effective and efficient EEOS becomes operational, and therefore motivates companies to engage. According to stakeholders, it takes considerable time and effort to convince industry and other

[21] Denmark has 20 years experience with EEOS.

stakeholders to buy into an EEOS. The mentioned areas, which are most complex are the formulation of the actions and monitoring and reporting requirements.
For those countries with less experience, it might be a better choice to focus on a smaller number of obligated parties and then organically add to the covered sectors. Stakeholders expressed the view that for those Member States, which have limited capacity in designing and managing complex energy efficiency schemes (Alternative Measures), EEOS can still be an appropriate instrument, provided that the number of obliged parties (companies) is limited. Increasingly consulting companies e.g. based in Denmark or the UK offer services for governments or other stakeholders to implement EEOS.

Some stakeholders suggested that the European Commission should provide assistance to Member States to implement EEOS. This suggestion however remained largely generic and it was not always clear whether stakeholders were up to date with the latest attempts by the European Commission to assist Member States. Generally, stakeholders saw a need for the European Commision to provide resources and mechanisms for Member States such as formal and informal platforms for the exchange of information, guidance materials or technical assistance.

2.2.2. Trade-offs between EEOS and Alternative Measures

Member States face trade-offs when choosing between EEOS and Alternative Measures. Most stakeholders agree that Alternative Measures, notably funding programmes or subsidies can be designed in a more focused way while at the same time, can be implemented faster than EEOS and therefore are quicker to deliver results. The disadvantage is that Alternative Measures in most cases require long-term government funding, which often is not available. An exception is fiscal policies, whose additional advantage is that they are easy to implement. Their disadvantage it is that they can lack focus and are not always able to address non-financial barriers to energy efficiency.

Many stakeholders favoured EEOS as the most suitable tool because of fiscal considerations. EEOS are much less a burden to the government budget, a welcome instrument in strained national budgets. Where the fiscal situation of the country is sound, Alternative Measures are seen more positively. A case in point was Germany where stakeholders generally expressed confidence in Alternative Measures because of the countries' fiscal position, which offers good prospects for the continuation of funding. Nevertheless, in countries in a difficult fiscal situation and simultaneously suffering from the economic crisis, the burden of EEOS to energy consumers and energy poverty need to be carefully addressed in the design of the scheme.

In summary, stakholders seem to believe that Alternative Measures can be suitable provided that a) finances are available, and b) that government/administration capacity is given. Most stakeholders find that funding would need to be scaled up significantly.

Both EEOS and funding programmes require significant government capacity. There have been concerns expressed that vested interest could deviate subsidies to make them tools to subsidise the local economy or specific sectors.

2.3. EEOS as a foundation for energy service markets

One of the principle objectives of EEOS has been to develop new markets for hitherto non-existing energy services. Many stakeholders we have interviewed appear to agree that there is some evidence that this might be the case. Other stakeholders disagree with this view.

2.3.1. Some companies see EEOS as a tool to develop new markets and revenue streams

The traditional model reflected by the tariff structure of locking-in customers for the long term appears to become increasingly less attractive due to falling wholesale electricity prices. Electricity companies are investigating new revenue streams linked to services. While such services are still slow to develop, all electricity companies emphasise by now the importance of the customer interface. EEOS are seen as encouraging suppliers to adapt their business model from mainly selling electricity to selling services, such as for installations that reduce the energy bill.

The UK example shows that EEOS can be interesting for utilities to strengthen the customer interface. Given the competitive markets in the UK retail market, utilities are interested in distinguishing themselves from their competitors by focusing on communication of energy savings' potentials and their potential economic gains. Motivation was to increase customer loyalty, e.g. by a broad service offer going beyond selling energy but also by reducing costs of call centres.

Some stakeholders also saw the EEOS as a means to make energy efficiency move up the political priority list.

2.3.2. Businesses face many practical obstacles

One of the concerns presented by stakeholder is to ensure additionality and the correctness of estimations of impacts. To ensure that savings are actually realised, the best method in place are the Energy Performance Contracts (EPC). It is one of the main tools or business models which energy service companies apply. However, there are difficulties, and stakeholders expressed the following issues:

- Projects using EPC generally are only profitable if the whole value chain is included, including energy supply. This is not always guaranteed due to missing laws or regulation. Foregoing the potential of energy supply weakens the business case.
- Another major requirement of EPCs or any other business models that may appear in this vein is standardisation to reduce transaction costs. One area for standardisation is monitoring. One suggestion was to link the granting of subsidies to 'automatic' monitoring for example under ISO 15000 or regular energy audits.
- Awareness has been another important issue. Stakeholders mentioned that in most cases possible customers have little idea of EPCs or comparable instruments and have limited

possibility to obtain information in an easy way. It was suggested that local governments ensure that information on new energy services are made available or be facilitated.

- Some stakeholders recommend separating the measures for single residents from larger industrial customers or buildings. Closer monitoring and EPCs are necessary for the latter, while single households are benefitting for simpler schemes without monitoring and estimated savings.

2.4. Aspects of moral hazard in Article 7

While it is too early to pass judgement on EEOS a recurrent theme has been that EEOS lack ambition or is not properly implemented.

2.4.1. Obligations under EEOS are not ambitious enough

A recurrent theme by stakeholders from the energy efficiency industry has been the lack of ambition of the obligations (e.g. UK, France, Italy). Low ambition EEOS mean that projects focus on easy to make and, generally, cheap measures. This is seen as evidence by some that the initial implementation of EEOS was made too easy for example by getting qualifying reductions for profitable lighting projects, which did not go beyond 'business as usual' (BAU).

According to several stakeholders, the EEOS in their country often led to energy providers to originate certificates based on cheapest one-off options, often outsourced to third parties. An often cited case was the UK's scheme where the government created a complex formula which de facto lead to a race to the bottom around cheapest-to-deliver certificates. But concerns were raised in all EEOS, including Denmark. The design of the schemes often gave the wrong economic incentive to energy providers. The schemes therefore missed out on a focus on the client-service delivery, whereby packages of measures would be worth more than one-off measures or would reflect the inclusion of best-in-class technologies and intelligent devices etc.

2.5. Acceptability

Energy supply companies including oil product retailers and electricity utilities have sometimes been opposed to the introduction of EEOS. There is evidence that this has been the case of in Germany and Spain. Opposition from utilities has been strongest where companies owned generation assets. Opposition, however, sometimes was also triggered by negative experiences in the EU or abroad. Sometimes, resistance was fuelled by a fundamental opposition to an approach, which is seen as constraining the supply of energy, which for most companies has been the predominant model upon which the financial health of the business rested.

Stakeholders reported that over time opposition was or has been receding.

- The fact that some Member States have used EEOS has somewhat weakened the case that EEOS are inappropriate. The design of EEOS is essential. Several EU and national stakeholders have expressed the view that the experiences with the UK EEOS have triggered a negative view by some utilities. The reason seems to be rooted in the political decision taken in 2012 that energy companies also address social issues based on complex

sub-measures and targets, which increased the complexity of implementation, as well as it multiplied the bureaucratic burdens.

- The changing nature of the European electricity sector, as described above has been seen as important for the change of view of utilities.
- There has also been evidence that oil product retailers remain sceptical towards EEOS. They argue that there is no customer loyalty in the case of oil products (transport and heating fuels). Customers switch regularly. Hence, oil product retailers' influence on customer behaviour is minor. Such negative views can be overcome in case of flexibility mechanisms for example White Certificate Schemes. Austria is currently discussing the possibility to credit for addititives in the fuels. In France, credits are obtained through savings obtained by car sharing.
- Acceptability can also be increased if financial instruments, including Structural Funds, can be used. This has been suggested by the examples of Ireland and Latvia.
- A recurrent theme was that EEOS or Alternative Measures work best and are most acceptable if stakeholders are consulted. Experiences with stakeholder consultation and involvement were mixed. The level of consultation in the Member States has been very varied, in some cases very weak.

2.6. Implementation and enforcement

Almost all stakeholders acknowledged that the implementation has just begun, at least in most cases and therefore, implementation shortcomings should be expected. Many stakeholders agreed that many implementation issues such as the phase in or exemptions would be solved over time.

2.6.1. The importance of the current EED implementation review

There were different views on the value of reviewing the EED now. Basically two schools of thinking exist. Some held that more time should be given to implementation before the evaluation. The other position is that in order to make the necessary adjustments in time for the Directive after 2020, it is time to kick-off the process for review, taking into account the time needed for co-decision.

2.6.2. Reducing Member State discretion

There was a general feeling that Member States have too much discretion when implementing EEOS. The point most often repeated has been the exemptions. On the other hand stakeholders acknowledged that the exemptions would gradually disappear, as they are associated with the phase in.

Many stakeholders have argued that more precision and robust methodologies would be required for Annex 5 of the EED in general. In addition, the following points were mentioned most often.

- A number of stakeholders felt that additionality and materiality provisions are set too vagely and offer too much room for interpretation. Some argued for harmonisation of the additionality calculation.
- Several stakeholders were concerned that the impact of the measures was overstated since measures typically have not the same effect every year, due to the diminishing returns caused by wear and tear.
- Price elasticity was another area where stakeholders thought Member States would overstate their achievements.

2.6.3. European Commission Guidance

Many stakeholders saw the European Commission Guidance by and large as adequate, except for the points discussed in the previous section. At the same time, stakeholders thought that Member States too seldom followed EC Guidance. It was suggested that the European Commission puts more emphasis on the uptake of Guidance. One suggestion has been to ensure that EC Guidance is part of the EU's discussions and decisions on governance. Another suggestion has been to provide funding for 'dialogues' of EU and Member State officials on the implementation of Article 7, e.g. through Concerted Actions. Such a measure was seen as a means to increase capacity of Member States and other stakeholders, compare best practice and more generally, compare experiences.

Some stakeholders also mentioned the need to monitor impacts on consumer prices.

Other stakeholders proposed to simplify and standardise reporting requirements for Alternative Measures.

2.6.4. Other implementation issues

The following practical suggestions were made:

- Alternative Measures appear to be too open ended; some stakeholders suggested establishing a list of eligible measures (positive list). For measures not on the list, Member States would need to prove that they help reaching the target.
- How transport is accounted for should be clarified
- Remove savings for electrity transmission and distribution, as they are regulated industries.
- Some stakeholders opposed borrowing of energy savings; banking was generally accepted.
- The use of trading in EEOS divides the stakeholders. Some consider trading provisions as useful; others opposed them. The main concern of those opposing it was trust, i.e. that the trading scheme would not be abused or mismanaged. All agreed that trading provisions could only be introduced in countries with experience with such measures. It requires a large number of retailers and clear rules. If well run it increases efficiency of the EEOS.

2.6.5. Calculating reductions

A recurrent theme has been the difficulties and complexities of calculating reductions. The situation seems to be aggravated where Member States have combined EEOS with Alternative Measures. A first issue is how to calculate additionality, and avoid double counting. A second is that on occasion companies submitted to EEOS can find it difficult to identify reduction potential, because the reduction has already been realised for example by pre-existing Alternative Measures.

2.7. Governments are constrained through fiscal discipline

Many stakeholders mentioned the fiscal constraints by governments. Practically, it has been noticed that government-held energy performance contracts increases public debt. One stakeholder argued that public spending on energy efficiency should be exempt from EU rules on fiscal discipline. Such an exemption could be justified because of the multiple benefits of energy efficiency in terms of the environment, security of energy supply, jobs creation or economic growth. To avoid excessive spending, a ceiling would need to be adopted.

3. Member States' findings

Key findings

- Almost all stakeholders have identified consumer information as an essential element for the success of both EEOS and Alternative Measures. Most stakeholders felt that not enough resources are dedicated to this. Stakeholder consultation has been identified as another important component. Consultation and negotiations between the government and the obligated parties on the design has been identified as success factor in some cases.

- EEOS offer the possibility for Member States to design an efficient instrument, yet adapted to national circumstances. Precondition is acceptability of the concept to go ahead via a market-based solution.

- Other factors for success: EEOS are more likely accepted if governments can 'threaten' with Alternative Measures; simple and transparent procedures; credible compliance mechanisms; flexibility tools such as banking, borrowing or combination with trading mechanisms, provided they are properly implemented.

- Factors for failure: lack of political will; lack of government capacity; lack of support instruments for obligated parties; lack of compliance mechanisms; high complexity; lack of suitable monitoring mechanisms.

AUSTRIA

Implementation process of Article 7

Austria has a long history of energy efficiency measures. Article 7 was thus not particularly appreciated because it put into question existing schemes and additionality rules required going beyond some ongoing efforts. Alternative Measures are today mainly based on reinforcements of existing measures.

The introduction of EEOS was not smooth and came late, i.e. rushed, and implementation problems can be traced to this. Their design is the outcome of a difficult compromise with industrial energy consumers and energy providers. It is unclear how well the compromise will work in practice.

The decision on the EEOS was taken politically in a rather opaque manner. The pressure from interested parties on the government was allegedly considerable, but the government proceeded to set up EEOS despite misgivings from the energy sector. This result was apparently driven by the promising experiences in other countries and the lower fiscal burden required in a country where already many energy efficiency and housing schemes are subsidised by the state. EEOS could therefore be considered the right missing complement.

Measures adopted

EEOS

The Austrian EEOS was set up quickly causing confusion on, for example, who is obligated, what measures to implement and what their impact is. The country nearly set up an energy efficiency fund instead, but this was rejected in the end. The EEOS suffers from some design problems as it encourages the obligated parties to implement the cheapest measures, which often are short-lived and doubtfully additional. It is difficult for the obligated parties to find new additional measures, as the alternative ones already apply many instruments, such as subsidised loans and subsidies.

Savings are owned by the regional governments and the EEOS cannot set up a similar parallel system without rising problems of additionality and double counting. The EEOS is still being developed and soon the chosen measures will be published. Energy providers will have the choice of what measures to implement, but are required to ensure that 40% of the measures are for households.

The EEOS is expected to contribute to 40% of the 1.5% savings leaving 60% for the Alternative Measures.

Stakeholders have expressed doubts that the EEOS compromise agreement can lead to a product and services market and avoid a race to the bottom to implement the cheapest short-term measures. The incentives created are questioned.

Alternative Measures

Austria has a long history of fiscal incentives and subsidies in place for housing, including for EE measures.

Recommendations by stakeholders:

- All sectors should be included, particularly the transport sector;
- Trading of certificates, even domestically, may open too many loopholes. Trading across borders is not seen as acceptable as there are no solid comparable metrics. Non-transparency is a concern.

Factors for success (EEOS):

- EE targets have to be clear and mandatory;
- The EEOS should include distributive justice ensuring that costs and benefits are all distributed based on equity. Households should be included.

Factors for failure (EEOS):

- The introduction of exemptions, voluntary agreements and Alternative Measures that weaken rather than complement EEOS;
- Lack of political commitment;
- Lack of effective consultation.

BULGARIA

Implementation of Article 7

Bulgaria introduced EEOS with the Energy Efficiency Law in 2008. The national target is allocated in sub-targets among three groups of obligated parties: energy suppliers (with annual amount of energy sold to their final consumers more than 75 Gigawatt hours (GWh)), buildings with more than 1.000 m² floor area (municipal and state administrations), enterprises with annual consumption more than 3.000 Megawatt hours (MWh).

The biggest part of this obligation scheme is for the energy suppliers. Their energy savings' target for 2016 covers 64% of the total, i.e. 644 GWh. In 2014 the implementation of the energy suppliers' target stood at 41.3%, representing 1. 916,4 GWh.

With the new Energy Efficiency Law from 2015 Bulgaria amended EEOS. The effect of its implementation is not available yet though.

Measures adopted

EEOS

In addition to building and companies (as described above), the Bulgarian EEOS put the obligation to all energy supply companies. The scheme was adjusted to exempt transport fuels. Reason was to avoid an additional burden to industry via potentially increased fuel costs, especially given the EU's already strict rules and obligations for companies selling oil products.

The introduction of the obligation scheme was seen as stimulus for the energy suppliers to start thinking about energy efficiency and also to start searching for other ways to reach their final consumers by offering an energy efficiency service. It triggered changing effect on the side of energy supply companies.

The Sustainable Development Agency (SEDA) successfully completed an EU funded project on the design for a White Certificates Trading System linked to the EEOS. Implementing the Trading System is seen as a good tool to increase cost-effectiveness but also to raise awareness on energy efficiency.

Alternative Measures

Supporting measures have been implemented to complement and assist the obligated parties to achieve the targeted savings.

Recommendations by stakeholders:

- EEOS require supporting mechanisms (e.g. financial incentives, trading provisions, etc.) to assist actual implementation of energy efficiency measures;
- EEOS need to be accompanied by information campaigns both for industry and customers/households. Industry campaigns best focus on the benefits in terms of

efficiency (cost-effectiveness), effectiveness (energy savings), but also the potential to develop new services and strengthen the customer interface. Final consumers should be informed on workings and the possible benefits;

- Administrative capacity is essential; simple and cost-effective procedures for monitoring and verification of the EEOS' results as well as for the development of specialized methodologies for energy savings calculations are needed;
- A wide sector coverage, i.e. limiting exemptions to a minimum, is seen as a guarantee to reach the national savings in a cost-effective way;
- The design of the EEOS should take into account energy poverty, which is a wide spread feature notably but not only in South East Europe; acceptability can be improved if EEOS are perceived as addressing energy poverty.

Factors for success (EEOS):

- The combination of a legal obligation – subject to monitoring and verification – and information campaigns including mutual consultation between the stakeholders, i.e. 'stick' in form of obligation and penalty and 'carrot' in form of supporting measures such as tax reductions, trading system, etc.;
- Limited administrative and financial burden for the obligated parties to prove the implementation of their individual targets as well as for the monitoring and verification body;
- Simple and clear design to evaluate savings, e.g. single simple calculation methodologies, lists of eligible measures, deemed savings, publicly available calculation fact-sheets, etc.;
- The administration's resolve to implement the EEOS.

Factors for failure (EEOS):

- Lack of support for the obligated parties, notably financial incentives, administrative capacity, information campaigns;
- Lack of information (which leads to lack of understanding) for the benefits of the EEOS for all the stakeholders;
- Lack of *simple* monitoring methodologies; current calculation methodologies based on complicated monitoring and verification protocols are too complicated.

DENMARK

Implementation of Article 7

Denmark has chosen to implement EEOS. Principal reason was consistency with the existing legal framework. Denmark has started to develop its EEOS since 1995 and is has been fully implemented in 1999. Starting with electricity distribution companies it was expanded later to natural gas suppliers (2004) and oil and district heating companies (2006). The scheme sets a (energy efficiency) target for the different industries, in relation to their yearly sales of energy[22].

[22] Based on average of previous three years.

The EEO is based on a negotiated agreement and is then codified in national law.

Experiences in Denmark have been seen as positive by all major stakeholders. The EEOS is supported by all parties; i.e. from the left to the right. The Danish EEOS has been identified by most all stakeholders as very successful, and as best-practice.

Stakeholders believe that the positive experiences with the Danish EEOS as well as in Italy and France have been the reason for including EEOS in Article 7. For Denmark EEOS seem to have been the instrument of choice. At the time of the implementation of the EED, Alternative Measures have not been considered seriously. Since the choice of the instrument was fix, there was no need for consultation. However, there were consultations back in 2006.

The main reason for the choice of EEOS was its promise to achieve cost-effective reduction as a result that it is a market-based instrument. Stakeholders acknowledge that energy efficiency and the EED make a substantial contribution to the EU 2050 goal. The main importance of the EED is seen in Article 7 with its supplier obligation schemes, which have been picked as the main instrument in the Directive to achieve the 2020 energy efficiency target. Article 7 is seen as a key to cost-effectiveness, which is considered as underpinning industrial production in Europe, jobs and growth.

Measures adopted

EEOS

The EEOS was based on a voluntary agreement between the Danish Energy Agency and the energy utilities.

Stakeholders agreed that the Danish EEOS has increased energy efficiency and saved energy in a cost-efficient way.

There is a trading provision on the Danish EEOS, i.e. savings can be traded.

Several evaluations of the Danish EEOS showed that more than half of the energy savings were achieved within the industry. Evaluations also indicate that the energy savings in the industry sector is more cost-efficient and that there are less doubts on the additionality than energy savings generated under the EED in the public and residential sector.

However, there was concern that energy savings will get more difficult and costly in the future because the most cost-effective measures have already been implemented. [23]

Some concerns have been raised that the design of the Danish EEOS do not give the right economic incentive, because it does not take properly into consideration the short timeframe of

[23] According to one stakeholder, an evaluation on Article 7 by Deloitte in Denmark concluded that the overall EEO is a well-functioning instrument to achieve end-use savings, and that it generates a socio-economic surplus of 1,3 EUR cent/kWh for each invested DKK (0,13 EUR). Nevertheless, the large increases in the Danish saving target that have been introduced in the period of 2012-2020 have caused a cost increase in complying with the saving target.

the Directive. While energy companies in Denmark are seen as efficient and have a positive attitude towards the implementation of EEOS, the incentive encourages short-term, cheap measures (e.g. compact fluorescent light bulb, low flow shower heads), rather than longer-term measures such as insulation. The closer we get to the sunset clause of 2020, the greater the incentive for implementing the cheapest solutions.

Alternative Measures

The EEO accounts for 100% of the target under Article 7(2) even though supporting measures have been implemented, including taxation, financial incentives, standards but also information, positive lists or ranking of craftsmen and service providers. Stakeholders thought that Alternative Measures or a mix of EEOS and Alternative Measures can work.

Recommendations by stakeholders:

- Focus should be "using the energy more efficiently", which often but not always is the same as "reducing energy consumption in absolute terms".
- The most cost-efficient way to increase energy efficiency is to promote and use EPC (Energy Performance Contracting) in both the private and the public sector. Especially in the public sector, Denmark has good experiences with EPC.
- A combination of EEOS and Alternative Measures has been seen generally as positive, even if in the Danish case only EEOS was applied.
- Precondition for cost-effectiveness is that Member States are able to design their own strategies.
- In case of a competitive market, the obligation should be put at the whole energy supply industry (i.e. electricity, gas, oil products, district heating etc.) to allow companies from different sector to compete with each other.
- In a monopolistic or oligopolistic situation, the obligation is best put at the company.
- Energy distributors or retailers should be able to establish and implement a cost recovery scheme.
- Regular evaluations are required.
- Limited coverage (e.g. exclusion of sectors) reduces cost-effectiveness.
- Exclusion for affordability (e.g. energy poverty) is not recommended; energy poverty should be handled by social policy, e.g. transfers.
- Trading, banking and borrowing have been seen as positive to increase cost-effectiveness.

Factors for success (EEOS):

- Negotiated nature (negotiated agreement) between government and obligated parties as to main design elements.
- Focus on markets and cost-effectiveness – companies need an incentive to reduce the costs of each unit of savings.
- Comprehensive coverage to capture the full least-cost potential.

Future success factor(s):

- Take into account the transformation of the energy sector, notably electrification and remuneration of flexibility in the power market.

Factors for failure (EEOS):

- Lack of political will.
- Lack of acceptance by industry.
- Poorly defined regulatory framework.
- Too short timeframe of the EEOS - it takes time and several adjustments to make a well-functioning EEOS.
- Not enough flexibility for Member States to design their policies and/or obligated parties to capture full potential for cost-effective solutions.

GERMANY

Implementation process of Article 7

Germany has implemented Alternative Measures only. The reason was effectively a political choice. The existing framework was seen as working. Hence, implementation of Alternative Measures was seen as being consistent with the existing framework. Two other reasons were given. One was the strong opposition from energy suppliers, especially electricity. The other was due to electricity market liberalisation. In the case of an EEOS several thousands of electricity retailers would have to be obligated.

There was some consultation before the choice of instruments. The government notified largely existing measures but also invited stakeholders to propose additional measures. The choice of not using EEOS has not been based on a formal consultation.

Measures adopted

EEOS

No EEOS were adopted.

Nevertheless, stakeholders believed that EEOS could be a suitable instrument also for Germany. EEOS are particularly suited if the obligated parties are market participants, which see a business opportunity for reducing energy cost-effectively and are capable of refinancing this via consumer bills. EEOS can address uncomplicated measures or those with short pay-back time (e.g. lighting, motors, pumps etc.).

EEOs are especially appropriate if government money is tight.

A key element is the choice of the obligated party. In competitive markets, Distribution Systems Operators (DSOs) seem to be the most suitable choice while in oligopolistic markets, energy retailers seem to be a better choice.
To ensure a level playing field, implementation of measures could be tendered for example to third parties.

Alternative Measures

Germany used the following measures: taxation, financial instruments, standards & norms, regulation, voluntary agreements.

The Kreditanstalt für Wiederaufbau (KfW) building rehabilitation scheme was cited as an important instrument.

Experiences have been the following:

- Taxation measures did not work due to low price elasticity, e.g. in transport;
- Voluntary agreements and standards were too weak;
- Regulation (standards) and financial incentives (subsidies) work best; and
- Budgetary resources may need to be doubled in the future.

Recommendations by stakeholders:

- Keep flexibility between EEOS and Alternative Measures to ensure that the most suitable instruments are used.
- Sector coverage should depend on Member States' choices.
- Best sector coverage is final energy consumption including domestic, industry, tertiary and public.
- Ensure a variety of different programmes to effectively address the existing potential.
- Concentrate measures (Alternative Measures or EEOS) on biggest and least-cost potentials, e.g. apply *de minimis* rule.
- Alternative Measures should be clearly defined and limited to proven best practice policy options (e.g. tendering models, KfW-type funding schemes).
- Ensure that regulation (standards & norms) is simple, predictable, and that their effectiveness is proven to be eligible to Article 7.
- Exclude any measure from Article 7 (9) where effectiveness is not proven.
- Exclude any measure where energy savings are not primary intention (e.g. lorry tolls, renewables levies).
- Allow Voluntary Agreements only if a credible threat of regulation exists as fall-back.
- Tendering of sub-contracts is simpler than trading.
- Guarantee the continuation of funding.
- Provide sufficient resources for consumer information and 'marketing' of policies.
- Focus on transparency and stakeholder consultation.

Factors for success (EEOS):

- Identify the right actors.
- Consumer information.
- Stakeholder consultation & transparency.

Factors for failure (EEOS):

- Poorly defined and inconsistent regulatory framework.
- Absence of penalties.
- Poor design.

GREECE

Implementation of Article 7

According to stakeholders, Greece has attempted to implement Article 7 initially by using Alternative Measures. Most measures focus on financial incentives and training and educational programmes. They are complemented by regulation (standards & norms).

Measures adopted

EEOS

The change of the law makes the use of EEOS after 2017 possible. Stakeholders thought that the deviation from 2014 and 2015 targets under Article 7 might render the introduction of an obligation scheme necessary to bring about additional savings during 2017-2020 and to be compliant with the cumulative national energy savings target set for 2020.

Views on the merit of EEOS were mixed with some stakeholders being positive towards EEOS – essentially based on experiences from Denmark, Italy and France – while others saw them as ineffective.

Alternative Measures

Alternative Measures in Greece consist of a long list of horizontal measures relying on different instruments including financial incentives, education, training or regulation and numerous projects. Yet stakeholders doubted that measures were actually implemented.

All stakeholders acknowledged the impact of the economic crisis.

Generally, stakeholders felt that Alternative Measures are the best way forward. Yet, under certain circumstances, EEOS were seen as a complement.

Energy poverty was identified as an obstacle to both Alternative Measures and EEOS.

Several stakeholders saw energy efficiency as a means to stimulate the economy and job creation. For this to happen, energy efficiency needs to be a political priority and efficiently designed.

Recommendations by stakeholders:

- Alternative measures or EEOS need to be seen as a credible instrument to reduce energy consumption and increase energy efficiency.
- To make energy efficiency policy successful, all stakeholders should be involved.
- Avoid overlap of instruments and over-financing.
- Review instruments and identify cases where information and education campaigns are most suitable.

Factors for success (EEOS):

- Political will.
- Simplification, especially in the initial phase of implementation.

Factors for failure (EEOS):

- Lack of political will.
- Lack of collaboration between different stakeholders including the government.
- Opposition by the energy supply industry and refusal of industry to participate.
- Role of utilities and their fear of being subject to overlapping regulation, e.g. from the EU Emissions Trading System.

HUNGARY

Implementation process of Article 7

The transposition of the Energy Efficiency Directive has not been completed in Hungary. This has led to the present situation where no EEOS or Alternative Measures have been set up. The proposal to set up an EEOS appears to be vague but no other plans seem to be made.

The Parliament has recently issued an Act on energy efficiency aiming at implementing the EED, but this Act has no operable requirements. The debate on the transposition of the Directive is still not complete.

This has led the Commission to refer Hungary to the European Court of Justice for infringement in March 2015.

Measures adopted

EEOS

Hungary has indicated its intent to implement EEOS on the energy distributors and retail energy sales companies. The EEOS would cover all energy consumers, with the exception of the transport sector. This will require a detailed description by the Hungarian authorities.

Alternative Measures

In December 2015 the Hungarian Parliament passed an energy efficiency bill, requiring for large companies to conduct energy audits every four years. It also obliges energy companies to provide information on their energy efficiency measures. The state also has set up an information site on available measures.

Recommendations by stakeholders:

- EEOS should target retail energy sales companies, because it would have numerous regulatory advantages, such as low administrative costs and a stable financial background.
- The obligated parties should be household and transport sectors.
- Trading requires a well running system, something stakeholders questioned in the case of Hungary.
- EEOS should allow banking, but borrowing only under special circumstances.

Factors for success (EEOS):

- If the obligated parties are determined accurately.
- If the set of obligations are determined accurately.
- Effective, proportionate and dissuasive sanctions in case of infringement.

Factors for failure (EEOS):

- If the above requirements are not fulfilled.

ITALY

Implementation process of Article 7

Compared to most EU Member States, Italy has a very mature EEOS mechanism consisting of tradable White Certificates, which has been in place for 12 years. Obligated parties are electricity and natural gas distributors. Alternative Measures include tax deductions for energy efficiency introduced in 2007 and the Conto Energia Termico (CET) introduced in 2013.

The White Certificates have evolved and matured over the years. Initially, they targeted the residential sector, and consisted of small replicable actions with a focus on electricity savings,

mainly lighting. It later expanded to cover residential heating. In 2012 a change in legislation set incremental energy saving targets for electricity and gas distributors, while the use of White Certificates was shifted from the residential to the industrial sector. The residential sector is now covered by tax incentives for energy efficiency and partially by the Conto Energia Termico, which proposes financial instruments to offset the investment costs of new renewable thermal systems. The Conto Energia Termico also gives support to public administration buildings for renewable thermal systems investments, as well as for energy efficiency.

Important legislative changes to the White Certificates mechanism are expected in 2016, the exact content of which is still not known.

Measures adopted

EEOS

The Italian White Certificates are today targeting the industrial sector and other large gas and electricity energy consumers. This shift demonstrates, according to the stakeholders, a sign of maturity, as the system now requires a higher level of expertise from the energy companies involved. The White Certificates are expected to cover 60% of the 2020 energy savings' target.

A difficulty encountered with the new users of the White Certificates is that assumptions on the stability in time of energy efficiency measures that are valid in the residential sector do not hold in the industrial sector. The White Certificates include banking from expected future savings. The calculations on the 'business as usual' (BAU) and the savings after intervention are affected considerably by economic cycles in the industrial sector, impacting the calculations.

The legislation now also allows industrial players to apply directly for White Certificates, reducing the role of Energy Service Companies (ESCOs). In fact, the government now requires ESCOs to obtain a specific certification (UNI:CEI 11352 standard), which only large, structured entities can achieve. This removes from the market many small ESCOs, which in the past operated as intermediaries for the White Certificates with residential customers.

White Certificates have also been praised for the following characteristics: the projects covered by the White Certificates are suitable for a wide range of industries. Investment costs are well covered by the White Certificates with low impact on the costs of energy.

Alternative Measures

To address the shift of the White Certificates towards larger energy users, small residential users (and local public administrations) are now able to access tax credits to deduct energy efficiency interventions, as well as obtain support from the Conto Energia Termico (CET) to finance renewable installations for thermal savings (e.g. solar heating systems).

The CET also supports energy efficiency investments, but only in the public sector.

While White Certificates require complex monitoring of energy savings, the CET does not. This simplifies the introduction of energy efficiency measures in the residential sector. The methodologies used to assess the energy savings linked to the CET measures are solid, and

ensure that credible estimates are produced.

Recommendations by stakeholders:

- Avoid imposing restrictions on EEOS; it is better to leave market mechanisms determine the interventions.
- Change the methodology for the estimation of future savings.
- Ensure clarity and regulatory stability.
- ESCOs should be kept involved, as these have a valuable accumulated knowledge.
- Energy poverty could be addressed better.

Factors for success (EEOS):

- Stability of the legislation.
- Clarity on the methodology.
- The existence of an efficient independent body issuing the White Certificates.

Factors for failure (EEOS):

- Absence of penalties to ensure enforcement.
- Inappropriate baseline calculations as a basis to estimate the energy savings.
- Unstable regulatory framework.

POLAND

Caveat: This description is based on limited stakeholder input.

Implementation of Article 7

With the Energy Efficiency Act, in 2012 Poland implemented an EEOS in the form of a White Certificate Trading System. The EEOS has been designed for the period until the end of 2016 only with new rules being planned for the time thereafter.

Potential changes are that obligated parties will need to reduce 1.5% annually, new rules to validate the credits will apply and the so-called substitution fee of around EUR 230 (PLN 1.000) per tonne of oil equivalent will be replaced by a maximum penalty of somewhat less than EUR 700.000 (PLN 3.000.000).

Under the current system, the government via the Energy Regulatory Office (ERO) organises tenders for projects falling in the scope of the obligation, e.g. energy supply, transmission and distribution as well as end-use.

Measures adopted

EEOS

To use a White Certificate Trading System was a political choice. The White Certificate Trading System and EEOS in general are seen as the most cost-effective instrument and a good way to establish a market-based system. The government makes energy efficiency a priority and has identified considerable potential for energy efficiency, some of it being very cost-effective.

The introduction of the White Certificate Trading System has been based on stakeholder consultation.

The reductions achieved by the EEOS have been seen as very poor by stakeholders.

Nevertheless, stakeholders believed that EEOS can work if simplified and therefore can become an important tool to trigger interest in energy efficiency.

Alternative Measures

No information.

Recommendations by stakeholders:

- The main recommendation is to simplify the procedures and notably the auctioning process for projects. It was suggested to replace the auctioning altogether.

Other recommendations included:

- Set up funding instruments to help investors paying for upfront investment;
- Add taxation measures to the policy mix; and
- Cover energy-intensive industries.

Factors for success (EEOS):

- Simplification.
- Making obligations harder to avoid, e.g. by imposing higher penalties.

Factors for failure (EEOS):

- Substitution fees gave a too easy possibility to avoid obligation.
- Administrative complexity makes the system too cumbersome.
- Insufficient interest by stakeholders both in terms of scale and scope.
- The workings and potential of the White Certificate Trading System had not been properly examined.

SPAIN

Implementation process of Article 7

Spain has taken a long time to implement Article 7, and has only partially done so. The political process towards the design of the measures was quite opaque. According to the stakeholders' opinions, planning was made by the Ministry of Energy and Industry without formally announcing the work in progress. There was, however, some external output from experts consulted individually or through commissioned reports.

Measures adopted

EEOS

Spain did not adopt EEOS, but there are indications that the government has an intention to do so in the near future. The fact that they were not introduced has been explained by some stakeholders as a result of resistance by industry including fuel product suppliers and some utilities, which were described as being oligopolistic and influential. Also the negative experience in the UK seems to have created strong resistance by a major utility. However, the more positive experiences in some other countries have started to convince the energy sector that EEOS may be a good policy instrument.

Alternative Measures

In a difficult economic situation, few options were available for Spain. Taxes could not be introduced and strong resistance for costly standards was feared. Under these conditions what was set up is the National Energy Efficiency Fund (Fondo Nacional de Eficiencia Energetica, FNEE), which stakeholders have by and large considered inappropriate. It is merely a simple fund without expert fund managers dedicated to deliver a particular set of outcomes. It subsidises projects for sectors and regions. The fund is fed into by energy providers based on the calculation of the estimated costs for each of them to reach a 1.5% net reduction in energy sales. The money provided is then used to subsidise energy efficiency measures in housing, transport and industry. Funding from FNEE can also be used with EU Structural Funds to co-finance measures, which means that much of the FNEE is then managed by the autonomous communities, which are in charge of the Structural Funds. The fund has faced criticism, because it has been unable to disburse the funds effectively and has partially been captured by vested interests.

The FNEE is mainly dedicated to energy efficiency measures in housing and non-residential buildings. In the area of transport, the measures have attracted severe criticism, because it mainly it subsidised the PIVE programme (Programa de Incentivos para los Vehículos Eficientes), which offers subsidies to purchase new vehicles. The plan claims that it replaces the car stock for cars with more efficient motors, but has been criticised as being mainly a subsidy to the car sector. It is unclear where the additionally is and it ignores rebound effects.

Another measure has been the possibility to reduce property taxes for homes with high energy efficiency. But this tax is in the hands of the municipalities, and the measure is voluntary.

Recommendations by stakeholders:

- The funding raised has to be linked more clearly to effective measures in energy efficiency. One of the recommendations was connect to the influx of money created by Article 7 to go directly towards the implementation of Article 4.
- More transparency and consultation in decision-making.
- There is a need to look for more soft measures: information to consumers, and sending stronger energy efficiency policy signals to consumers.
- The property tax reductions may be a stronger incentive that the energy efficiency obligations of the fund.
- For the transport sector, rather than a subsidy, a car registration tax in function of energy efficiency is considered more efficient.
- Smart meters are not interesting as an incentive: a quantification of the annual money savings resulted in €50 per year.
- Better use of behavioural economics to develop the right incentives.
- Energy efficiency certificates for housing should be compulsory. This is not the case in Spain.

THE NETHERLANDS

Implementation of Article 7

The Netherlands has chosen to implement Alternative Measures only. Principal reasons mentioned were a political choice and the consistency with the existing legal framework.
The choice was based on consultation, as part of the nation-wide energy agreement with stakeholders. In the Netherlands, there is consistency and a long history in working together with stakeholders, which has led to successful voluntary agreements.
The introduction of an EEOS is presently being considered.

Measures adopted

EEOS

There is no EEOS presently in the Netherlands but it is under consideration, mainly because it could provide a way to meet the more ambitious national energy savings goal, and complement the alternative measures. A decision to elaborate on such a scheme is planned before the summer.

Alternative Measures

The Netherlands use the following measures: Taxation, financial instruments, and regulation & voluntary agreements.

Although the mix of Alternative Measures in the Netherlands is expected to be sufficient to meet Article 7's target, there are doubts that they could create sufficient incentives towards the

more ambitious national energy savings goals for 2020 (see National Energy Agreement), which is why an EEOS is considered.

It is deemed difficult (if not impossible) to assess the effect of Alternative Measures individually, since these policy measures work in general best in a package, but general issues encountered by Alternative Measures are:

- Difficulty in demonstrating additionality, especially in the case of financial instruments; and
- Monitoring requirements for Alternative Measures lead to an additional administrative burden.

Recommendations by stakeholders:

On EEOS

- Set very simple rules in order to avoid high administrative and transaction costs.
- The additionality of measures under an EEOS should be ensured.
- Both the target and the idea of obligation to parties should be clearly communicated. The target should initially not be set too high, and the EEOS are best combined with existing policies that market actors already know.
- Energy suppliers/retailers are the preferred EEOS obligated parties, as they have a direct relationship with the end-consumers. They have an incentive to compete, leading to more cost-effectiveness.
- All end users ought to be covered, or at least the households and trading sectors, as well as services and government, with a focus on the built environment.
- Specific rules targeting vulnerable consumers should not be included within an EEOS, as they would interfere with national income policies.
- Trading provisions could introduce greater flexibility for obligated parties to reach their goals, as well as promote a better functioning of the market, provided that there is a sufficient number of suppliers of cost-effective measures.
- Banking and borrowing could also be eligible actions, on the condition that a large number of retailers and eligible parties for trading is present in the market.

On Alternative Measures:

Amongst Alternative Measures, the standards and norms in place are perceived as successful, as it is easier to demonstrate additionality. However, EEOS are seen as necessary as some targets cannot be achieved through Alternative Measures only.

Factors for success (EEOS):

- ***A longer and consistent time horizon, at least medium term (10 year), with*** intermediate targets.
- A simple reporting and monitoring mechanism, including effective enforcement.
- A well-developed energy service market with sufficient suppliers of cost-effective measures.

- Consistent and regular consultation with stakeholders, this also allows for more flexible and voluntary schemes that parties then strive to implement successfully.

Factors for failure (EEOS):

- Inconsistent policy design. EEOS should complement other measures and target outcomes that would otherwise not have been reached. The additionality in the system needs to be ensured.
- Resistance at end-user level (e.g. because of complex administrative procedures and potential high costs).
- Complex monitoring and reporting mechanisms.

UNITED KINGDOM

Implementation of Article 7

The UK uses a mix of EEOS and Alternative Measures. The UK has a long experience in implementing EEOS; the first EEOS were set up in 1993 and were generally seen as successful. However, a reform in 2012 added layers of complexity, with three sub-targets addressing low income households and households in deprived areas. These sub-targets come each with different measurement metrics, which significantly increases the bureaucratic burden. Energy companies struggle to comply with these new targets.

The design of the reformed EEOS and Alternative Measures was based on incorrect assumptions about consumer behaviour, as well as exceedingly high values for each ton of CO_2 reduced. This made investments in energy efficiency seemingly attractive, but unrealistic in practice.

The problems encountered are partly blamed on the lack of effective consultations prior to the reforms.

This combination of factors has led a number of stakeholders to mention the UK as an example of bad practice.

Measures adopted

EEOS

The UK applies its EEOS exclusively to the residential sector. Energy companies offer energy savings measures through sub-contracting third parties such as insulation or boiler installers. Stakeholders identified two main issues affecting the efficiency of EEOS.

First, the imposition of complex and cost-ineffective audit protocols: these protocols assume that it is possible to calculate accurate energy savings for a given household, but households are not identical and the composition varies continuously. This has caused delays, added costs and

complications with the audits. Simpler methods using estimated average values for different combinations of measures are advised.

Second, burdensome and excessively complex targets were introduced in support of low-income households and deprived areas. The UK already had experience of schemes addressing fuel poverty. However, the reforms transferred the burden mainly onto the EEOS (particularly in England). Despite efforts from obligated parties to meet the objectives, the complexity and high costs related to the added obligation drove some of the energy companies to prefer paying a fine rather than attempting to meet the targets.

Stakeholders consider that energy companies do not have access to information to identify many of those target groups, nor the capacity and structures to tackle the needs of complex social policies.

The government intends to reform the EEOS, but still expects energy companies to focus on low-income consumers. While stakeholders agree that EEOS can play a role, they warn that energy companies cannot properly address the needs of low-income consumers. Meeting these needs often does not contribute to achieving additional energy efficiency outcomes (e.g. bringing the electrical system to minimum standards and other basic ancillary works). EEOS need to be complemented by appropriate Alternative Measures, specially aimed at meeting the needs of low-income consumers.

Alternative Measures

There are a number of Alternative Measures that include some support to low-income households (in Scotland and Wales), as well as standards and regulations. Stakeholders focused mainly on the experience under the Green Deal, now discontinued. The Green Deal allowed consumers to carry out energy efficiency improvements that would be repaid through the energy bill. The 'loan' was thus not held by the tenant or owner, but was transferred with the home to the next inhabitants. The Green Deal had a flaw, in that it assumed that residents would behave as rational economic actors and would invest in energy efficiency, since estimates showed a positive return to investment. However, the Green Deal used commercial interest rates, included an annual fee, and required the consumer to pay for an audit. These charges drove consumers away from signing up to the Green Deal. Savings on the energy bills at the household level were too modest to incentivise consumers to take such loans. Given the lack of progress the Green Deal started offering grants, but the scheme was finally discontinued in 2015.

Stakeholders consider that authorities did not take into account at the design level some classical barriers to energy efficiency, such as market imperfections and actual behavioral observations. Example is given of the successful Kreditanstalt für Wiederaufbau (KfW) subsidised loans to homeowners in Germany, which has taken these considerations into account.

Stakeholders consider that a better balance between EEOS and Alternative Measures is necessary, but the government has not proposed a replacement to the Green Deal or new measures targeting fuel poverty.

Recommendations by stakeholders:

- The design of EEOS should be based on observed consumer behaviour.
- EEOS should take into account the need to support low-income households, but without imposing excessive burdens on energy companies.
- EEOS need to be combined with other policy measures, such as publicly funded grants and subsidised loan programmes.
- Rather than targeting low-income or fuel poor households EEOS should focus on housing with very low energy efficiency standards.
- Minimum standards for social and private rented housing are needed.
- Local authorities should have a larger role in overseeing the delivery of programmes.

Factors for success (EEOS):

- EEOS should be designed with the right incentives and requirements for obligated parties and consumers.
- EEOS should take into account equity concerns, such as low-income households.
- EEOS should be complemented by Alternative Measures.
- Regulations should be solid and monitor 'suppliers' real costs and delivery programmes.

Factors for failure (EEOS):

- Excessive reliance on EEOS.
- Excessive administrative burden.
- Lack of integration with other measures.
- Lack of consultation.

List of abbreviations

BAU – Business as usual
CET - Conto Energia Termico (Italy)
DSO - Distribution Systems Operator
EPC - Energy Performance Contracts
EED - Energy Efficiency Directive
EEOS - Energy Efficiency Obligations Scheme
ERO - Energy Regulatory Office (Poland)
ESCO - Energy Services Company
ETS - Emission Trading System
FNEE - National Energy Efficiency Fund (Fondo Nacional de Eficiencia Energetica, Spain)
GWh - Gigawatt hour
KfW - Kreditanstalt für Wiederaufbau
MWh - Megawatt hour
NEEAP - National Energy Efficiency Action Plans
PIVE programme - Programa de Incentivos para los Vehículos Eficientes
SEDA - Sustainable Development Agency (Bulgaria)

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Annexes

Annex 1. Overview of measures opted by Member States

	EEOS	Energy Efficiency National Fund	(a) Energy or CO2 taxes	(b) Financing schemes or fiscal incentives	(c) Regulation or voluntary agreements	(d) Standards and norms mandatory and	(e) Energy labelling schemes	(f) Trading and education in reducing end-use energy	(i) Other policy measures	Total number of policy measures
Austria	1	0	2	3	1	1	0	0	1	9
Belgium	0	1	0	14	4	3	0	0	0	22
Bulgaria	1	0	0	0	0	0	0	0	0	1
Croatia	1	0	1	8	0	0	0	1	0	11
Cyprus	0	0	0	3	0	0	0	0	2	5
Czech Republic	0	0	0	11	0	0	0	0	0	11
Denmark	1	0	0	0	0	0	0	0	0	1
Estonia	1	1	1	1	0	0	0	0	0	4
Finland	0	0	1	2	2	3	0	0	0	8
France	1	1	0	0	0	0	0	1	0	3
Germany	0	0	4	7	0	3	0	3	1	18
Greece	0	0	1	7	0	0	0	4	5	17
Hungary	1	?	?	?	?	?	?	?	?	1
Ireland	1	0	1	5	0	5	0	1	0	13
Itlay	1	0	0	2	0	0	0	0	0	3
Latvia	1	1	0	4	1	0	0	0	1	8
Lithuania	1	0	0	1	0	7	1	3	1	14
Luxembourg	1	0	0	0	0	0	0	0	0	1
Malta	1	0	0	14	19	0	0	0	0	34
Netherlands	0	0	10	10	19	5	0	0	0	44
Poland	1	0	0	0	0	0	0	0	0	1
Portugal	0	0	2	3	4	3	4	2	6	24
Romania	0	1	0	0	2	0	1	2	0	6
Slovakia	0	0	0	21	0	0	0	0	44	65
Slovenia	1	1	0	0	0	0	0	0	0	2
Spain	1	1	1	8	0	1	0	1	0	13
Sweden	0	0	1	0	0	0	0	0	0	1
UK	3*	0	1	6	6	3	0	0	1	20
Total Number of measures	19	7	26	130	58	34	6	18	62	353
Total Number of MS	17	7	12	19	9	10	3	9	9	

* Includes two EEOS notified as early actions (the Carbon Emissions Reduction Target and the Community Energy Savings Target) and a new obligation scheme in place from 2013 (Energy Company Obligation).
Source: Ricardo-AEA (2015), p.14

Annex 2. Questions for EU-level stakeholders

8 QUESTIONS FOR EU-LEVEL STAKEHOLDERS ON THE IMPLEMENTATION OF THE ENERGY EFFICIENCY DRECTIVE (2012/27/EU) – ARTICLE 7

In your experience, is the implementation of Article 7 achieving its objectives? What works best, EEOs or alternative measures? Why?

What are the obstacles to implementation, especially of EEOS, e.g. complicated procedures, unclear regulation, high costs - other?

In which countries do you see problems? What is best practice? What is worst practice?

What are the most important reasons for the implementation of EEOs and/or alternative policy measures?

What are the main obstacles to the efficient and effective implementation of EEOS and/or alternative measures?

How can they be overcome?

Which other EU specialists or national and local stakeholders do you recommend we contact to take this survey at the level of local implementation?

Any additional issue you consider of importance?

Annex 3. Questions for Member States stakeholders

QUESTIONS FOR MEMBER STATES STAKEHOLDERS

SECTION 1.
Choice of instrument

Q1. In your case, which instrument was chosen: Energy Efficiency Obligation Schemes (EEOS) or alternative measures?

- Energy Efficiency Obligation Scheme (EEOS)
- Alternative policy measures
- Both

Q2. In case the choice was alternative policy measures, which ones were chosen?

- Taxation measures
- Financial instruments
- Standards and norms
- Regulations or voluntary agreements
- Other (please specify)

Q3. What was the reason for the choice?

- Evidence: (good or bad) experiences with instruments
- Consistency with existing legal framework
- Political choice
- Other (please specify)

Q4. Was the choice based on consultation?

- Yes
- No

SECTION 2.
Performance of instrument

PART 1. ***Energy Efficiency Obligation Schemes (EEOS)***

Q5. Do EEOS work in your view?

- Yes (Questions 5a)
- No (Questions 5b)

5a. If YES (Positive experience with EEOS)
5a1) What are the main achievements of EEOS?
5a2) What are the success factors?
5a3) What, in brief, are your main recommendations?

5b. If NO (Negative experience with EEOS)
5b1) Which are the main obstacles that prevent EEOS from working?

- Complicated procedures

- Unclear regulation
- Costs of implementation
- Other (please specify)

5b2) What were the reasons?

5b3) What, in brief, are your main recommendations?

PART 2. ***Alternative Measures***

Q6. Does the mix of the alternative measures work?
- Yes (Questions 6a)
- No (Questions 6b)

6a. If YES (Positive experience with Alternative Measures)

6a1) Which of the alternative measures work best?
- Taxation measures
- Financial instruments
- Standards and norms
- Regulations or voluntary agreements
- Other (please specify)

6a2) What were the success factors?

6a3) What, in brief, are your main recommendations?

6b. If NO (Negative experience with Alternative Measures)

6b1) Which of the alternative measures did not work?
- Taxation measures
- Financial instruments
- Standards and norms
- Regulations or voluntary agreements
- Other (please specify)

6b2) What were the reasons?

6b3) What, in brief, are your main recommendations?

PART 3. ***Specific issues for EEOS***

Q7. Who should be the obligated parties and why?
Q8. What sector coverage can you recommend?
Q9. How can EEOS be best designed to meet social aspirations?
Q10. Would you recommend trading provisions? If so, which ones and why?

Q11. Would you recommend banking and borrowing? If so, why?

PART 4. ***Concluding questions***

Q12. Would you recommend the use of EEOS for future use?
Q13. What are the 3 key elements to consider when trying to make EEOS work?
Q14. What are the 3 most important issues, which make EEOS fail?

Annex 4. Contacts

The authors have contacted and received a response from a total of 53 persons with their names listed below, except for seven persons who have preferred not to be acknowledged.
22 representatives were interviewed either by telephone or in a meeting lasting from 30 minutes to 90 minutes while 23 people sent in detailed responses in the form of the questionnaire. The remaining persons either made specific singular points, referred to additional contacts or put us in contact with more suitable colleagues.

Out of the total of 45 people who were either interviewed in depth or responded to the survey, six provided an EU-wide perspective only, while 14 covered both the EU-level and one or more Member States. This means that the interviews and surveys captured the input of 20 stakeholders on the EU-level EED implementation, while another 39 covered one or several EU Member States.

A broad overview of the interviews on EEOS conducted with some of the stakeholders was presented orally to Claudia Canevari and Axel Bierer of DG Energy Unit C3.

Interviews:

Shradha Abt, Energy Efficiency Manager, European Insulation Manufacturers Association (eurima)

Peter Bach, Chief adviser on energy efficiency, Danish Energy Agency

Anca Diana Barbu, Project manager for Energy, European Environment Agency (EEA)

Frances Bean, The Coalition for Energy Savings

Paolo Bertoldi, Action leader, Renewable Energies and Energy Efficiency, European Commission DG JRC

Randall Bowie, Member of the eceee board, and Chief Consultant, Public Affairs Division, Rockwool International

Renée Bruel, Senior Associate Energy Efficiency, European Climate Foundation (ECF)
Marco De Min, Direzione Mercati Unità Produzione di energia, fonti rinnovabili ed efficienza energetica, Autorità per l'energia elettrica il gas e il sistema idrico

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Annex II

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

Research paper
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 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.

AUTHORS

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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

Key Findings

- Article 7 is a key provision of the 2012 Energy Efficiency Directive. It requires Member States to calculate their national energy savings targets and report on which policies will be used to achieve them.
- Article 7 is deliberately flexible. Savings from Article 7 must be additional to those already guaranteed by other EU legislation. This makes evaluation challenging.
- This report will analyse the implementation of Article 7 and will present key findings, together with recommendations for improving the implementation and the application of the Directive.

What is Article 7?

(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?

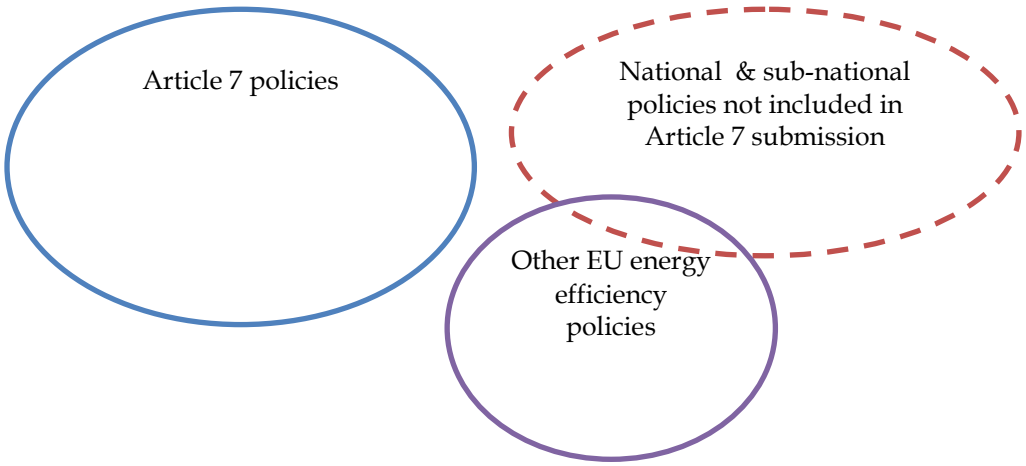
In addition, the study will highlight good practices in the implementation of the Directive. This will include case study examples of good practice related to particular policies in a number of member states. The study will include recommendations for amending the Directive.

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

Key Findings

- Findings are based on a number of data sources, including: formal notifications by Member States; additional information in National Energy Efficiency Action Plans; and Article 7 annual reports from 2015.

- Energy savings figures are based on Member States' reporting, which it has not been possible to check in detail. Thus quantitative data on the expected energy savings should be treated with some caution.

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.[24]

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.

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.

[24] enspol.eu

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

Key Findings

- Member States are entitled to use exclusions and exemptions in calculating their national savings targets.
- All Member States, apart from Sweden, have excluded energy use from the transport sector and 14 Member States have excluded own energy use from the baseline used for target setting.
- 24 Member States have used the maximum 25% exemptions, with only Portugal not claiming any exemptions.
- The combined effect of exclusions and exemptions is that the notified saving targets are only about half of what they would be without those adjustments: the annual saving rate of 1.5% is reduced to about 0.75%.

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	-
Total	1,080,353 **	723,55925	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)

[25] 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.

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 are 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		
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		

Member State	Energy savings target (ktoe)	exemptions used (%)	Type of exemptions used			
			Phasing in	EU ETS sector excluded	Supply-side savings	Early actions
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

Key Findings

- In total, Member States have implemented or plan to implement 479 policy measures - with the number of policies per country ranging from one to 112.
- The largest share of the overall savings is expected from Energy Efficiency Obligation Schemes (34%), financing schemes or grants (19%), and from taxes (14%) - all financial 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%).
- The credibility of savings have been assessed in terms of eligibility, additionality, risk of double counting and risk of non-delivery. Policies score least well on additionality and risk of non-delivery.
- 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

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.

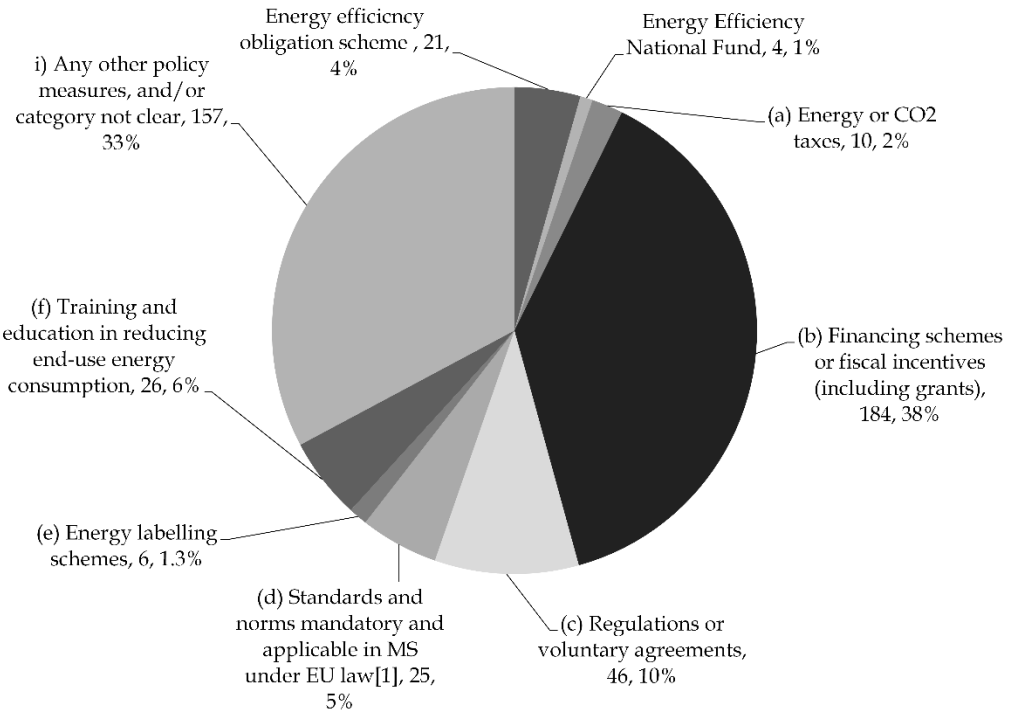
Share of different policy measures

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.

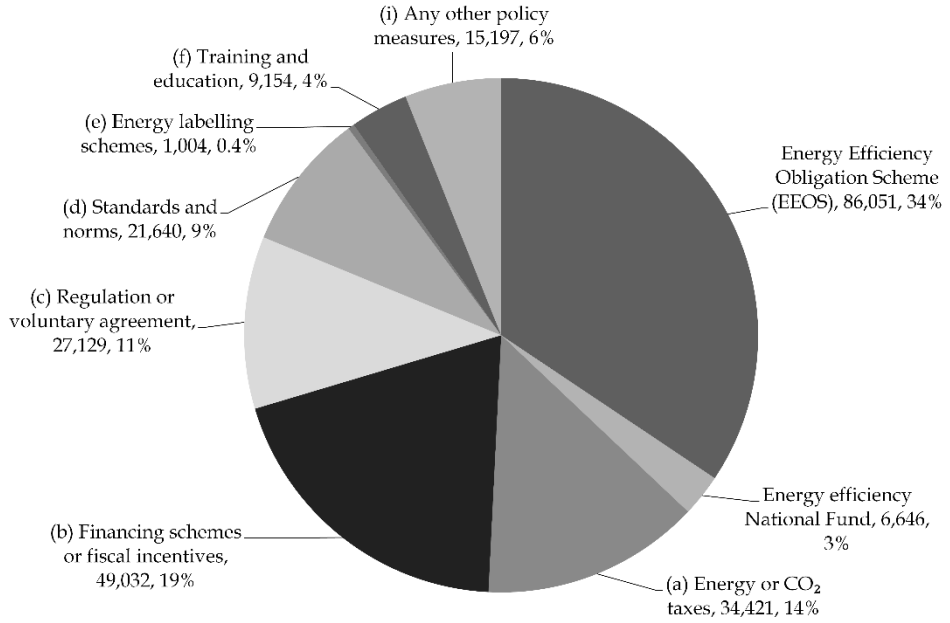
Figure 2 provides an overview of both the number of the different policy measures by policy instrument category. Figure 3 presents the share of the overall savings by policy instrument type.

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)

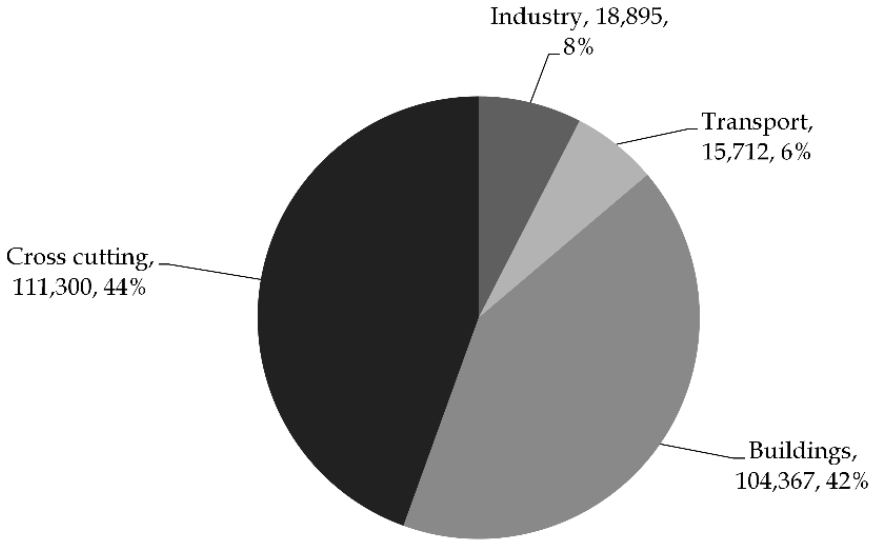
The analysis shows that a small number of measures – essentially those genuinely horizontal in nature - deliver a large share of the total savings. In terms of the number of policy instruments, EEOS comprise just 4% of all policy measures whereas in terms of expected energy savings their share is 34%.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

Key Findings

- There are 16 Member States with planned or existing EEOS.
- Evidence shows that EEOS can be a successful policy, delivering substantial savings at a cost which is significantly below the price of energy.
- No two Member State EEOS have the same design. The number of obligated parties can range from one up to tens, hundreds, or even thousands. Most EEOS cover all sectors, but some focus more, or exclusively, on the residential sector.
- Successful EEOS have been introduced gradually, with a period of learning and re-design in the early years.
- For those countries with new EEOS and which have not taken steps to shorten the learning period, Bulgaria, Croatia, Estonia, Latvia, Lithuania and Spain, there is a risk of under-delivery.
- For EEOS focused on buildings, continuing to deliver savings is challenging, as the low-cost, mass market, technological savings opportunities reduce.

Overview

'Energy Efficiency Obligation Schemes' (EEOS) are a key policy tool being used to deliver 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

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 retailers of oil products and LPG	all sectors
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%[26]	Unclear	
Lithuania	77%	2015(expected)	

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

	Contribution to overall Article 7 target	Date started	Comments
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.

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

Key Findings

- There are case studies of both good and poor practice in the implementation of Article 7.
- Good practice case studies include examples of Member States dealing well with additionality and double counting - which have proven problematic in general. There are also good practice examples related to detailed policy design issues and monitoring and verification of policies.
- Poor practice case studies include non-additionality in relation to energy savings from buildings, where EPBD requirements are already in place. Both Article 7 and EPBD are complex pieces of legislation, and Member States are struggling to deal with their interaction.
- These case studies highlight how Member States can improve their reporting, compliance and policy design and implementation, and illustrate some of the issues Member States are finding difficult.

Case studies of good and poor practice in meeting the requirements of Article 7 can help illustrate. 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

Case study 1: Additionality

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.

Labanca 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, Labanca 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 5: 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 (Labanca 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

Key Findings

- A significant share of the expected savings is at risk of not being delivered in practice because of non-additionality; weak monitoring and verification regimes; and methodological issues related to the calculation of energy savings.
- Member States would benefit from more advice and guidance on additionality, monitoring and evaluation and methodologies for calculation of energy savings. National experts could work together to develop guidelines and rules under established 'comitology' procedures, where appropriate.
- Templates covering all reporting requirements in a systematic manner accompanied by clear guidance would enable Member States to understand what exactly is required and how they have to report compliance, and help the Commission with ensuring that the EED is implemented as intended.
- The Directive itself should be reviewed to provide more clarity and detail. Its requirements should be simplified where possible, particularly in relation to calculating national targets.

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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Annex III

The implementation of Article 7 of the Energy Efficiency Directive in the households and the building sector

Research paper
by Andrea Bigano and Marinella Davide

Abstract

The aim of the present study is to support the European Parliament in understanding the current situation of the implementation of the Article 7 of the 2012 Energy Efficiency Directive with regard to residential consumers and buildings. We look at key facts highlighted in the energy economic and behavioural sciences literature on energy use by residential consumers and at results of the assessments of the implementation of the Directive, analysing the policy measures implemented in the Member States and providing some examples of best practices. We deepen the level of detail of our analysis for two Member States (the United Kingdom and Italy) looking at the policy framework in which Article 7 is being implemented and evaluating the policies measures planned for its implementation. We conclude the study by highlighting a series of policy relevant issues and by providing a number of policy recommendations.

AUTHORS

This study has been written by **Dr Andrea Bigano and Ms Marinella Davide** of Fondazione Eni Enrico Mattei at the request of the Impact Assessment Unit of the Directorate for Impact Assessment and European Added Value, within the Directorate General for Parliamentary Research Services (DG EPRS) of the General Secretariat of the European Parliament.

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Contents

1 Introduction

1.1 Objectives

The European Union's Energy Policy has three major goals: energy security, competitiveness, and sustainability. These goals are at the core of the Energy Union Package and of its targets for 2020, 2030 and 2050. Consumers' energy efficiency decisions in their homes is one of the two priority areas (together with transportation) singled out in the Energy Union Package for energy efficiency. The European Commission is aware that important progress has been made towards improving energy efficiency, but still there is a significant potential untapped. The DG energy web page on energy efficiency[27] mentions for instance, that new buildings consume half the energy than what was consumed in the 1980's, and that now 90% of the refrigerators sold have at least an A label. Nevertheless it also notes that, while the 2020 target is well in the reach of current legislation, the current rate of progress would imply that it will missed by 1-2%.

Household consumption is a major component of energy demand. Residential energy consumption alone accounts for some 20 to 30% of total energy use in developed countries[28], and recent studies suggest that improving energy efficiency in buildings would allow reducing energy use and pollution emissions associated with power generation at low cost (Intergovernmental Panel on Climate Change, 2007; McKinsey, 2009). However, many observers believe that investment in energy efficiency technologies is slow, a phenomenon that has been dubbed 'the energy efficiency gap' (Jaffe and Stavins, 1994). Policies that have encouraged or demanded the adoption of energy efficient technologies may include taxes on energy inputs (including carbon taxes), regulations and standards, incentives, and improved information.

1.2 Motivation and Scope

In view of the target to improve energy efficiency by 27% by 2030 approved by the EU Countries in October 2014 and of the Commission's proposal to raise it to 30%, the European Union has launched the review process of the Energy Efficiency Directive of the European Parliament and of the Council of 25 October 2012 on energy efficiency (EED 2012/27/EU). The review of this Directive follows the adoption of the Energy Union Strategy in February 2015 and is in line with the abovementioned target and with the idea of considering energy efficiency as an energy source in its own right. This review process involves consultations at various levels (European Commission, 2012). In this framework, European Parliament's Committee on Industry, Research and Energy (ITRE) has launched an own-initiative report on the implementation of the Directive 2012/27/EU.

The aim of the present study is to support the European Parliament in understanding the current situation of the implementation of the Directive with regard to residential consumers and buildings, by looking at the state of the art of academic studies and assessment reports, and by exploring in more detail the situation in two selected countries. Understanding how consumers behave and make decisions when confronted with energy related choices is a fundamental step towards unlocking the yet untapped potential for improving energy

[27] https://ec.europa.eu/energy/en/topics/energy-efficiency
[28] Likewise, personal transportation accounts for some 20-30% of energy use and of carbon emissions.

efficiency. The SET plan roadmap document of December 2014 recommends, among other actions to 'Overcome the socio-economic barriers that restrict the up-take of deep energy renovation of the EU building stock as well as the administrative and standardization barriers that hinder the implementation of energy efficiency solutions in buildings.' (SETIS, 2014 p. 12)

The Energy Efficiency Directive is the European major policy instrument to boost action toward the achievement of the 20% energy saving goal by 2020. Article 7 is a key pillar of the EED as it is expected to deliver more than half of the required energy savings. Specifically, it requires Member States (MS) to introduce energy efficiency obligation (EEO) schemes or alternative policy measures aimed at achieving an annual saving of 1.5% of energy sales to final customers of all energy distributors or retail companies.

Article 7 deals with two main issues. The first one is how to compute the energy efficiency targets and the savings put in place to reach that target, setting specific rules as to which sort of savings qualify, and to avoid double counting of the savings. This part of Article 7 is outside of the scope of the present report, which rather focuses on the second issue covered by the Article, namely the policy measures that can be used to reach the target insofar they impinge on residential consumers and the buildings they live in. EEOs are relevant in this perspective, particularly if they results in contractual arrangements between consumers and the company providing energy efficiency services, and the consumers' decisions and behaviour are relevant for such contract. The issue of double counting can be relevant for our purposes as well, because there are policies that were already in place in a number of countries when the Directive entered into force, and which are designed to or can contribute to increasing energy efficiency. We need to look into these policies anyway, for two reasons. For one thing, it might be difficult to sort out what can count towards reaching the target and what it is actually double counting. For another thing, they might imply interesting lessons and possibly, best practices for those countries which did not yet put in place similar measures.

1.3 Methodology

In this paper we will build our assessment of the implementation of the Article 7 of EED/2012 in the household and building sector on surveys of the grey literature and of the academic literature. In our report we have adopted the strict definition of our field of study as facts, issues and policies related to **energy savings generated by residential consumers within the dwellings they inhabit**. However we are aware that buildings can have other uses (business activities in the tertiary sector and activities of the public administration), sometimes with multiple uses within the same building; and that households use energy (and thus can save energy) also outside their dwellings (typically when they move around).

Our survey of the academic literature mostly looks at the most relevant results in the applied energy economics literature, but will also look at the behavioural science literature relevant for our topic. To this purpose we analysed the most cited contributions in this field which have assessed broad issues and relevant phenomena for the implementation of energy efficiency policies in the residential sector, such as the energy efficiency gap, the role of information, the role of time, or issues which that matter for specific policy tools often used to promote energy efficiency, such as free riding in incentive schemes. Given the broad validity of these analyses we did not limit the survey to studies about European countries, although a large share of the studies surveyed are indeed about European countries. In reporting the results of our survey,

we have looked specifically for policy relevant facts and recommendations and overlooked the technicalities concerning the theories and methods applied in the studies surveyed.

The grey literature review served the purpose of assessing and rationalising the currently available information on the implementation of this Directive in the Member States with a specific focus on Article 7 and on the policy actions related to households and buildings. In particular a screening of the most recent, currently available assessments of the state of implementation of the Directive has been performed, applying an energy policy perspective to this material. The main effort in this part of the study has been in distilling that part of the findings which actually mattered for households and buildings. Most studies are in fact cross-cutting, and it was generally non obvious how to extrapolate the relevant information and how to identify relevant best practices. Particular attention has been paid to assessments focusing on the implementation of Energy Efficiency Obligations as well as to alternative measures in order to identify existing approaches. The policies that emerged as the most significant in terms of innovation and/or energy saving impact have been analysed more in depth to show replicable elements and best practices. However, the differences in energy efficiency capability, capacity and progress are wide among EU Member States and should be taken into due account.

The lessons drawn from the academic literature review were also used as guide in our search for relevant information in this literature, although the high level of generality of this literature often precluded a direct meaningful matching of the academic and grey literature findings.

The status of the implementation of Article 7 of the Directive will be analysed in depth from an energy economics perspective in the case of the UK and Italy. For these case studies, we analysed carefully National Energy Efficiency Action Plans, national reports on energy efficiency policy, national assessments of the implementation of the EED/2012, and international comparative studies such as those carried out by the Odyssee-Mure project or by ACEEE. We also attempted an application of academic recommendations to the national context, finding, particularly in the case of Italy, interesting exemplifications of the issues raised by the academic literature.

1.4 Structure of the report

The rest of this report is organised as follows.

The next section looks at key facts and factors for energy efficiency policy design. It draws from two main sources. On one hand, it looks at lessons from the energy economic and behavioural sciences literature on energy use by residential consumers (Section 2.1). Section 2.2 on the other hand, looks at results of the assessments of the implementation of Article 7 of the EE Directive in the EU MS and related policies, analysing the policy measures implemented in the Member States and providing some examples of best practices. Section 3 deepens the analysis of Section 2 for two Member States (the United Kingdom and Italy) looking into the details of the policy framework in which Article 7 is being implemented and evaluating the policies measures planned for the implementation. Our conclusions and final recommendations are in Section 4.

2 Key Facts and Factors for energy efficiency policy design for households and buildings.

2.1 Key factors for energy efficiency policy design: Lessons from the academic literature

Key findings

- The rebound effect implies that the savings directly generated by energy efficiency policies will free financial resources for the consumers, and a fraction of these extra resources will turn eventually into additional energy consumption.
- The energy efficiency gap implies that households adopt energy efficiency technologies at a sluggish pace and forgo opportunities to save on energy costs through investments that make economic sense.
- The presence of free-riding can seriously reduce the cost-effectiveness of financial incentives for energy efficiency upgrades.
- The quality of the information about the advantages of energy efficiency upgrades and the opportunities offered by related policy initiatives can have an important impact on the effectiveness of the main policy actions planned for the implementation of Article 7.

This section deals with some relevant factors and issues, highlighted in the academic literature, which can be determinant for the successful implementation of the EE directive. These facts have been identified in various energy-related contexts, including but not exclusively buildings, and- are all relevant for residential consumers. The insights that will be briefly reviewed in this section are by and large the result of empirical energy economics studies, but a number of relevant considerations come from behavioural sciences studies. In the following, we will dwell upon the literature dealing with the 'energy efficiency gap', that this the poor uptake of energy efficiency investments in spite of their clear profitability, empirically detected by several studies; with the 'rebound effect', which has to do with the (partial) increase in energy use after the uptake of energy efficiency improvements; with 'free riding' which relates to taking advantage of financial incentives promoting energy efficiency also by those household who would have done such investments anyway; and finally with the literature dealing with the role of time in energy-related investments of the households.

2.1.1 The Energy Efficiency Gap

Energy efficiency investments are made infrequently, and individuals need to base such decisions on their views about future energy prices and the utility they will derive in the future from these purchases (Anderson et al., 2013; Busse et al., 2014). A somewhat disappointing and widely noted phenomenon is that households tend to adopt energy efficiency technologies at a sluggish pace and to forego many opportunities to save on energy costs and to make investments that make economic sense. This behaviour has been dubbed the 'energy efficiency gap' (Jaffe and Stavins, 1994). Possible causes include incomplete or asymmetric information, myopia, high discount rates, liquidity constraints, institutional constraints (e.g., tenants and landlords have diverging incentives). The existence of the energy efficiency gap however is not uncontroversial, as other observers question its existence, or at least argue that it can have a rational explanation in presence of cautious households (see the related considerations in sub-section 2.1.5).

A number of economic or behavioural theories have been proposed that might help explain how people make their purchase of energy and energy-using durables, and that may make certain policy tools more or less successful in encouraging energy efficiency upgrades. For example, **salience and habit formation** theories suggest that people will not respond to energy price changes (whether due to market conditions or brought about by policy measures) unless these changes are **clearly visible** to them and are perceived as **permanent** (Chetty et al., 2009). Salience may also imply different responsiveness to different types of energy efficiency incentives (Muehlegger and Gallagher, 2011).

In general, behavioural economics holds that decisions are not just influenced by 'regular' economic factors, such as prices, income, etc., but also by the particular state of mind or emotions that someone is in at the moment of making the decision. The theoretical approach of behavioural economics usually assumes that cognition consists of two different systems. This 'Dual Process' model of thinking (*Thinking fast and slow*; Kahneman, 2011) provides a comprehensive explanatory framework to understand individual decision making, distinguishing between deliberative, well-reasoned, 'rational' consumer behaviour ('System 2' decision making) and automatic, impulsive, habitual, and sometimes 'irrational' consumer behaviour ('System 1' decision making). In particular, the framework helps to identify under which conditions individuals make deliberative and informed decisions and under which conditions they act on impulse (driven by reward) or respond mindlessly (based on habit). This distinction is crucial for the analysis of how and when consumers can verbalize their preferences, and how they will respond to attempts to influence their choices. The distinction also matters when designing policies that may help consumers in acting upon their preferences by taking advantage of insights when consumer decisions can be improved by more or better information and when they need to be guided by more subtle choice rearrangements.

While the dual process model is assumed to be universal, not dependent on culture or any other segmentation of the population, a number of context factors can influence the behaviour. First is the extent to which the immediate decision context puts a strain on cognitive resources available for a decision. When resources are low (e.g., due to time pressure, distraction, or emotions) consumers are forced into a more heuristic System 1 mode of thinking. Second is the social context. To understand the decisions consumers make it is essential to understand their immediate social context. People behave differently when they are observed by others or when they are accountable to others compared to when they make private decisions. For example,

consumers tend to choose more expensive options when they feel observed (Argo, Dahl, & Machanda, 2005) or prefer to compromise options between two extremes when they feel accountable (Simonson, 1989). Third, and very important to European policy makers who need to encompass cultural differences, our choices are influenced by cultural factors. Cultures differ in value systems (Hofstede, 2001) and individuals living in different cultural contexts differ in the way information is processed, categorised and even perceived (Nisbett & Masuda, 2003).

2.1.2 The rebound effect

The rebound effect is observed when replacing an old, inefficient appliance with a new, energy-efficient one causes people to use more energy (Sorrell et al., 2009). This erodes the savings in energy use brought about by the high-efficiency equipment.

The literature distinguishes between **direct** rebound effect and **indirect** rebound effect. The **direct** rebound is linked to the immediate effect of having a more efficient energy consuming good at one's disposal. The **indirect** rebound effect has to do with the consequences on the consumption of other energy consuming goods, beside the one whose energy efficiency has improved, of having more financial resources freed by the energy savings originated by the increase in efficiency. The two effects together form the **overall** or **economy-wide** rebound effect (Sorrell et al., 2009)

The existence of rebound is widely acknowledged in the scientific community but there is no consensus on its importance and variation across products and services (Davis, 2008; Gillingham et al., 2013, 2016; Sorrell, 2009; Sorrell and Dimitropoulos, 2008; Sorrell et al., 2009). Sorrell et al. (2009), tentatively place their best guesses at 10–30 % for space heating on the basis of 9 studies.

In the policy context, however the rebound effect is generally hardly considered. Sorell (2007) points as an exception to the 'UK policy to improve the thermal insulation of households, where it is expected that some of the benefits will be taken as higher internal temperatures rather than reduced energy consumption' (Sorell 2007, p. 5).

One problem with the rebound effect is that its extent is often estimated from the price elasticity of energy demand. But this approach assumes, without testing, that households respond symmetrically to changes in energy prices—whether they are increasing or decreasing. A better approach would be to rely on actual energy consumption records from before and after the purchase or investment, including properly measured technical energy efficiency, and compare them to the energy consumption of an otherwise comparable group that did not make such an investment.

The economic approach envisages rebound effect as caused by lower operation costs due to increased efficiency, resulting in higher demand for products or services. However, there alternative psycological mechanisms might compound the issue and make it more difficult to tackle from a policy perspective. Interestingly, however, these mechanism may suggest alternative policy tools to deal with the rebound effect. **Behavioral rebound** effects can also be observed for investments that do not lower costs. Explanations for such effects have been dubbed 'licensing' (Khan & Dhar, 2006; Mazar & Zhong, 2010 Tiefenbeck, and Sachs, 2013) or 'mental rebound' (Girod & de Haan, 2009). These explanations assume that individuals or

households keep mental accounts of the progress they make towards their economic or ecological goals. The investment in a more efficient equipment can be perceived as accomplishing a goal, which then 'licenses' households to compensate with an increase in consumption. This suggests that **it might be possible to limit the rebound effect, or even reverse it, through 'soft' measures that change these self-perceptions**, such as raising individual and general awareness, information campaigns, energy feedbacks, setting of role models etc. (Truelove et al., 2014).

2.1.3 Free riding

Free-riding behaviour occurs when the economic agents targeted by the policy take the incentives, but would have done the energy efficiency improvements anyway. Since programs to encourage energy-efficiency home renovations and appliance replacement have been widely offered to individuals in Europe and other countries, this is an important concern. Thus this issue is relevant only for a sub-class of policy measures that usually belong to the 'other policies' foreseen by Article 7. It is nevertheless very relevant because those policies are a) quite popular among policy makers b) by and large, favourably accepted by the targeted households and c) costly for public budgets, as they usually consist in the provision of public funds, or in reduced tax revenues that take their toll on the finances of the governmental bodies that implements such policies.

Free riding may occur because i) the energy efficiency characteristics of the renovation are not separable from other technical or aesthetic features that would have motivate the renovation anyway (new windows that are both nicer to look at and more heat efficient), ii) the new energy-using durable replaces one at the end of its life, or iii) the agents were already convinced that the resulting efficiency improvement was worth its cost. Clearly, in these cases**, the policy is cost-ineffective**[29].

Earlier studies led to very diverse and somewhat contradictory results. For instance Walsh (1989) finds that federal incentives in the U.S. have no effect on energy efficiency renovations (or expenditures). Pessimistic views about the severity of this effect are held also by Malm (1996), who estimates that 89% of the households he examined would have purchased a high-efficiency heating system even in the absence of subsidies. On the other hand an earlier meta-analysis of demand-side management programs conducted by the utilities suggest that the effect can be relevant but not so extreme, with the share of free-riders ranging between 0 and 50% (Joskow and Marron, 1992). At the opposite side of the spectrum, Hassett and Metcalf (1995) find that a 10% increase in the US federal tax credit leads to a 24% increase in the likelihood of performing energy-efficiency home improvements. More recently, studies seem to confirm the policy relevance of free riding in energy efficiency incentives programs. Grosche and Vance (2009) examine renovations using a cross-section of data from the 2005 German Residential Energy Consumption Survey, and conclude that free-riding, which they define as

[29] This is compounded by a confusing factor, as identifying the energy use reductions that can be correctly be attributed to incentive programs is challenging, due to the heterogeneity of consumer behaviours. Usually people choose on a voluntary basis to take advantage of incentive schemes and thus these schemes may attract those who are already more proficient at reducing energy use or implementing energy efficiency upgrades. The presence of these persons will overstate the cost-effectiveness of the program (Joskow and Marron, 1992).

the situation in which a household's willingness to pay for renovations exceed their cost, occurs in 50% of the cases.

In a more recent study, Alberini et al. (2014) analyse the effect of tax credit for energy efficiency renovations to homeowners in Italy and suggest the free riding played a role in the case of heat system renovations, while the effect of the policy was much stronger in the case of more 'modular' door/window replacements. In fact, all else the same, the tax incentive policy in Italy would raise window replacements by 37-40 % in sufficiently cold climates.

Ignoring free riders overstates the cost-effectiveness of an incentive program sometimes to a staggering extent (Joskow and Marron, 1992). Hartman (1988) establishes that the average conservation truly attributable to an audit program—a popular DSM initiative—is only 39% of the savings calculated based on a naïve comparison between participants and non-participants. Waldman and Ozog (1996) estimate that the DSM program they analyse accounts for only 71% of the total conservation, the remaining 29% being 'natural' conservation (i.e. that would have happened regardless).

2.1.4 Other behavioural effects

Energy-efficiency incentive programs may engender a number of other behavioural effects. Assistance with a specific type of energy-efficiency investment, for example, may free up income that can be spent on other, additional energy-efficiency investments (a sort of virtuous indirect rebound effect). Grosche, Schmidt and Vance (2012) predict that as incentives increase, households substitute away from simpler, less expensive energy-efficiency renovations (such as adding insulation or replacing the heating system) to more complex and expensive ones (e.g., windows, doors, or other structural changes). The latter are less cost-effective in terms of energy savings and carbon emissions reductions.

Gillingham and Palmer (2013) and Blumstein (2010) discuss **free drivers**, namely persons who do not avail themselves of the incentives offered by a program, but choose to make energy-efficiency purchases because their awareness has been raised by the existence of the program.

Young (2008) notes another potential threat to energy efficiency incentive programs—namely when individuals accept an incentive and add to the stock of energy-using capital in their homes, rather than replacing an existing, inefficient appliance. She uncovers that a non-negligible share of Canadian households do not dispose of old and inefficient refrigerators, once they replace them with new ones. Instead, they keep using them as 'beer fridges' (to store cold beverages), for a net increase in electricity consumption. This can be avoided with careful incentive program design, which in turn will increase program complexity and the associated administrative and enforcement costs.

2.1.5 The role of Discounting

In earlier energy economics research, discount rates were estimated by observing the purchases actually made by individuals out of a choice set that included appliances with different prices, different characteristics, and energy efficiency levels. Estimated discount rates ranged from

5.1% up to 243%, depending on the study and the appliance (Hausman, 1979; Ruderman et al., 1987). Hassett and Metcalf (1993) show that such high discount rates are explained away when theoretical and empirical models are modified to allow for individuals to wait until uncertainty about future energy prices was resolved. Among other things, **waiting for clearer information about energy prices is shown to be an important cause of the energy efficiency gap** (Hassett and Metcalf, 1993). Allcott and Greenstone (2012) note that consumers behave similarly in other domains, and that, when it comes to discounting, many people take up debt at similarly high interest rate, for example when using their credit cards.

Some studies point to evidence of hyperbolic discounting rather than standard discounting. Briefly, hyperbolic discounting discounts the more immediate future more heavily than far away future events than with standard discounting. To illustrate, with standard discounting an individual who prefers 110 euro tomorrow to 100 euro today will also prefer 110 euro on day 31 over 100 euro on day 30. With hyperbolic discounting, this person may prefer 100 today to 110 tomorrow, but 110 on day 31 over 100 on day 30. Hyperbolic discounting is often discussed in the context of decisions with very long time horizons, such as those about climate change.

Newell and Siikamäki (2013) find that **getting the discount rate right is very important to evaluate the cost-effectiveness of energy efficiency policies** such as labelling. In particular using the individual discount rates separately elicited for each respondent in their survey (with mean value of 11%) instead of the standard uniform rate of 5% rate leads would lead to EE investment decision much closer to those dictated by cost-effectiveness. Similarly, Miller (2015) finds that the standard assumptions of the US DOE regarding the rate of discount to be applied in the evaluation of the benefits from the application of specific energy efficiency standard to residential central heating furnaces could be incorrect and can lead to a severe overestimation of the benefits and actually using discount rates more representative of the average consumer time preferences shows that this standard results in net costs.

2.1.6 The role of Information

Standard economic theory bases its optimality results on restrictive and somewhat unrealistic assumptions. By and large we live in a sub-optimal, or in economic lingo, *second best* world. Two particularly unrealistic conditions for optimality are that all economic activities take place in presence of perfect and complete markets and perfect and complete information. In particular we usually make our economic decisions knowing a limited amount of information about the goods and services we deal with, and about the other agents we interact with. Not only usually we do not know much, but probably what we know is different from what the people we interact with know. In economic terms, our information is imperfect, incomplete, and asymmetric in most occasions; thus any measure that in principle can improve the information we base our economic decisions on, can lead to welfare improvements. In other words, on **economic grounds alone, measures increasing consumer's awareness of their situation in any market are likely to be welfare-improving**.

In the case of energy efficiency, the lack of sufficient information is regarded as one of the main reasons why households underinvest in energy efficiency (Gillingham et al., 2009). Aydin (2016) briefly reviews the literature on energy labelling, and reports that energy labels may spur appliance manufacturers to design more energy-efficient products, according to Mills and Schleich (2010). Citing Newell et al. (1999), Aydin reports a significant positive impact on the

mean energy efficiency of water heaters and air conditioners the US following the introduction of the labelling scheme in 1975. Aydin (2016), while arguing that increasing transparency and information may improve the decision process of the consumers and lead to increased adoption of energy efficient equipment, also notes that their effectiveness in terms of total residential consumption reductions is still far from proven, because the ex-post studies evaluating these programs have generally failed to assess the impact on actual behaviour, and only focused on the awareness on the part of the consumers about the labels. In his own study on the effectiveness of appliance's energy labelling across the EU, Aydin (2016) finds that increasing the coverage of mandatory labelling by 10% (in terms of energy consumed by household appliances) yields a decrease in residential electricity use in the years to follow, of about 0.2 percent per year. In a study about the US, Newell and Siikamäki (2013) find that attaching a label stating the energy performance of a given equipment may be not enough to deploy the full potential of information in this field: although 'information is on the economic value of saving energy was the most important element guiding more cost-efficient investments in appliance energy efficiency', (Newell and Siikamäki, 2013, p. 23), while information on energy use and CO_2 emissions, was found to be relevant but less important, the way information is conveyed and which reactions it triggers are also important factors, in particular if it 'endorsed a model' (*ibid.,* p. 23) such as the Energy Star program, or compared the performance of a given appliance to a model (like the EU energy label system).

In general, **the way energy efficiency related information is conveyed** has important policy implications as it relates to the mental mechanisms that can be exploited to steer individuals towards adopting more energy efficient behaviour. 'Nudging' can indeed be an effective way to improve energy efficiency, as the OPOWER program shows (Allcott and Mullainathan, 2010). In this program, implemented in cooperation with several energy utilities in the US over a period of two years, electricity and gas residential consumers were split into a treatment group and a control group. The treatment group received regular reports on their consumption and, importantly, on how it compared with that of their neighbours, while the control group did not receive such reports. The difference in energy consumption between the two groups showed that the social comparison resulted in 2% energy saving, at the negligible cost of writing, printing and mailing the reports[30].

Finally, another policy-relevant insight stems from the salience and habit formation approaches mentioned in sub-section 2.1.1. **Complex energy efficiency information may trigger rational inattention if the effort of processing that information is greater than the perceived benefits** (Sallee, 2014). Thus it is very important that information is conveyed in a clear, concise, and intuitive way.

[30] OPOWER (2014) claims that significant savings (12 terawatt-hours (TWh) of energy per year) would results from applying a similar scheme in the EU. However the study cited is white paper has not been per-reviewed and expresses the point of view of OPOWER, and thus these optimistic conclusions should be taken with a pinch of salt.

2.2 *Key factors for energy efficiency policy design: Lessons from the implementation of the Article 7 of the EE Directive in the EU MS and related policies*

Key findings

- Only few MS provide an explicit sectoral split of the expected savings in the notifications that they submitted under the Article 7 of the EED.
- The analysis of EEOs and alternative measures illustrates that the residential sector is likely to be responsible for the largest share of the 1.5% annual energy end-use savings required by the EED.
- Overall, most measures included in the EEOs focus on implementation of 'low-hanging fruits', in the residential sector, such as efficient light bulbs and roof insulation.
- Best practices can be useful to highlight replicable approaches. In particular, flexibility (both in terms of diversity of offers and freedom of methodology) emerges as key to ensure cost-effective energy savings and adaptability to technology markets, national circumstances and policy priorities.
- Measures jointly addressing financial incentives and information/education campaigns turned out to be more effective that the two approaches taken individually.
- Simple implementation rules complemented by a transparent process (e.g. calculation methods, detailed results per sector), as well as an effective and periodic evaluation of the scheme can result in higher effectiveness of measures.

This section provides an overview of how the building and household sectors are addressed in the national plans related to the implementation of the Article 7 of the EED/2012. Further details about country specific characteristics are detailed in the best practices section. Existing studies focusing on the evaluation of the Member States' level of compliance in implementing the provisions included in the Article 7 and those aimed at assessing the achievement of the EED's objectives regarding the two targeted sectors are reviewed.

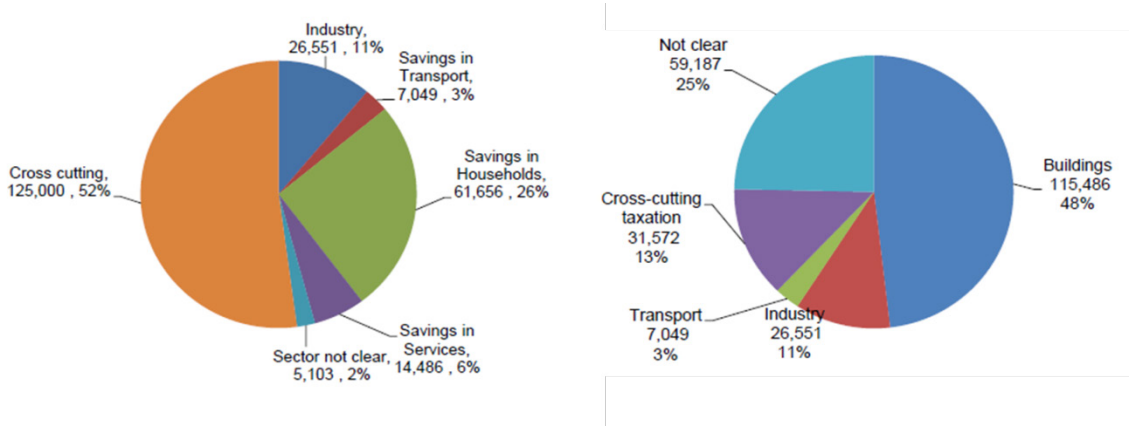
In the following paragraphs we often refer to EEOs, since it is very challenging to extrapolate reliable information about implementation of the Article 7 of the EED for the covered sectors from other sources without taking into account some overlapping with other policy objectives or other regulations.

In terms of policies planned, the number of policies proposed and the degree of applicability to the household and building sector varies so much across Member States that a comprehensive assessment is beyond the scope of this report. Instead, in what follows we try to derive useful insights in four ways: in the next subsection we give a broad overview of how the households and building sector are included in the policies implemented or planned in the EU relevant for Article 7 of the EED; then in sub-section 2.2.2 we look at some best practices highlighted in the literature on the assessment of the implementation of the EED/2012 in selected countries; this is followed, in sub-section 2.2.3 by a simple evaluation of the policy measures implemented based on the insights from the literature.

2.2.1 Overview of policy measures implemented in Member States

Although most of the Member States (MS) do not provide an explicit sectoral split of the expected savings in the national energy efficiency action plans or in the notifications that they were required to submit, recent studies highlight that the majority of the savings under the Article 7 come from measures that are cross-cutting (including taxes, regulations applying to domestic and non-domestic buildings, financial incentives for multiple sectors). However, the residential sector appear to be responsible for the largest share of the savings aimed at achieving the 1.5% annual end-use energy savings required by the EED (Ricardo AEA, 2015, Enspol, 2015a). In particular, if cross-cutting measures targeting both households and services are considered as measures mainly targeting buildings, these contribute to almost half of the projected savings, confirming the large potential for energy efficiency improvements in the building sector (Figure 1).

Figure 5: Breakdown of energy savings by type of proposed measure (left) and by sector (right) by 2020. Source: Ricardo AEA et al. (2015)



Among the few countries that reported an estimate of savings derived from the implementation of energy efficiency measures by sectors, the Netherlands report that 130-211 PJ (about 46 – 35% of the total estimated saving) will come from households (Deniels et al., 2013), Portugal estimates that the annual energy savings derived from residential and services sector will be 2.3 PJ (16%), whereas the Czech Republic gives a prediction of sector share according to which households account for 29% (14 PJ) of the savings target (Coalition for Energy Savings, 2014).

Looking at single EEOs implemented by MS, Table 1 below summarizes information available about countries that explicitly target household or building sectors.

In particular, UK is the only country to address the residential sector exclusively whereas Malta's obligation scheme focus on households. Austria has a mandatory energy saving share of 40% to be achieved for households. Similarly, Ireland put in place a mandatory split across non-residential and residential sectors, assigning to the latter a sub-target of 20% and 5% to specific energy poverty measures. Also, France sets as priority objective of its energy saving certificate scheme the refurbishment of the building stock (ATEE, 2015; Enspol, 2015b).

Table 6: Examples of households and building provisions in the EEOS implemented by MS[31]

Country	Households/building provisions
Austria	A minimum share of 40% of the final energy savings have to be achieved for households. Actions for households in fuel poverty get a bonus factor (*1.5).
France	Priority policy objective is the refurbishment of the building stock but the transport sector is also included. From 2006 to January 2015, 70% of the certificates have been issued for actions in residential buildings (14% in commercial buildings, 8.5% in industry, 2% in networks, 2% in agriculture and 3.5% in transport).
Ireland	Relative sub-targets (in shares of the total target) have been set to ensure a minimum share of savings in housing: 75% for non-residential sectors, 20% for the residential sector and 5% for within the 'fuel poverty' scope. Actions in other sectors are considered on a project-by-project basis.
Lithuania	Priority is on buildings and industry, even though all end-use sectors will be eligible.
Malta	The scheme is focused on electricity consumption in households. The main objective is increasing consumers' awareness about their electricity consumption, by using two main approaches: information activities related to smart meters, and electricity pricing.
Slovenia	The scheme focuses on households and commercial sector.
Spain	New scheme (2015, financial incentives); priority on building renovations and energy efficiency in transports.
UK	ECO is focused on the residential sector. Special focus on area-based and 'fuel poverty' targets.

The EED Article 7 (7)(a) also allows MS to include requirements with social aims in their EEOs, as for example to prioritize households in energy poverty or social housing (European Commission, 2012). Most MS have not included this kind of requirement with the exception of Austria, France, Ireland and UK, where such provisions involve special bonus factors or specific sub-targets. In particular, Austria includes an uplift factor of 1.5 for savings achieved in fuel-poor households. This means that for each unit of energy saved in households living in fuel poverty the energy suppliers receive 50% additional savings compared to households not in fuel poverty. France introduced a 'programme option' as part of its scheme starting in 2011, prior to the EED. Obligated parties can realise up to 25 TWh (cumulated and actualized), or 7.2% of the national obligation by financing specific programmes on information, training or innovation. Four of them target fuel poverty, without limit to the amount of savings that can be generated. Ireland prescribes that 5% of the total savings need to be achieved in fuel-poor

[31] Sources: ATEE (2015), Coalition for Energy Savings (2014), Enspol (2015c).

households defined as receiving certain welfare transfers or located in specific disadvantaged or rural areas. The UK has always included provisions for low-income customers. Since 2002, a specified share of savings had to be generated in low-income households that receive special income-related benefits (see paragraph 3.1 for details). The literature on EEOS and social aims such as reducing fuel poverty is, however, thin and there are limited analyses on this topic.

As for alternative measures to comply with Article 7, the landscape is more fragmented. The building sector is mostly addressed by regulatory measures that MS countries implemented aiming at tightening building regulations for new and existing buildings (e.g. Greece, the Netherlands and UK), minimum standards of energy performance equipment (e.g. Italy, Greece, the Netherlands, UK) and requirements to undertake energy audits (e.g. Italy, UK and Sweden).

Overall, most measures included in the EEOs focus on implementation of 'low-hanging fruits', in the residential sector, such as efficient light bulbs and roof insulation. However, especially in the buildings sector, this may prevent the diffusion of more innovative, long-term solutions.

It is however hard to understand to what extent these measures are new, mainly because many countries rely on policy existing before 2012, but also due to the delayed implementation of measures, overestimation of expected savings or overlapping effects of different policies aimed at multiple policy objectives.

2.2.2 Best Practices

This section focuses on best practices. As explained in the methodology, we report here policies that emerged as the most significant in terms of innovative approach and/or energy saving impact in order to show replicable elements and good examples. However, it is worth mentioning that this kind of evaluation cannot be independent from country-specific characteristics such as differences in energy efficiency capability, capacity and starting point.

2.2.2.1 The Netherlands

The Netherlands' recent experience in energy efficiency is often cited as a prototype of best practices able to establish an innovative, market-leading approach in the household and building sectors (European Energy Network, 2014, UNECE 2015). In particular, to fulfil the EED Article 7 requirements, the Netherlands decided not to introduce an obligation scheme but to implement alternative policy measures. According to the notification of the Netherland to the European Commission, the total cumulative savings of both existing and new Dutch policies in accordance with the EED are between 387 and 562 PJ, of which 130-211 PJ will take place in households (Daniëls et al. 2013).

New policy measures have been established as part of the Energy Agreement for Sustainable Growth, which includes provisions on both energy conservation and renewable energy sources (Government of Netherlands, 2016). The Energy Agreement was established in 2013 and it is expected to save some 100 PJ by 2020, at least 35% of which to be achieved by 2016 and the reminder 65% by the end of 2018. Additional measures will be implemented thereafter if the target will be missed. In order to exploit the many opportunities for achieving significant

energy savings in the built environment, the Agreement aims at incentivize cooperation between individuals and businesses through a combination of information provision, awareness-raising, reducing the burden, and funding support. Among the initiatives targeting the building sector there are:

- **Resources for home insulation:** since July 2014, €400 million have been made available to landlords in the subsidised rental sector in the form of grants for energy upgrades as well as reducing heating costs and CO_2.
- **An energy label for every home:** all privately owned and rented homes that have not already been assigned one, will be allocated a provisional energy label starting in 2015. This will raise awareness of energy consumption and help encourage people to invest in energy-saving measures. The parties to the Voluntary Energy Saving Agreement for the Rented Sector committed themselves to ensure an average of Label B for corporations and a minimum of Label C for 80% of private landlords by 2020. The initiative targets 1 million retrofits by 2020.
- **National Energy Saving Fund:** low-interest loans for homeowners to fund energy-saving improvements, financed by the National Energy Saving Fund, which has a budget of €600 million. Energy companies will be given the opportunity to offer customers more financing options, with loans being repaid via the energy bill.
- **Tax breaks for local clean energy initiatives:** local initiatives in which people club together to generate electricity from sustainable resources will be rewarded with lower energy tax rates.

Further noteworthy initiatives include:

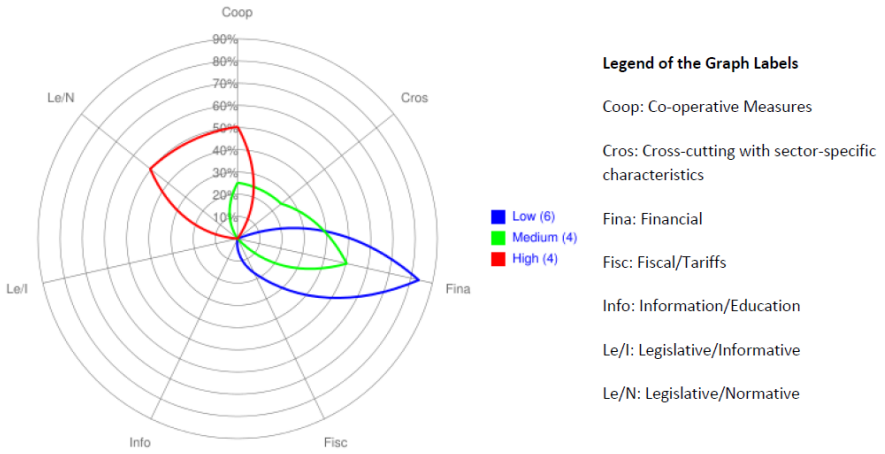
- **Zero-energy zones (GEN): agreement between** the central government and a 5 housing companies to refurbish 111,000 social dwellings to near zero energy levels with a 30 year energy performance contract funded from long term energy savings.
- **Green Deals**: the government offers a sort of brokering/consultancy service to unblock specific legal, regulatory or financial barriers to renovation initiatives with the objective to encourage energy efficiency and local generation of renewable energy by providing support for pioneering innovative initiatives.

Further strengths of the Dutch approach are its robust transparency and accountability systems. As to transparency, a user-friendly monitoring tool is available on-line to provide information on progress about policies implementation. Public communication campaigns about the available measures and their results are regularly undertaken. In addition, an annual progress report and a National Energy Report ensures that the outcomes of the measures are periodically assessed (Nijpels, 2014). A formal evaluation of the Energy Agreement will be undertaken in 2016.

In terms of energy saving, the Netherlands made a lot of progress since 2000 (Odyssee-Mure & ECN, 2015). The continuously strengthened standards for new dwellings and buildings yielded the bulk of policy-induced energy savings, increasing from 5 to 33 PJ for the period 2008-2012. On average energy efficiency in the household sector improved between 2000 and 2012 by 2.5%/year. The efficiency of space heating increased significantly until 2007, after which it slowed down as a consequence of the economic downturn. The electrical appliances show a more steady improvement. Among the policy measure types for EED Article 7 and NEEAP3,

those legislative/normative and cooperative are estimated to have produced the highest impact.

Figure 6: NEEAP3 and EED art. 7 measure types by impact in the households sector,



Source: Odyssee-Mure & ECN (2015)

2.2.2.2 Denmark

Denmark has a long experience with EEOs, which have been used as an innovative way to mobilise funds for investments in energy efficiency outside state budgets (RAP, 2012, Coalition for Energy Savings 2014; Enspol, 2015b). As for the energy efficiency objectives mandated by the EED/2012, Denmark established higher targets than required: under the energy-policy agreement of 22 March 2012, the country energy saving target is set at 10.7 PJ per year, corresponding to 2.6%, for 2013 and 2014, and 12.2 PJ per year, corresponding to 2.96%, for 2015-2020. Although the Danish experience is often cited as for its best practices in energy savings in the industrial sector, it also offers interesting insight about the design and management of EEO measures at the household level (Danish Minister for Climate, Energy and Building, 2012).

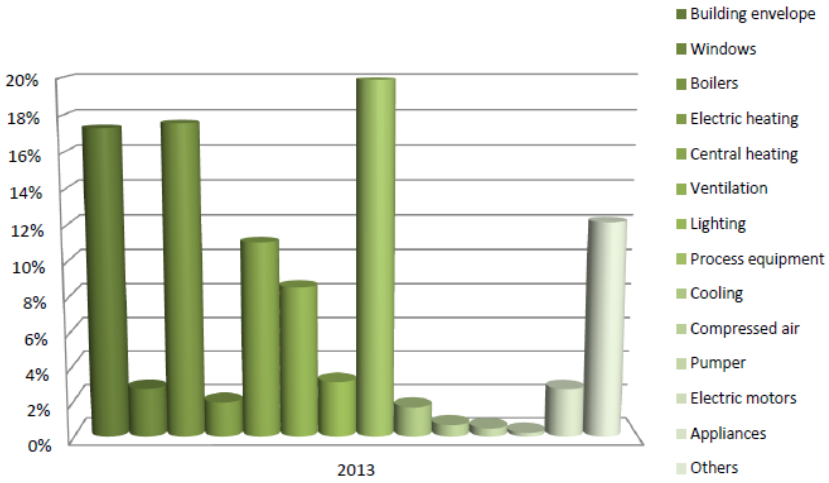
The first energy efficiency obligation schemes were implemented in the early 1990s. Although the overall policy objective has not changed significantly, the way energy savings had been achieved over the different phases changed considerably. In the initial phase the focus was on measures aimed at raising awareness - information, and education campaigns implemented by electricity companies, targeting different sectors: private households, industry, trade and services as well as the public sector. This period saw a joint effort that allowed energy companies to develop standardized methods (e.g. energy audits), widely applied by energy companies in Denmark, but also a common understanding of energy savings and laid solid foundations that later phases built upon.

In 2006 the focus moved from awareness and information to implementation of energy saving measures, with the objective to create a scheme that was administratively simple and flexible. A specific target for energy savings was defined. First year's savings were chosen in order to avoid uncertainty in the estimation of measures' lifetime (Enspol, 2015b). This opened a new

phase of the EEO, whose approach continues also nowadays, and that aims at pursuing the promotion of cost-effective energy savings particularly in end-use consumption that would otherwise not have been attained without the companies' involvement. To achieve this task, in 2010 had been introduced a 'Freedom of Methodology' for energy companies to choose whatever measure they expect to be most cost-effective taking into account the provision that the companies' efforts are to be aimed at existing buildings and industries. This means that no measures and technologies are excluded as long as the effect can be documented.

Although all technologies are allowed, some among those typically employed in the building and household sector are among the most favoured, by applying a 'prioritization' factor of 1.5 to the first year savings. These include technologies that reduce space heating consumption in oil and gas-heated buildings, such as insulation of floors, walls and roofs, energy class A windows and doors; heat recovery from space heating in connection with mechanical ventilation; increased insulation of pipes and new tanks for heating of domestic water (see Figure 7).

Figure 7: Distribution of savings across technologies in Denmark in 2013.



Source: Enspol (2015b)

The current Danish EEO is based on a voluntary agreement 'The Energy Savings Agreement' established on November 2012 between the government and the obligated parties, namely the grid and distribution companies for electricity, natural gas, heating and oil. The agreement is in force from 2012 to 2020 and is renegotiated every three years (Danish Minister for Climate, Energy and Building, 2012). More than on regulatory details, the Danish case can be considered a best practice in term of design and management of the whole process over the years.

Firstly, the greatest strength of the Danish EEO is the clear focus on one objective (cost-effectiveness) and the related flexibility allowed to achieve it. This result in a system that performs very well on delivering this particular goal compared to other measures taken in Denmark (Enspol, 2015b). Companies have therefore a strong incentive in contacting the consumers on a regular basis to make them invest in energy savings. This keeps the costs of the scheme at a very low level. According to the official evaluation of the EEO carried out by the independent consultancy EA Energianalyse on behalf of the Danish Energy Agency in 2012, investment costs in households were 1.2 €/kWh (9 kr./kWh) while other sectors had an average investment cost of 0.11 €/kWh (0.80 kr./kWh).

In this regard, the Freedom of Methodology results in innovative approaches to realize the economically viable energy efficiency potential. Energy companies in Denmark, in particular, the electricity companies that had been involved from the very beginning, have also used the new market for energy efficiency services to establish energy service companies that operate on market terms and thus have the possibility of making profit (Bundgaard et al. 2013).

Furthermore, administrative cost is also low mainly because the Danish EEO is based on relatively simple procedures for documentation. Also the methodology to handle the issue of additionality is rather simple compared to other schemes. The policy framework introduced in 2010 (the voluntary agreement) defines what is an additional saving in the context of the EEO. It is assessed on a 3-year basis and the framework adjusted to exclude areas with very low additionality or implement corrective measures in other areas with low additionality. These measures had been undertaken to progressively face the free-riding problem. However, the 2012 evaluation, indeed, showed a relatively lower additionality in households than in industry: approximately 45% of energy savings in businesses and some 80% of energy savings in households would have been implemented within three years anyway, somehow suggesting the presence of significant free-riding.

Finally, the process had been from the very beginning built around a strong dialogue between the energy authorities and the energy sector with effect of generating a strong expertise in providing advice on energy efficiency and offering free advice to consumers and businesses.

2.2.2.3 France

Within the framework of Article 7 of the EED/2012, France planned to use both the obligation scheme and alternative measures (Government of France, 2013).

In particular, the country has in place a scheme of tradable energy efficiency certificates (certificats d'économies d'énergie, CEEs) since 2006 which is revised every three years. Although, the French scheme is one of the few that targets all energy consuming sectors, including transport and agriculture, the building sector and the households in particular are the main targets.

Overall, main strengths of the French scheme are that it promotes the deployment of best available technologies and that it prioritises measures that produce higher energy savings. To encourage the deployment of best practices, additional energy efficiency certificates ('bonus CEEs') are granted for operations undertaken within a broader efficiency strategy, such as Energy Management System (EMS) or an Energy Performance Contract (ECP).

In coherence with its focus on efficient equipment and material, for which energy savings can be thoroughly estimated, the scheme does not reward operations related to individual behaviour change in the building sector, even though this is a source of considerable energy savings.

Programs are a peculiarity of the French scheme: beyond standard and special operations, obligated entities can receive CEEs by implementing or supporting special 'programs', which are designed to address specific objectives in the context of energy efficiency:

- Innovation, communication and training (max. 7.2% of the national obligation),
- Fuel poverty alleviation.

The first option does not produce energy saving improvement directly but is a key element to encourage change in individual behaviour. Fuel poverty programs do generate energy savings. However, since this particular target group requires a high level of subsidy, they are financially attractive for obligated parties. The ESC scheme then gives bonus for financial support granted to fuel poverty programs.

Another interesting characteristic of this scheme is that each new period of the scheme is prepared and discussed months before with all the stakeholders through specific meetings and open consultations and as well as informative and training events organised by obligated parties (ADEME and ATEE) at the beginning and during each period.

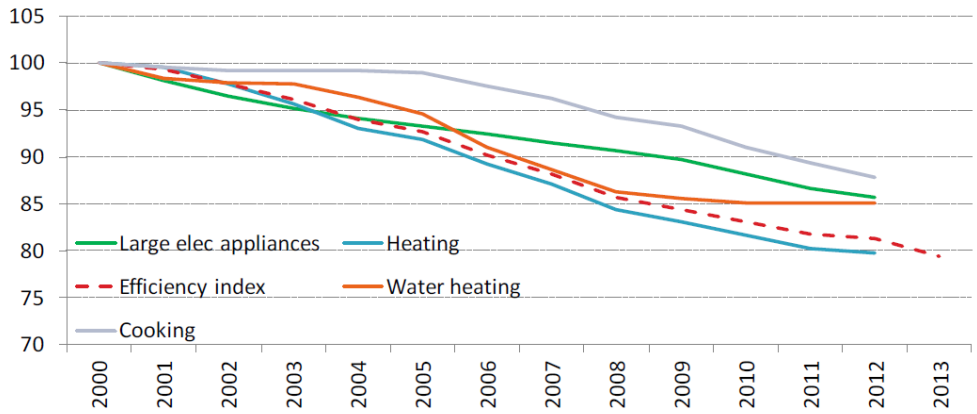
However, parallel to the France's ESC scheme, which is estimated to achieve 88.5% of the country's saving target, (314 out of 355TWh) in the period 2014-2020, other alternative measures have been recently defined. One of these, in particular, is aimed at the residential sector and show a promising approach: the energy renovation passport (Government of France, 2013; Enspol, 2015).

Implemented from 2015, the energy renovation passport, has the objective to improve performance of existing building stock by performing a detailed analysis of both quantitative and qualitative consumption information. As a result, step-by-step programs of energy saving actions are determined by capitalizing on a comprehensive overview of the housing, an energy report, an improvement program and a financial analysis. At least one of the proposed programs must lead to a "low consumption" performance. This way the energy passport allows households to make an informed choice regarding the program of actions required to improve their housing energy performance.

2.2.3 Evaluation of the policy measures implemented by MS

Studies assessing the effectiveness of policy measures implemented under the Article 7 of the EED, focusing on households and buildings are rather limited. According to the Odyssee-Mure (2015) database, household and building sectors contributed concretely to the achievement of the target to increase energy efficiency by 1.5% each year. In particular, energy efficiency for households in the EU, as measured with the energy efficiency index called ODEX, has improved by 1.8% a year (or 21% overall) between 2000 and 2012 (Figure 8). This energy efficiency improvement is largely due to the deployment of more efficient new buildings, new heating appliances (e.g. high efficiency boilers and heat pumps) and new large electrical appliances (e.g. labels A+ to A++) as demanded by the EU legislation, which can be considered as a major driver in policies and measures implemented in the household sector. Most improvements relate to space heating (20%), followed by water heating and large appliances (15%). However, the pace of energy efficiency improvement has slowed down since the beginning of the economic crisis in most countries and at EU level even though it remains in line with the target set by the Energy Efficiency Directive (Odyssee-Mure, 2015).

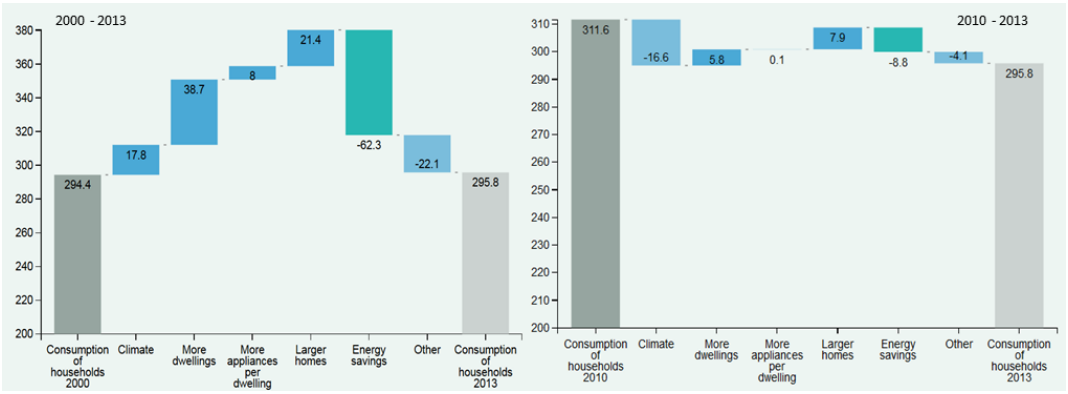
Figure 8: Energy efficiency trends in the EU household and building sectors.



Source: Odyssee-Mure (2015)

Although other factors contributed to increase the households' energy consumption (such as growth in number of occupied dwelling, space heating, electrical appliances), energy efficiency improvements managed to counterbalance the effect and keep final energy consumption value in 2013 at about the same level of 2000 (Figure 5, left panel).

Figure 9: Change in households' energy consumption in EU (Mtoe) 2000-2013 and 2010–2013.

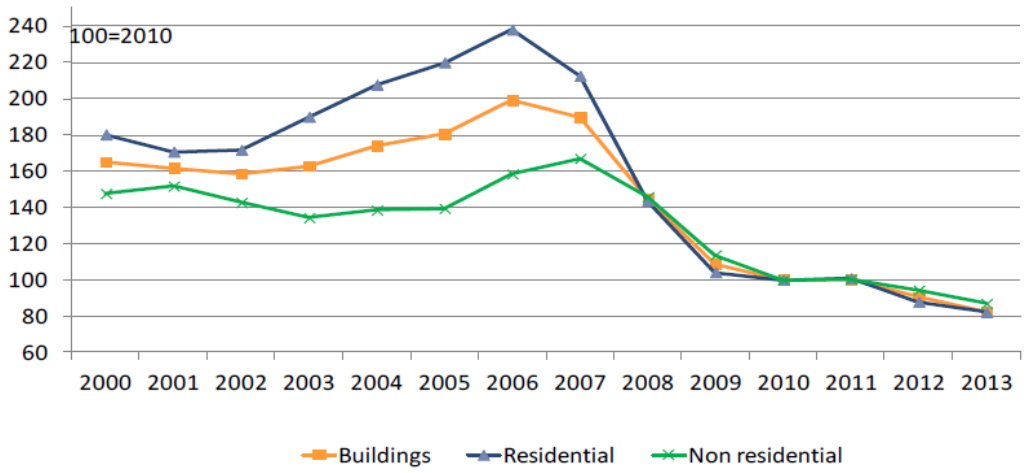


Source: Odyssee-Mure (2016)

The role of recent energy efficiency policies is shown in Figure 9 (right panel), which highlights energy savings as a relevant component of the decrease in energy consumption in the period 2010–2013. Even if the contribution of economic crisis in reducing energy consumption patterns in that period is widely recognized, energy savings increased even more than other effects (which include change in heating behaviours).

As for the building sector, new construction, measured in terms of the floor area with buildings permits, gives an indication of the impact of regulations on new buildings on energy use. According to Odyssee-Mure (2015), after peaking in 2006, energy use has been decreasing at the EU level and in 2013 it was 60% lower than in 2006.

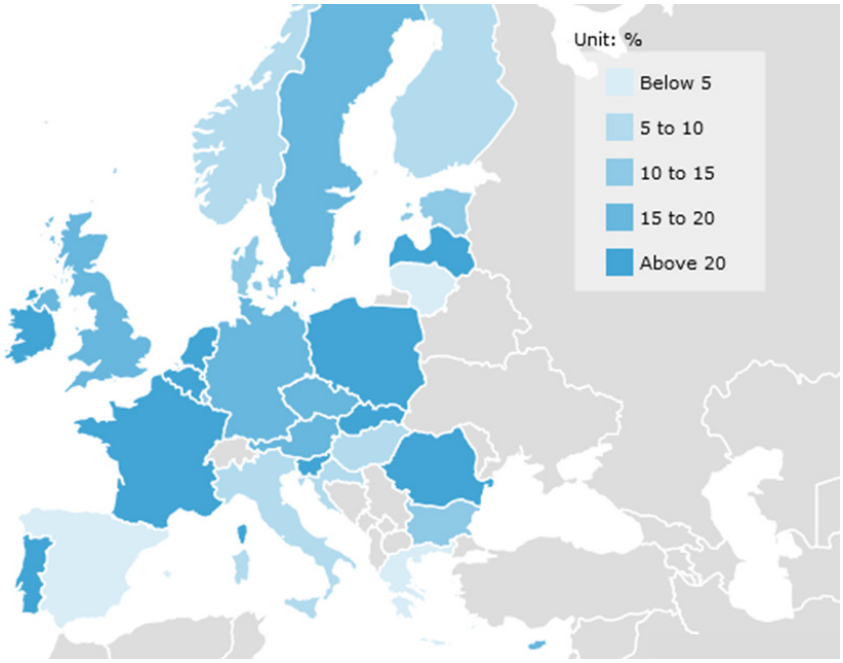
Figure 10: Trends in floor area of new buildings 2000-2013.



Source: Odyssee-Mure (2015)

At country level the performance of Member States is very different. This can be due to the longer experience in energy efficiency obligation schemes of come MS (as in the case of UK and Denmark) whereas some others adopted more stringent alternative measures. Among MS achieving the highest energy efficiency gains since 2000 in the households sector are Portugal, Ireland and Belgium (Figure 11). However, performance depends from the selected indicator: when space heating consumption per m² and degree-days are considered, the Netherlands is the country with the best performance, whereas Austria, Ireland, Finland and Sweden have the most efficient dwellings (Odyssee-Mure, 2015).

Figure 11: Energy Efficiency gains in households since 2000 in the EU.



Source: Odyssee-Mure (2016)

In terms of the insights provided by the academic literature and reported in Section 2.1, the following considerations can be made:

- **Free riding** is likely to reduce the cost effectiveness of the implementation in countries planning to use financial incentives to this purpose. This is clearly the case for France and Italy (see Section 3 for further considerations on this), and could also affect the home insulation scheme in the Netherlands.
- The **rebound effect**, particularly the indirect one, can imply an overestimation of capability of countries to effectively reach the energy saving target, in the sense that even if the targets are attained at the sector level, increased consumption in other sectors of the economy may partially curb the gain in energy efficiency within the reach of the policies targeting households and buildings. The lack of precise estimation of this effect makes it difficult to quantify the impact of this effect. As a rule of thumb one might use the best guess by Sorrell et al. (2009), of 10–30%, as it is directly relevant for space heating and hence for the sector under scrutiny. The policy implication is that countries foreseeing a moderate overshooting of the target might actually be those more likely to getting close to desired target of energy savings at the economy wide level.
- Most countries foresee **information and awareness raising** actions. These are highly recommended in the economic literature, but they cannot be the sole measures implemented as they generally are not sufficient to reach energy efficiency targets. Examples of effective ways to improve the use of information are given in the Italian case study of Section 3.2.

3 Case studies on the implementation in selected Member States

3.1 The case of the United Kingdom

Key findings

- United Kingdom's EEO is unique in targeting only the household sector. It became a pillar of the UK low-carbon strategy and helped to achieve substantial improvements in energy efficiency in the residential sector.
- The long-lasting experience of the energy suppliers dealing with the EEO (in place since 1994) allowed to increase expertise on energy efficiency and to implement targets incrementally ambitious over time.
- The strong focus on low income groups enabled a wider portion of households to be reached and also to pursue priorities beyond the low-carbon sphere.
- The recent experiment with ECO, ceasing support for low-cost measures, and its connection with the Green Deal, has not been completely successful.

The cumulative final energy savings target over the period 2014–2020 to be reached under the Article 7 of the EED/2012 for the UK is set at 324 TWh (27.859 Mtoe). Using the latest estimates, the UK has identified that quantifiable savings equivalent to 501 TWh will be generated by a total of 20 policy measures, including three Energy Efficiency Obligations: the Carbon Emissions Reduction Target (CERT), Community Energy Saving Programme (CESP), and Energy Company Obligation (ECO).

United Kingdom had an EEO in place years before the European Energy Efficiency Directive was implemented. It was the first country in Europe to establish a national energy saving obligation scheme dating back to 1994 under the name of Energy Efficiency Standards of Performance (1994–2000). Since then the programme has been periodically re-designed, mainly to change covered technologies and increase the energy saving targets: the Energy Efficiency Commitment (2000–2008), the Carbon and Energy Reduction Target (2008–2012) & Community Energy Saving Programme (2009–2012) and the Energy Company Obligation (ECO), that is in place at the moment and will run until 2017 (DECC, 2015).

With the exception of the early years (1994–2005), when some activities targeted also SMEs, the obligation scheme has mostly focused on the residential sector. 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 et al 2013). The success of the early phases led the scheme to become a key pillar of the UK energy efficiency and emissions reduction policy for the domestic sector and a leading example for other Member States

required to implement EED provisions (RAP, 2012; Bertoldi et al. 2015). During all phases of the EEOs, the vast majority of qualifying measures have been efficient appliances, boilers and Compact Fluorescent Lights (CFLs). There has been a consistently strong focus on delivering a significant proportion of measures to low income groups, in order to offset the regressivity of raising revenue via energy bills (Bertoldi et al. 2015). The obliged parties have been electricity and gas supply companies with a number of customers above a given threshold. The savings metrics of the EEOs have been based on lifetime savings, which consist of cumulative carbon/energy savings over the agreed lifetime of a measure.

The objectives of both CERT and CESP were to promote cost-effective energy efficiency measures in residential dwellings and overcome barriers to their uptake. They aimed at promoting micro-generation and other measures for reducing households energy consumption. The schemes were also meant to introduce new approaches for innovation and flexibility, keep costs at a reasonable level for consumers, maximise cost-effective carbon savings and maintain equity as well as to reduce fuel poverty and the fuel bills of low income households across UK (DECC, 2014).

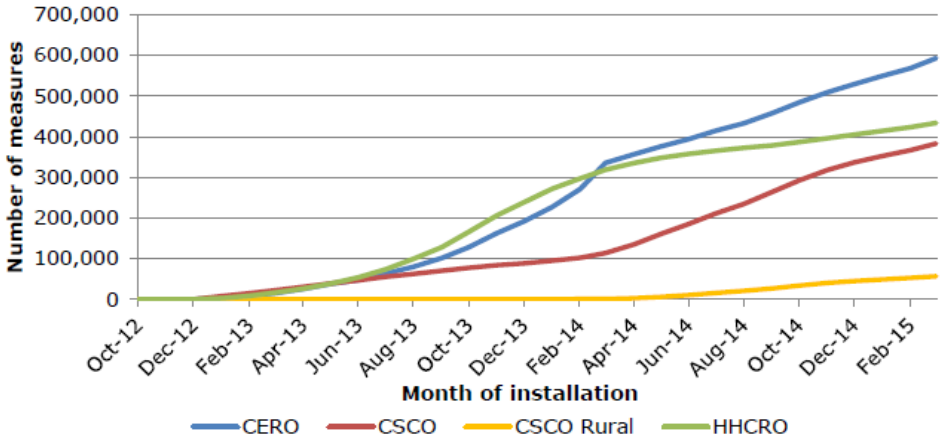
ECO is significantly different from earlier EEOs, although it shares some of their features. Obliged parties are the suppliers with over 250,000 residential customers. Rather than targeting all households, it was specifically designed to work with the 'Green Deal', a loan scheme launched in January 2013 and expected to establish a new market for energy efficiency measures with loan charges paid via electricity bills. The scheme targets higher cost measures and lower income households. A key feature of ECO is that projected energy saving benefits must exceed the loan charges (the so-called 'Golden Rule') for the proposed investment to be eligible for this scheme. Energy efficiency upgrades that were crucial in delivering targets in earlier phases, including attic and cavity wall insulation, were largely excluded from ECO initially (but reintroduced in 2014), with a view that households would be likely to keep making such upgrades by accessing Green Deal finance, rather than relying on EEOs-funded subsidies. ECO operates through three different obligation programmes, serving different objectives:

3. The Carbon Emissions Reduction Obligation (CERO) focuses on hard-to-treat homes and on measures that do not meet the 'Golden Rule' such as solid wall insulation and hard-to-treat cavity wall insulation. Target: 20.9MtCO2 lifetime savings.
4. The Carbon Saving Community Obligation (CSCO) focuses on the provision of insulation interventions and connections to domestic district heating systems for low income households. At least 15% of supplier's obligations have to be achieved in lower income and vulnerable households in rural areas.
5. The Home Heating Cost Reduction Obligation (HHCRO) focuses on the provision of measures to support low income and vulnerable households (the 'Affordable Warmth Group') in heating their homes, including heating saving measures such as the replacement of a boiler. Target: £4.2bn lifetime savings.

Another feature of the ECO, designed to lower the costs and encourage competition, is a 'brokerage' system: a market-based platform in which potential providers of energy efficiency upgrades can make them available to obligated suppliers through periodic auctions. Moreover, if suppliers fail to deliver the obligation, they face a penalty from the scheme regulator, of maximum 5% of company turnover, thus to remain substantially smaller.

However, in 2014 the ECO scheme was revised following the low uptake of the Green Deal and concerns around the costs imposed to companies, to ensure an easier and cheaper action and to reduce the 2015 CERO obligation by 33% (from 20.9MtCO_2 to 14MtCO_2) and extended to 2017 (DECC, 2014). Saving targets are currently less than a quarter of the annual target during the previous phase, 2008–2012. In addition to the energy supplier obligation a number of alternative measures will help UK to achieve the required energy saving target. Foremost amongst these measures are the UK's stringent building regulations.

Figure 12: Cumulative ECO delivery over time.



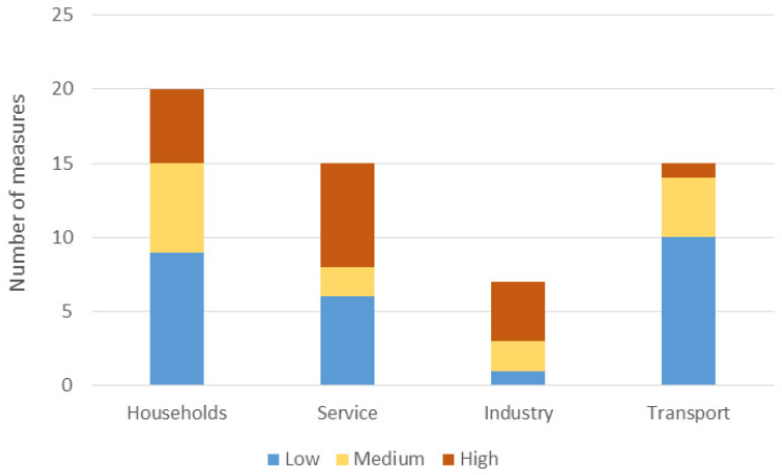
Source: Ofgem (2015).

Overall in the first period of implementation (ECO 1, running from Jan. 2013 to March 2015), all energy companies involved met their ECO obligations and sub-obligations. The total lifetime carbon savings achieved under CERO were 18.33 MtCO_2 whereas under CSCO were 9.87 MtCO_2, including 1.79 MtCO_2 achieved under the rural sub-obligation. These constitute 131% of the CERO target, 145% of the CSCO target and 175% of the rural sub-obligation target. A total 5.16 £Bn of lifetime cost savings were achieved by the HHCRO, which represents 123% of the target (Ofgem, 2015). The majority of energy companies had therefore delivered enough measures to meet their obligations several months ahead of the deadline. However, delivery continued towards all obligations even after the targets were met and it is likely that excess savings will be carried forward into the next phase 2015-2017. According to UK government estimates, the total delivery costs for ECO 1 were around £2.53bn, with an additional £212m in administrative costs (DECC, 2015).

Among the energy upgrades implemented, cavity wall insulation (including hard-to-treat cavity wall insulation) was the most installed, followed by loft insulation and boiler replacements. However, some concerns emerged over the quality of installations. Technical monitoring failure rates were higher at the beginning of the scheme for both installation and scoring issues but an improvement occurred over time (Ofgem, 2015).

The most recent figures (30th June 2015) show that 1,232,068 unique properties had benefitted from at least one ECO measure installed. Looking at the geographical distribution, the North West and North East of the country had the highest amount of measures installed with 74 and 70 households per 1,000 households respectively, against an average of 47 (DECC, 2015).

Figure 13: Number of measures and semi-quantitative impact by sector.



Source: Odyssee-Mure & Ricardo AEA, (2015)

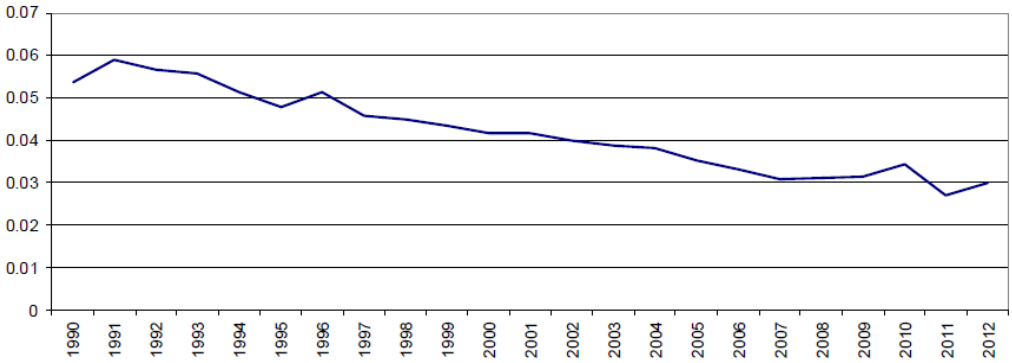
According to the Odyssee-Mure energy efficiency policy database, the household sector accounts for the second highest number of high-impact measures. The UK's previous supplier obligation, CERT delivered a significant amount of energy savings achieved through home retrofits mainly with insulation interventions and boiler replacements. However, some overlapping remains with measures related to other EU regulations such as the Energy Performance of Buildings Directive and the Energy Labelling of Household Appliances Directive (Odyssee-Mure & Ricardo AEA, 2015).

Figure 14: Share of final energy consumption from buildings in 2012.

Source: Odyssee-Mure & Ricardo AEA (2015)

The final energy consumption of buildings has been decreasing since 2008, although with a 2% increase between 2011 and 2012. This is not fully explained by the economic crisis as the GDP remained fairly stable since 2000 with a dip in 2008.

Figure 15: Final intensity of households to private consumption (Koe/€200).

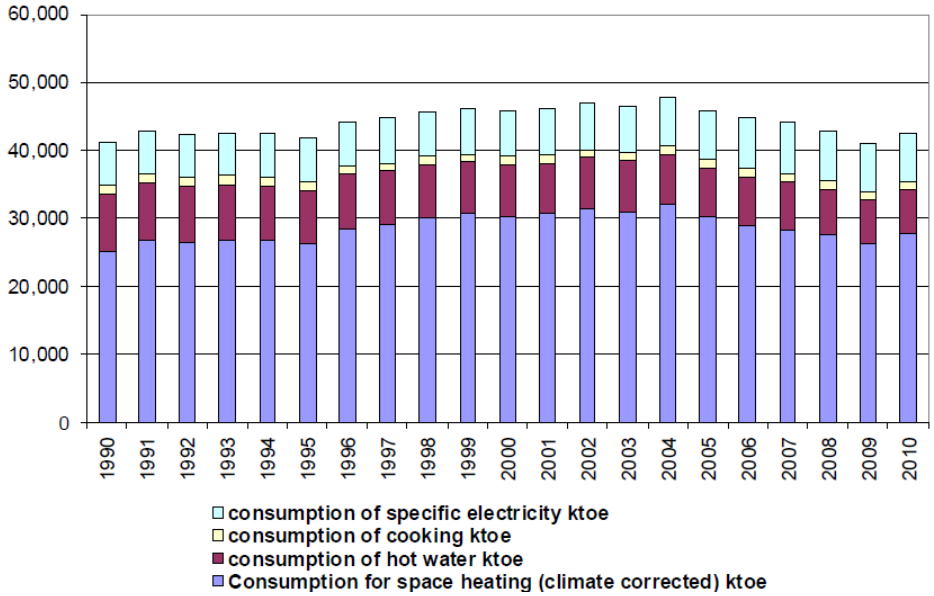


Source: Odyssee-Mure & Ricardo AEA (2015)

The UK has made good progress in improving household energy efficiency which is due in particular to the efficiency of domestic boilers, including widespread replacement with more efficient condensing boilers.

Figure 16Figure 16 shows that space heating and electrical appliances, closely followed by hot water, remains the highest sources of energy consumption in the household sector.

Figure 16: Households energy consumption in the UK.



Source: Odyssee-Mure & Ricardo AEA (2015)

3.2 *The Case of Italy*

Key findings

- In order to reach target of 15.5 Mtoe of final energy savings per year, Italy relies upon three main policies: White Certificates, income tax deductions and subsidies (the Thermal Account) supported by a number of additional measures. Residential consumers' role is relevant, accounting for about a quarter of the total effort.

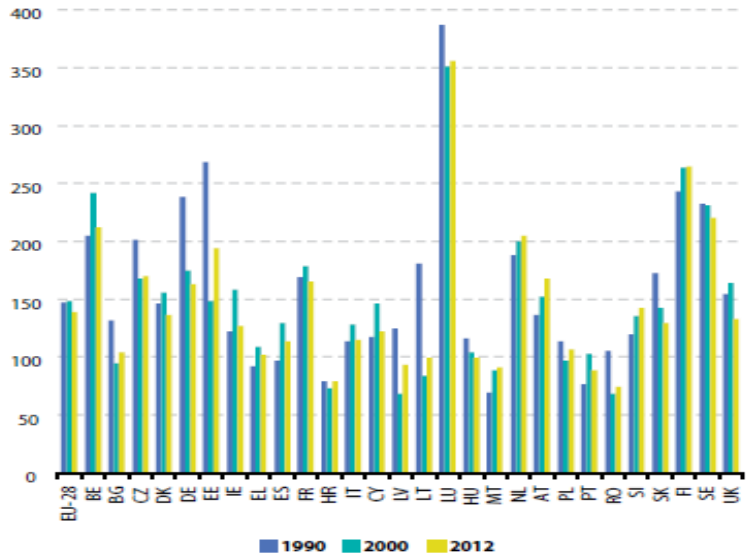
- The implementation in Italy of Article 7 of EED/2012 would benefit from a credible, transparent, well communicated plan, to which the government takes a credible long commitment. This would enhance the salience for the households of the policy action, and reduce the uncertainty surrounding the public financial support to energy efficiency renovations in the home.

- To reduce the negative effect of free-riding, the tax credit scheme and the White Certificates scheme, should be made more compatible by removing administrative barriers and the application of the latter to the building sector should be intensified.

- Italy has successfully pioneered the mass diffusion of smart meters, but it should take full advantage of the efficiency-enhancing opportunities offered by this tool by means of user-friendly and readily accessible interfaces, which would allow real time energy saving adjustments in residential consumption patterns.

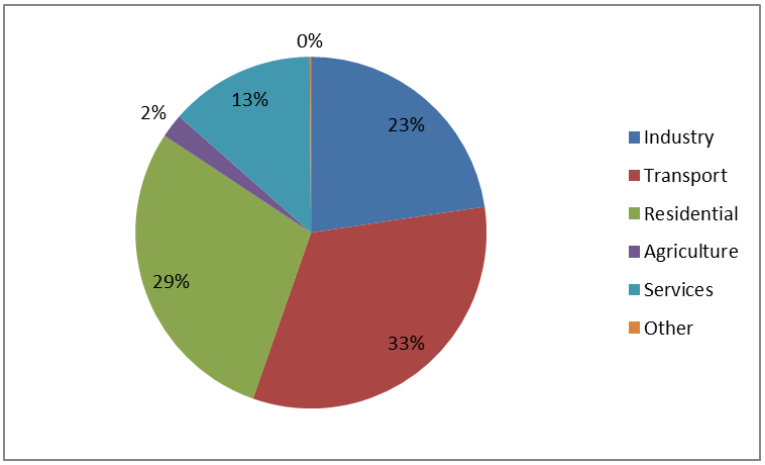
In 2012 Italy's gross inland energy consumption per capita (about 110GJ) was below the EU average of 139 GJ and considerably lower than those of other large western European countries (EUROSTAT 2014), such as Germany, UK and France (See Figure 17). The residential sector is responsible for the second largest share of final energy consumption, almost at par with transport, and by far larger than those of the tertiary, industrial sectors and agricultural sectors (See Figure 18). Thus the relevance of measures and policies for the residential sector is particularly high in the case of Italy.

Figure 17. Gross inland energy consumption per capita, in EU Member States 1990, 2000 and 2012.



Source: EUROSTAT

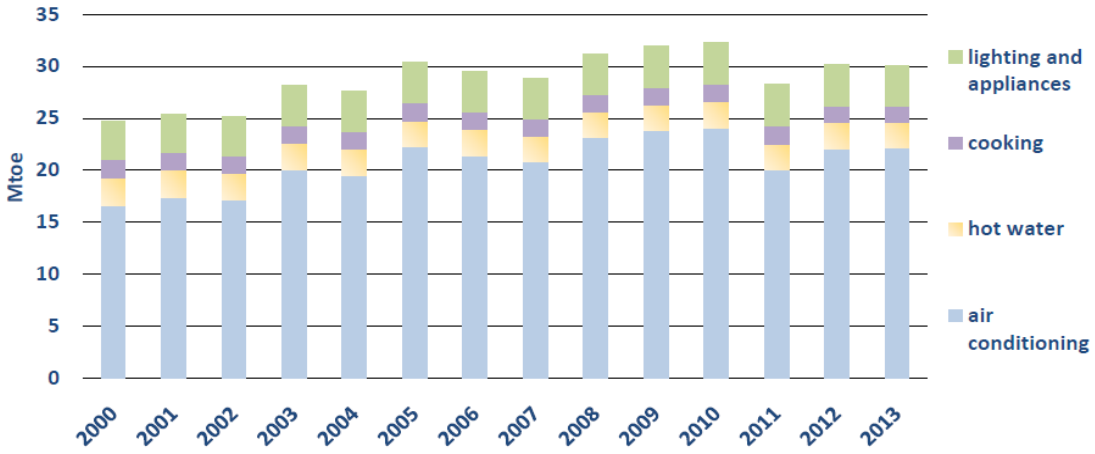
Figure 18: Final energy consumption shares by sector, 2013.



Source: EUROSTAT

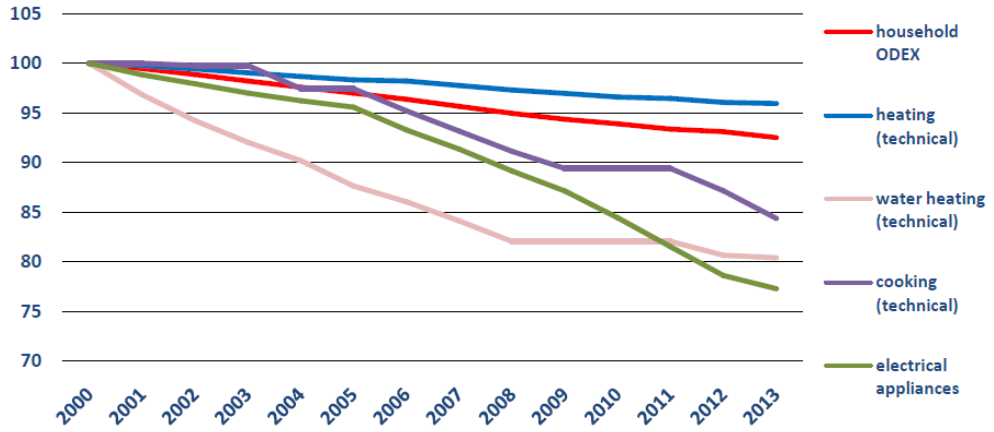
Figure 19 Figure 19 highlights that in 2013 three quarters of energy consumption was due to space heating and cooling (Moneta et al., 2015) ('air conditioning' in the words of the ENEA report) followed at a long distance by lighting and electrical appliances (10.9%), hot water (8.5%) and cooking (5.5%). Technical energy efficiency has improved for all components of residential energy use, but most notably for electrical appliance and water heating systems (Figure 16).

Figure 19: Energy consumption by types of end-use in households in Italy.



Source (ENEA, based on Odyssee-Mure data)

Figure 20: Energy efficiency trends in households in terms of the ODEX[32] index (2000=100).



Source: ENEA, (based on Odyssee-Mure data)

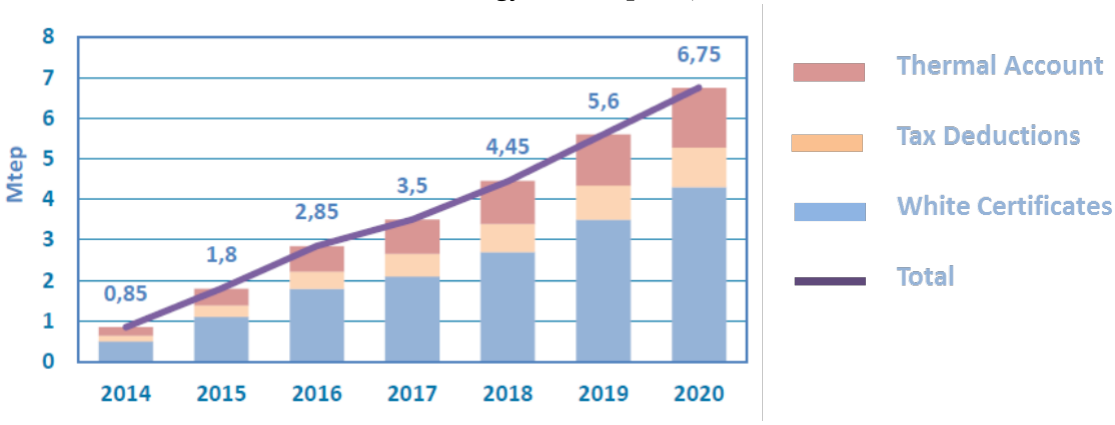
Italy is taking concrete steps towards the practical implementation of the Directive. Italy's action is quite comprehensive and to some extent, promising and innovative; however, some scope for improvement and reasons of concern remains. The directive was transposed into the Italian legislation in 2014 (DL 102/2014). The main current commitments and the status of the implementation as well as the forecast development have been spelled out in the Third National Energy Efficiency Action Plan of September 2014 (NEEAP), and the current governmental action seems to be committed to that plan (Governo Italiano 2014), although some minor policy adjustments have taken place in the course of 2015[33].

[32] For a definition of the ODEX index, see www.indicators.odyssee-mure.eu/odex-indicators-database-definition.pdf. ODEX is the index used in the Odyssee-Mure project to measure the energy efficiency progress of a given sector or of the whole economy. It ranges from 0 to 100 and a decrease of one point corresponds to 1% increase in energy efficiency, thus the lower the better.

[33] In particular, in 2015 fiscal deductions for 2016 were confirmed at 65% of the qualifying expenses for energy efficiency upgrades. The energy efficiency upgrades incentive scheme "Conto Termico" (Thermal Account) has just being updated and revised and the new regulations will enter into force this summer (90 days after official publication). The white certificates scheme is under revision. Public consultations have

The plan identifies a target of 15.5 Mtoe of final energy savings per year (20 Mtoe of primary energy), which, according to the modelling results used in the Plan would imply 'reaching consumption some 24% lower than the levels projected at European level under the 'business as usual' scenario (Primes 2008 model)'. In order to reach that target, the plan relies upon three main policy measures: White Certificates, income tax deductions and subsidies (the Thermal Account). These measures are by and large reinforcements and revisions of policies already in place. Residential consumption and buildings in particular play an important role in the strategy, although the lion's share of the efforts belongs to the White Certificate Scheme, which covers all sectors of consumption. Figure 21 illustrates the expected savings for the period 2014-2020 according to the 2014 NEEA and the relative contributions of the main efficiency measures to attainment of the savings target required by Article 7 of EED (Mtoe of final energy).

Figure 21: Expected savings in Italy from planned EED policy measures (MTep/year, final energy consumption)



Source: ENEA

White certificates embody the energy efficiency obligation instruments foreseen by the EED and, in the intention of the Italian government, are supposed to ensure reaching 60% of the overall energy efficiency target. The alternative measures include two main incentive schemes - the income tax deductions of energy efficiency upgrade expenditures and the so-called 'Conto Termico' (Thermal Account), which, together with the White Certificates, should, according to the NEEAP, ensure the attainment of the 2020 energy efficiency targets. Additional measures include financial support schemes, energy labelling for buildings and electrical appliances, planned new measures for the energy services and metering and billing sectors, energy audits and energy management support measures, rules and procedures for the qualification and accreditation of experts, consumer information campaigns and training programmes. These measures and their relevance for households and buildings, and effectiveness for achieving the EED target are discussed in more detail later on in this section.

The NEEAP specifies also how the target is expected to be shared across consumption sectors. This allocation to a certain extent reflects the choice of the policy measures and their relevance for the various sectors. In terms of primary energy consumption (see Figure 22) most of the effort will take place in industry, followed by transport, the residential sector and last the service sector. In term of final energy consumption, the allocation is similar, but transport and

been carried out in the second half of 2015, followed by discussion in the Parliament and with the Regions. At the time of writing, the reform was not yet finalized.

industry switch roles (see Figure 23). Residential consumers role is still relevant, accounting for about a quarter of the total effort. Two points are worth noting: first, residential consumption played a more substantial role in the savings achieved in the period 2005-2011 and in the savings expected by 2016. Thus it is quite reasonable that increasing attention is devoted to sectors such as transport and industry where larger potential savings are still to be reaped; second, the measures for the transport sectors may be relevant also for the households energy savings, insofar they relate directly or indirectly to the mobility of the households member, although for economy of space and given the focus on buildings of this report, they will not be treated in detail here.

Figure 22: Allocation of the 2020 energy saving target across sectors in Italy according to the 2014 NEEAP, in terms of final energy consumption (inner ring) and primary energy consumption (outer ring)

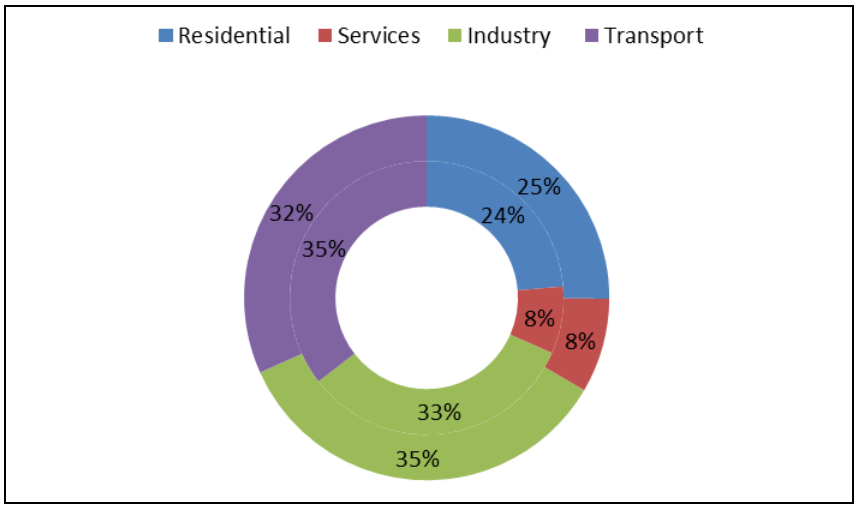
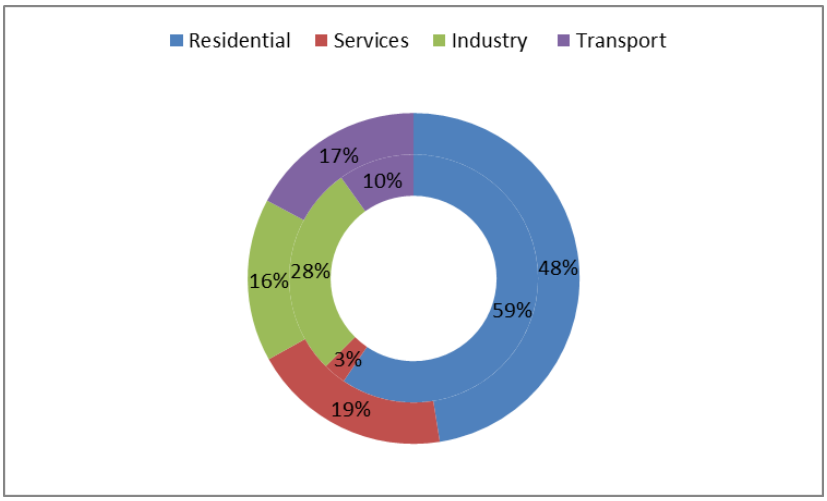


Figure 23: Allocation of the energy saving achieved by 2011 (inner ring) and expected by 2016 (outer ring) across sectors in Italy according to the 2014 NEEAP, in terms of final energy consumption



In what follows we will briefly summarise the three main measures adopted by Italy for the implementation of Article 7, as well as other pre-existing and ancillary measures, and discuss their relevance for the sector under scrutiny, and the potential issues and scope for improvement.

It is important to note that these three policies are not the only ones in place or foreseen in Italy of relevance for improving energy efficiency in the energy sector. There is a substantial corpus of laws and regulations, not explicitly designated in the NEEAP for the implementation of Article 7, but nevertheless contributing to the Italian policy framework for energy efficiency. These policies and measures either provide additional funding or aim at improving the knowledge and awareness of the interested parties, by means of energy labelling for buildings and electrical appliances, measures for smart metering and billing, energy audits and energy management, rules and procedures for the qualification and accreditation of experts, consumer information campaigns and training programmes. Importantly, they also mandate minimum efficiency standard for buildings, in accordance to Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings. We will devote a final subsection to these support measures, for which, again for economy of space, we will refrain from plunging into the regulatory details, and we will limit ourselves to pointing out the most interesting issues and features.

3.2.1 White Certificates

This is the main instrument envisaged to implement EEOs in Italy and entails setting up a national market in Energy Performance Certificates or White Certificates, i.e. tradable certifications of reductions in primary energy consumption via energy efficiency measures and actions[34]. This is a cross cutting schemes, as the obligated parties are natural gas and electricity distributors supplying more than 50000 end-user customers each. These consumers can be of any kind (industrial, commercial, residential) and hence only the fraction of White Certificates that relate to energy efficiency improvements for residential users matters for this report. The way this mechanism works is similar to other tradable certificate schemes: an overall target for a given period is fixed (in this case in term of final energy consumption reduction within a given year). Obligated parties and voluntary participants (distributors with less than 50000 customers, energy services companies, entities required to appoint an energy manager, entities which have voluntarily appointed an energy manager, entities that have implemented an energy management system conforming with ISO 50001) can act in end uses by implementing measures generating efficiency certificates. Following due assessment and certifications performed by GSE (Energy Service Operator) through technical bodies such as ENEA, the energy market operator (GME) issues the certificates after completing the assessment. Parties are free to exchange on the market their Certificates, and on 31 May of each year GSE verifies whether the obligated parties have achieved their target. The scheme integrates a support mechanism (a tariff contribution to obligated distribution companies to help partially recovering costs incurred to achieve the objectives) and a compliance mechanism (penalties in cases of non-compliance).

According to the latest report by ENEA (Moneta et al., 2015) on energy efficiency, this measure has yielded overall savings in primary energy use of 4.85 Mtep/year, equivalent to 3.4

[34] Ministerial Decrees of 20 July 2004 and of the Ministerial Decree of 28 December 2012.

Mtep/year in final energy use, of which, for the period after the entry into force of the Directive for which data are available (January 2013 - November 2014) about 80% were performed in the industrial sector, and only about 9% were due to energy efficiency improvements in the residential, service and agricultural sectors. Thus, although potentially promising also for the sector of consumption of interest for this report, the practical relevance of this instrument for this sector has been marginal. This is unfortunate, because the cost effectiveness of this instrument appears to be high: according to ENEA (Moneta et al., 2015) it costed only 1.7 Euro cents to save a Kwh, seven times less expensive than tax deductions (see sub-section 3.2.2). This might have to do both with the technical nature of the interventions, and in this sense economies of scale in the industrial sector might have been an important driver; on the other hand the very economic nature of the mechanism, with particular reference to its market-based features, is well known in the public economics literature for its cost-minimizing properties. It would thus be a good idea to further promote and expand the use of this tool, encouraging its wider application to the residential sector. The key issue would be then to find a way to leverage an analogous level of economic attractiveness and practical feasibility for the residential sector as it is currently within the reach of the industrial sector. A serious constraint is that White Certificate are currently incompatible with other financial incentives issued by national governmental agencies (but not with regional and local incentives). Thus there is a clear conflict with support measures consumers are more familiar with, such as tax deductions. Moreover, it might be easier to reach the target (and validate its attainment) by putting in place few large scale energy efficiency upgrades in the industrial sector than several small scale interventions in the residential sector.

3.2.2 Income Tax deductions

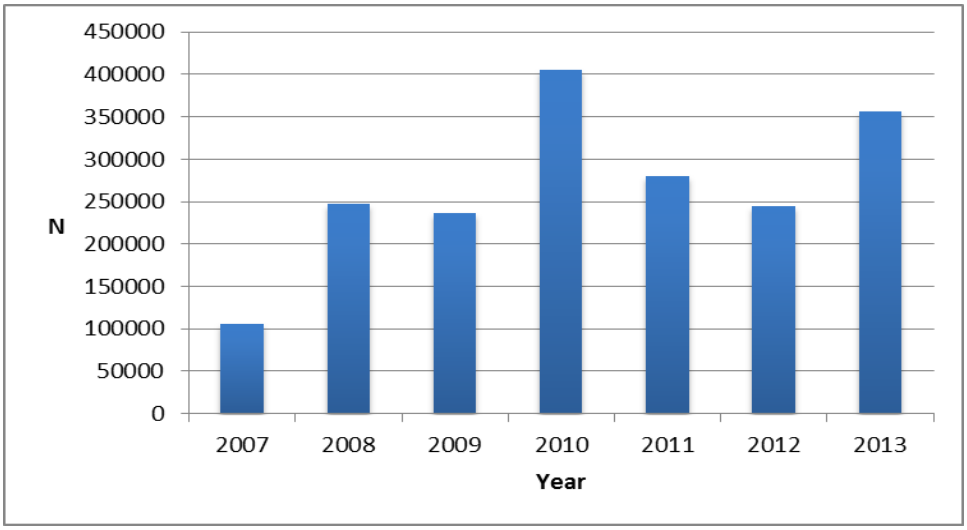
Since February 19, 2007, the national budget law allowed homeowners to deduct from their income taxes up to 55% of the expenses incurred to implement certain types of energy efficiency renovations or source of renewable energy in existing homes. (Earlier legislation in place since 1998 allowed deductions for renovations--36% of expenses--but did not target energy efficiency renovations.) Subsequent budget laws have always confirmed this incentive, varying on occasion the deductible amount and/or the period over which the tax credit could be recovered.

Qualifying renovations include the replacement of the heating system, windows and doors; attic and wall insulation; the entire building envelope, and hot water solar panels. Applications for the tax credits must be accompanied by a professional engineer's certification of the renovations and estimated energy savings.

ENEA reports that slightly more than 1.5 million applications were filed (Moneta et al. 2015) between 2007 and 2013 (see Figure 24). Requests peaked in 2010 and again in 2013. These two peak years highlight the importance of a stable policy regime and a clear policy communication. The 2010 peak can be ascribed to the uncertainty about the prosecution of the program after January 2011, a situation which lead a significant number of households to anticipate the upgrades in order to benefit of the incentive scheme while it was still in place. The 2013 peak is partially an indirect consequence of the EED directive, because it follows the increase of the deductions to 65% following the decision by the Italian Government to include tax deductions among the measures selected to reach the energy efficiency target, and, to this purpose, reinforce it; it might also be due to the short term horizon (one and half year at most) foreseen at that time for the increased tax deduction rate. The increased deduction rate was then confirmed

for 2015 and 2016. The issue here is that the implementation of the measure would benefit from a clearer long-term perspective with a transparent and stable schedule of the deductions allowed over a time horizon of several years, rather than the uncertain situation resulting from yearly revisions of the rules of the game. The government has in several occasions and in the NEEAP itself (p. 29) expressed the determination to revise the scheme and to turn it into a structural incentive.

Figure 24: Number of filings for income tax deductions for energy efficiency upgrades received by ENEA per year, 2007-2013.



Source: ENEA

ENEA computed the cost-effectiveness of the energy savings attributed to these renovations (assuming no free riding). As mentioned above, this measure is far less cost-efficient than White Certificates, and on average amounts to 12.4 Euro cents cents/Kwh. Windows, door and opaque surfaces upgrades are the least cost-effective (15.2 Eurocents/ Kwh), followed by space heating (12.4 Eurocents/ Kwh) and overall upgrades (7.4 Eurocents/ Kwh). ENEA (Nocera 2014) reports that windows and doors accounted for 64% of the renovations in 2012, thus placing the bulk of this policy action on the least cost-effective among qualifying renovations. Importantly windows and doors can typically be replaced for other reasons (security and aesthetical features) than energy efficiency, while boilers are typically replaced only in case of breakdown. Thus in both cases the fiscal incentives could have been pocketed by consumers who would have done the investment anyway for other reasons. This is indeed a concrete illustration of the risk of free riding highlighted in Section 2. One of the authors of this report has studied the issue of free riding for tax incentives for energy efficiency in Italy using the data of the Italian consume expenditure survey, and found that the tax incentive policy was more effective in encouraging window replacements in the regions of Italy characterized by colder climates, and that, all else the same, the policy would raise window replacements by 37 – 40 % in areas of Italy with sufficiently cold climates. The data used in that study also point to a very low effectiveness with heating system replacements, suggesting that free riding is almost complete with this type of equipment. On further examination, however, the results indicate that the effects of the policy are heterogeneous across the territory and are in fact sizeable in the colder parts of the country (Alberini et al., 2014). A more recent study by the same team (Alberini and Bigano 2015), was based on the result of a survey of Italian homeowners, who

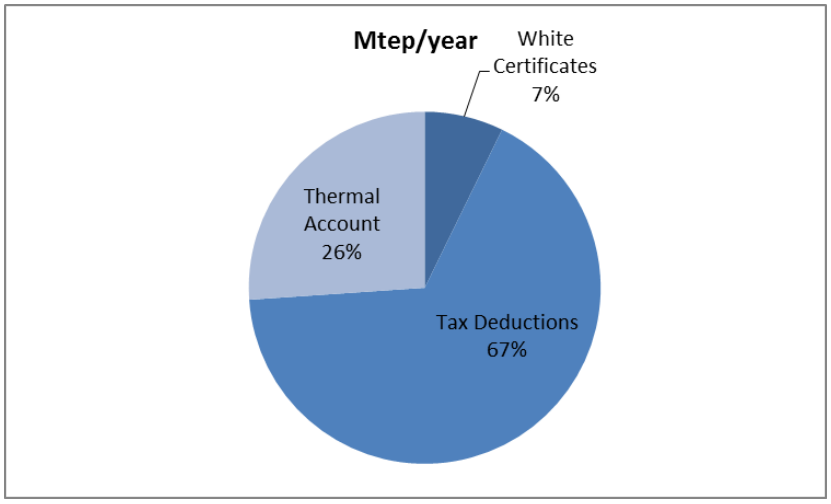
were interviewed about their recent energy efficiency upgrades in the home and their attitudes towards energy efficiency policies. The study found that increasing the incentive by 100€ raises the probability of undertaking energy efficiency upgrades by three percentage points. This implies that, for monetary incentives similar to those in the Italian tax and for reasonable levels of investments and energy efficiency improvement, a tax credit program such as the Italian one is effective, but generally not as much cost-effective as would be desirable.

3.2.3 Thermal account

The thermal account is a recently introduced policy measure, launched in July 2013 and very recently revised- the new decree has just been licensed in January 2016. Its novelty however is mostly chronological, since this measure is in fact a classical pure subsidy. The way the subsidy is delivered is not direct, but requires the involvement of an ESCO, by means of a third-party financing contract, an energy service contract or an energy performance contract. The incentive scheme is managed and monitored by GSE and is funded from the revenues of the natural gas tariffs, according to specific procedures defined by the Italian Energy Authority (AEEG).

The thermal account covers various kinds of energy efficiency upgrades by local public administrations and individuals. For the latter, the range of qualifying interventions is rather restricted and boils down to the replacement of heating and hot water systems with more efficient ones such as heat pumps, biomass furnaces (in rural areas), and solar thermal plants for hot water. The subsidy ranges between 40% and 65% of the investment costs and for heating systems it covers 55% of the expenses. Local public administration may receive up to 65% of the costs for radical interventions entailing building insulation coupled with the installation of efficient heating systems. The measure is unfortunately too recent for its effects to be assessed in full. ENEA estimates that for the decade 2011-2020, this measure will generate about one quarter of the savings related to EED/2012 in the residential sector, as illustrated in (Figure 25), and that the residential sector will be responsible for 0.54 Mtoe/year(about 37%) of the savings to be generated by this scheme.

Figure 25 Allocation of the 2020 energy efficiency target among measures, for final residential consumption.



Source: Enea

3.2.4 Additional policies and support measures

Aspects of energy use directly or indirectly relevant for energy efficiency have been the object of EU and national energy policies for a long time, and thus it is quite natural that the implementation of Article 7 of EED 7/2012 must take in consideration and be compatible with parallel and often pre-existing policy measures. There are a number of measures which are of immediate relevance for our topics: energy labelling, smart meters, additional financial incentives and general information policies.

Energy labelling applies to both dwellings and electric appliances. In the case of buildings is regulated by Law No 90/2013, amending and converting Decree Law No 63 of 4 June 2013 'Urgent provisions to implement Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010, on the energy performance of buildings'. This law's main focus is setting the rules for establishing the minimum level of energy efficiency that buildings built or renovated in Italy must guarantee. Moreover it requires that an Energy Performance Certificate is enclosed with the sale or letting agreement every time a property is sold or rented. The certificate must provide:

- Overall energy performance of the building in terms of total primary energy and non-renewable primary energy using the respective indices;
- Energy rating calculated by means of the building's overall energy performance index expressed in non-renewable primary energy;
- Minimum energy efficiency requirements under the law;
- CO_2 emissions;
- Energy sold to the grid;
- Recommendations for improving the building's energy efficiency with proposals for the most effective and cost-effective actions
- Information about energy audits and financial incentives;

The obligatory character of this certificate (failure to provide it in a property sale may result in fines for the seller ranging from a minimum of 3000€ to a maximum of 18000€), the technical rigor of the procedure and the level of training prescribed[35] for the professionals qualified for issuing the EPC, ensures that energy efficiency information is given adequate consideration by individuals considering moving to a new home, and thus it is expected to work as a market signal expressing objective characteristics of the dwellings, influencing their value on the market and therefore the choices of the consumers. The hope here is that a property with a high energy efficiency certification will be regarded as a better investment and therefore become more in demand, and hence the new building stock will become increasingly more efficient. These certificates can be used also as a lever to force the transition towards more energy efficient housing units, by making progressively more severe the minimum level of acceptable energy performance. Finally they are a promising way to engrain energy efficiency consideration into the consumers' mental processes, by making energy efficiency appear as one of the main ingredients in the most fundamental financial decision a household can make.

Smart meters are an innovation in the retail electricity and natural gas market pioneered by Italy, which has been the first EU country to deploy them on mass scale starting in 2001 and to

[35] Ruled by Presidential Decree No 75 of 16 April 2013.

reach an almost complete diffusion of electricity smart meters on its territory. For gas, pilot studies were carried out in 2014 and 2015 in nine Italian cities to test the installation of gas meter banks for residential users (with a capacity of less than 10 m^3/h), and the Italian Energy Authority is now mandating a complete switch to such meter for all Italian residential customers by 2018[36]. The deployment of electricity smart meters is regulated by Legislative Decree No 115 of 30 May 2008. Smart meters of the kind deployed in Italy allow, in principle, two-way communications between the distributor and its customers, high frequency reading of energy consumption, the provision of billing information, the possibility of changing billing procedures and other contractual arrangements (and even the provider itself) with a simple phone call, the remote detection of excess load, outages and technical issues. What is interesting for energy efficiency improvement is the two–way communication and in particular the potential to provide detailed information on consumption patterns to consumers and on how to shift consumption in order minimize inefficient use. Unfortunately the way this information is currently provided to Italian residential consumers is still widely improvable, as the procedure for reading data is quite user-unfriendly and involves unpleasant trips to the basement or the attic (were these meters are usually installed). More user-friendly systems based on in-house display technologies or smartphone applications are technically readily available, but currently are implemented only as pilots (at the time of writing Enel provides the application Enel Info to about 30000 residential and small business customers in Puglia and to the residents of L'Aquila). It would be highly advisable (and extremely cost-effective) to increase the diffusion of such applications to all households connected to the grid. Moreover, in order to increase the options for the households to improve the energy efficiency in their homes, it would be important that consumption data could be disclosed to third parties with the professional capability of suggesting and putting in practice improvements in the consumption patterns of the interested households, such as ESCOs or energy auditors. This option is generally precluded by contractual arrangements with the distributors, but, as stated in the NEEAP (p. 42), 'to ensure compliance with the EED's requirement to strengthen measures, the national transposing rules provide that the available information on the final customer's energy bill and historical consumption be provided on the final customer's formal request to an energy services supplier designated by the customer'.

Additional financial incentives come from a variety of sources. A small fraction (3.7%) of the projects financed by European Structural Funds entailed energy efficiency renovations of private buildings, while a more consistent share (32.2%) went to energy-related renovation of public buildings. It can be expected that part of these funds covered renovation of residential buildings. In 2014 a national policy measure supporting social housing ('Piano Casa') provided funds for energy efficiency renovations in social housing buildings amounting to EUR 400-million Fund for energy renovations of dwellings plus EUR 67.9 million to renovate 2300 dwellings for disadvantaged categories. A specific fund for home purchase and renovations ('Plafond Casa') was set up in 2013 to help young people and socially disadvantaged families to gain access to low interests loans to purchase residential properties. One of the main criteria to access these loans is that the dwelling should belong to high efficiency energy classes.

Finally, a **number of information and awareness raising initiatives,** both at the national and the local level were implemented in the past years and are currently undergoing. A long but nevertheless non-exhaustive list is provided in the Appendix B of the NEEAP (p.132). The focus of these initiatives may be broader than energy efficiency proper, covering also broader

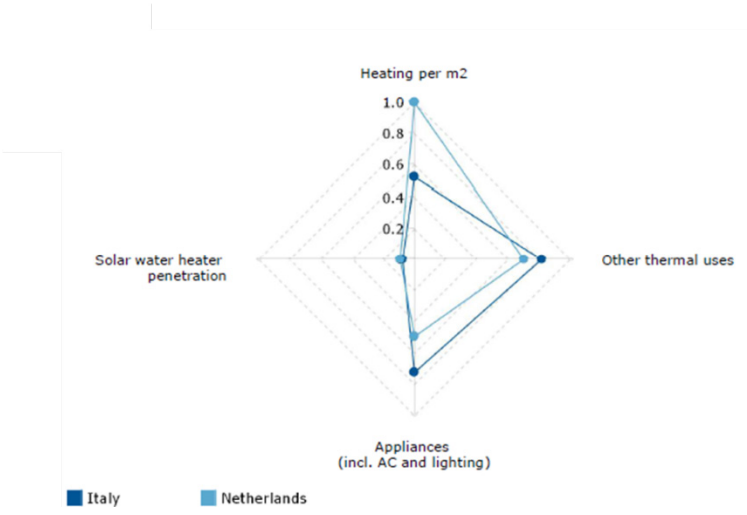
[36] Decision 20N 2015 554/2015/R/gas (http://www.autorita.energia.it/it/docs/15/554-15.htm)

sustainability, consumer protection, or energy related themes, but energy efficiency is always included. An important knowledge–based initiative, carried out within the 2014 NEEAP itself, has been the assessment of the building stock in Italy and the quantification of its energy saving potential. For the residential building stock, this assessment yielded a potential of 49 Mwh/year (3.71 Mtep/year) of energy savings, which would require the renovation of about 170 million m^2/year (ENEA 2015).

3.2.5 Assessment and concluding remarks

A couple of comparative studies have assessed the energy efficiency policies of Italy, with various degree of sectoral resolution (and thus with varying level of relevance of such assessments for residential energy efficiency), and overall reporting positive assessment. According to the Odyssee-Mure scoring system, Italy's policies overall bring the country in the middle range of the rankings for households' energy efficiency. Looking into the detail of the scoring (see Figure 26), and comparing Italy with the best performing country (the Netherlands), it transpires that Italy is actually doing better in terms of energy use by appliance and non-heating thermal uses, is on par for solar boilers, but policies targeting heating systems are way more effective in the Netherlands than in Italy. Incidentally Italy ranks higher for energy efficiency in the transport sector.

Figure 26: Comparison between energy efficiency policy results in the Netherlands and in Italy.



Source: Odyssee-Mure (2016)

ACEEE's 2014 (Young et al. 2014) ranking of energy efficiency policies has awarded Italy the second place after Germany, but the main reason for this outstanding result is the performance of the transport sector, which boasts the highest fuel economy achieved among the countries considered in the report, and takes into account the recent upgrades in the railway capacity (particularly for medium-long distance high speed trains). The building sector, according to the ACEEE would benefit from stricter building standards, particularly for non-residential buildings. In this perspective it is thus quite fortunate that specific initiatives in this sense have been taken for public administration buildings (for instance through the Thermal Account or through the requirements of nearly zero energy buildings pursuant the national

implementation of European Directive EPBD 2002/91/CE Recast by means of Ministerial Decree of 26 June 2015. Also ACEEE suggests to intensify the policy action about electrical appliances, by extending appliance and equipment standards to a greater number of products. Indeed it is quite odd that in the 2014 NEAAP the role given to appliances is quite limited, notwithstanding the very positive role that they have played in increasing residential energy efficiency in Italy in the first decade of this millennium. Confirming and strengthening the policy action in this area would be advisable.

Looking at the Italian case through the lens of the general recommendations stemming from the economic literature reviewed in section 2, the following considerations can be made.

- The implementation in Italy of Article 7, of EED/2012 would benefit from a credible, transparent, well communicated plan not liable to be frequently revised, to which the government takes a credible long commitment. This would enhance the salience for the households of the policy action, and reduce the uncertainty surrounding the public financial support to energy efficiency renovations in the home. This is particularly relevant for the 65% tax deduction scheme, but it would be also important to rationalize and simplify the access to the various national funding programmes available analysed in this section (not to mention the regional and local ones that we did not consider for economy of space). The idea of making the tax deduction incentive a structural feature of the Italian fiscal system, put forward in the NEEAP, is particularly welcome.
- However, the review of Section 2 has shown that financial support to households is prone to free-riding, which can significantly reduce the cost effectiveness of the measure. The recommendation here is not to cancel this scheme, as it is nevertheless effective, in particular by making energy efficiency an important variable in the financial decision process of the households, thus significantly contributing to raising the interest of the public into this matter. The recommendation here is that this scheme should be coupled with more cost-effective policies such as White Certificates, whose application to the building sector should be intensified. To this end, administrative barriers should be removed, such as the incompatibility of White Certificates with other support measures. A possible facilitating measure to this end would be to lower considerably the cap on the renovation costs eligible for the tax deduction scheme, and require that the rest of the investment should qualify for the White certificate scheme and dealt with an ESCO.
- The role of information is very important. This holds clearly for awareness and information campaigns, but more crucially for the extremely relevant information that smart meters could already deliver today, practically cost-free, with the deployment to all costumers connected to the grid of user-friendly and readily accessible interfaces, which would allow them real time energy saving adjustments in their consumption patterns. Such information would be very useful to implement behavioural measures such as nudging schemes to steer households' behaviour towards a more energy efficient lifestyle and it is a true low-hanging fruit that, in order to be reaped, only takes the political will to innovate the current commercial practices.

4 Conclusions and policy recommendations

Key findings

- The identification of relevant policy actions and the appraisal of their effects is not clear–cut nor straightforward. Policy measures adopted or planned are often cross-cutting, thus they can be of partial or even marginal relevance for the residential sector.

- Nevertheless, the residential sector appears to be responsible for the largest share of the savings aimed at achieving the 1.5% annual end-use energy efficiency target. However, only few countries explicitly address or prioritize the households or building sector within their obligation schemes or alternative measures.

- Most measures included in the EEOs focus on implementation of 'low-hanging fruits'. This may prevent the diffusion of more innovative, long-term solutions.

- A long-term commitment in policy action and the adoption of clear, fair, transparent rules of the game for a reasonably long time horizon are crucial.

- Policymakers should take full advantage of the benefit of a correct use of information and information-enhancing technologies.

Our analysis of the implementation of Article 7 of EED/2012 with regard to households and buildings in the EU has highlighted a number of policy relevant issues which prompt us to formulate some policy recommendations.

4.1.1 Issues

- The first issue is purely semantic and has to do with the definition of 'households and building'. Our strict definition of effects of policies targeted at energy savings generated by residential consumers within the dwellings they inhabit was dictated by economy of space and by the need to define the area of analysis. Different assumptions may have been made in the documents and publications we analysed, making it sometime difficult to disentangle what is really relevant for our study, among results based on various aggregation hypotheses. More generally, the policy relevant issue here is that grey areas matter in a complex and interconnected world, and it is important to bear in mind the implication of simplifying classifications when making policy decisions.
- Similarly, the identification of relevant policy actions and the appraisal of their effects is not clear–cut nor straightforward. For one thing, many policy measures adopted or planned in the Member States are cross-cutting, thus can be of partial or even marginal

relevance for the sector under scrutiny. This partial relevance in some cases may be fortuitous or temporary: the focus of a cross-cutting policy may shift from a sector to another after some years, or vary across countries. For instance White Certificates in Italy are currently focusing on industry, and only marginally on residential energy use, but it is feasible and advisable to increase considerably the weight of the latter.

- On the other hand the opposite caveat is also relevant, in the sense that the presence of very specific policies can, paradoxically, increase complexity: Since both households' energy use and buildings sectors covered by this report are regulated by other ad hoc EU Directives and national measures, the implementation of some policies can be difficult to attribute - and evaluate - univocally.
- Another obstacle to the precise assessment of the economy-wide energy savings stemming from the policies for the implementation of Article 7 is the rebound effect. Policy makers should keep in mind that the savings directly generated by energy efficiency policies will free financial resources for the consumers, and a fraction of these extra resources will turn eventually into additional energy consumption. No precise robust estimates are available, but most likely the net effect will be modest albeit not negligible (10-30%).
- There are a number of known issues widely studied in the energy economics and behavioural sciences literatures that matter for our topic. In particular, the energy efficiency gap imply that households adopt energy efficiency technologies at a sluggish pace and forgo many opportunities to save on energy costs and to make investments that make economic sense; free-riding can seriously reduce the cost effectiveness of financial incentives for energy efficiency upgrades; the quality of the information about the advantages of energy efficiency upgrades and the opportunities offered by related policy initiatives can have an important impact on the effectiveness of the main policy actions planned for the implementation of Article 7.
- From the analysis of implementation of policy of Article 7 of the EED emerges that the residential sector appear to be responsible for the largest share of the savings aimed at achieving the 1.5% annual end-use energy efficiency target. However, only few countries explicitly address or prioritize the households or building sector within their obligation schemes or alternative measure. Some of them include specific sub-targets for the residential sector and measures aimed at achieving social aims (Article 7 (7)(a)).
- Overall, the issue of additionality emerges as challenging as it is quite hard to separate the effect of existing measures, but also due to the delayed implementation of measures, overestimation of expected savings or overlapping effects of different policies aimed at multiple policy objectives.
- Most measures included in the EEOs focus on implementation of 'low-hanging fruits', such as efficient light bulbs, roof insulation, mainly in the residential sector. If from one side this has allowed EEOs to delivered very cost effective savings, reach large numbers of householders from the other, especially in the buildings sector, this may prevent the diffusion of more innovative, long-term solutions.
- The analysis of EEOs and alternative measures illustrates the diversity of possible designs. Some best practices can be useful to highlight replicable approaches. In particular, as shown by the Dutch, Danish and French experiences, flexibility (both in terms of diversity of offers and freedom of methodology) emerges as key to ensure cost-effective energy savings and adaptability to technology markets, national circumstances and policy priorities. In addition, measures jointly addressing financial incentives and information/education campaigns have resulted to be more effective that the two approaches taken individually.

- Simple implementation rules complemented by a transparent process (e.g. calculation methods, detailed results per sector), as well as an effective and periodic evaluation of the scheme, as in the Danish case, can result in higher effectiveness of measures.
- The UK case study showed some peculiarities. Its EEO is unique in targeting the household sector. It achieved large improvements in energy efficiency in UK residential sector. The long term experience allowed to implement targets incrementally ambitious over time and the scheme to become a pillar of the UK low-carbon strategy. Moreover, the strong focus on low income groups enabled a wider portion of household to benefit and also to pursue priorities beyond the low-carbon sphere. The recent experiment with ECO ceasing support for low cost measures and its connection with the Green Deal has not been completely successful.
- The Italian case study has highlighted that the implementation in Italy of Article 7, of EED/2012 would benefit from a credible, transparent, well communicated plan not liable to be frequently revised, to which the government takes a credible long commitment. This would enhance the salience for the households of the policy action, and reduce the uncertainty surrounding the public financial support to energy efficiency renovations in the home. Also it highlighted again the importance of information, particularly when it could be directly relevant to each single household as the one that smart meters, coupled with the right communication tools, have the potential to provide. Overcoming traditional business models and, if present, technical and regulatory obstacles likely to slow down the mass diffusion of such tools should be a policy priority. Finally it highlighted the importance of maintain and strengthening policy actions that have proven effective and that can save financial resources. In particular White Certificates should be extended to other sectors, and the focus on energy efficiency of appliances should be maintained and reinforced.

4.1.2 Recommendations

The above considerations suggest the following recommendations to EU policy makers:

- Consider setting moderately more ambitious energy saving targets in the course of the revision of the Directive. Among the many merits of such effort, there is the fact that it would help counteracting the rebound effect, although only an economy-wide policy action directed to all sectors in which consumers' spending can generate extra energy consumption, has a chance of counteracting indirect rebound effect. This however would call for broad measures whose implementation may not be straightforward. An indirect, and still politically complex solution would be a carbon tax[37].
- Support the adoption of known best practices or their strengthening where they already in place: in particular market-based, cost-effective policies such as the Italian White Certificates and the Danish EEO approach are particularly promising.
- Since many of the 'low-hanging fruit', mass-market efficiency technologies for buildings have already been implemented (or can no longer be counted as additional), an option can

[37] This would call for broad measures, ideally through a tax on the direct and indirect "energy content" of goods and services. Such tax would be however hard to implement due to measurability issues. A more viable, but still politically complicated option would be to rely on a carbon tax, an indirect but still effective way to counteract rebound effects given the strong correlation between carbon emissions and energy use.

be to support actions entailing also more ambitious albeit possibly more costly measures, or focus on other sectors such as transport and industry. Analogously, if a measure has been widely and successfully applied in other sectors, consider its wider application to households and buildings (as suggested for the Italian White Certificates).

- Incentivise the periodic assessment of measures through quantitative ex-post evaluation as well as a regular assessment and adjustment of the additionality criteria in order to exclude areas with very low additionality, and thus contributing to reducing the risk of free-riding
- Stress the importance of long term commitment in policy action, and promote national initiatives which demonstrate the adoption of clear, fair, transparent rules of the game for a reasonably long time horizon;
- Take full advantage of the benefit of a correct use of information and information-enhancing technologies. A correct understanding of the benefits of energy efficiency schemes have the potential to raise the salience of this matter for consumer, and hence the likelihood of responding positively to policy stimuli. Proper two ways communication interfaces for smart meters could boost the impact of behavioural policies such as nudging initiatives.

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Energy efficiency is the most cost-effective way to reduce emissions, improve energy security and competitiveness, make energy consumption more affordable for consumers as well as create employment, including in export industries, stated the European Commission in 2010 in its "Energy 2020 strategy". A year later the Commission presented the proposal for a directive on energy efficiency, which entered into force on 4 December 2012.

Three years later, this European Implementation Assessment has been published to assist the ITRE Committee in scrutinising the implementation of the Directive.

Input was received from three independent groups of experts from: CPMC SPRL, University of Oxford and University of Sussex, and Fondazione Eni Enrico Mattei.

The first research paper presents opinions of national stakeholders at Member State level, gathered during interviews and surveys.

The second research paper presents the Member States' plans and achievements towards the implementation of Article 7 of the Directive (Energy Efficiency Obligation Schemes, EEOS).

The third research paper presents the implementation of Article 7 of the Directive in the household and buildings sector specifically.

The introduction to this European Implementation Assessment presents the overall legal and political context of energy policy in the EU as well as of the Energy Efficiency Directive and its implementation in particular. Key findings present main elements of the analysis provided by the external experts in the three research papers, which are included in full as annexes.

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