The Coalition for ENERGY SAVINGS

EU Energy Efficiency Directive (2012/27/EU)

Guidebook for Strong Implementation

The Coalition for ENERGY SAVINGS

The Coalition for Energy Savings is the voice of energy efficiency in Europe, bringing together business, professional, local authorities, civil society and trade union associations. Its aim is to put energy efficiency and savings at the centre of Europe's energy and economic policy.

Coalition members represent more than 400 associations, 150 companies, 15 million supporters, 2 million employees, 1,000 cities and towns in 30 countries in Europe.

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Editor responsible

Stefan Scheuer

Contributing authors and organisations:

Andoni Hidalgo (EURIMA)

Andrea Marandino (E3G)

Arnaud Duvielguerbigny (COGEN Europe)

Brook Riley (Friends of the Earth)

Dan Staniaszek (BPIE)

Dora Petroula (Climate Action Network Europe)

Eoin Lees (Regulatory Assistance Project)

Erica Hope (European Climate Foundation)

EuroACE

Fran McCrae (Stefan Scheuer Consulting)

Ingrid Holmes (E3G)

Katarzyna Wardal (European Federation of Intelligent Energy Efficiency Services)

Marta Toporek (Client Earth)

Matthieu Ballu (Stefan Scheuer Consulting)

Randall Bowie (eceee)

Renée Bruel (European Climate Foundation)

WWF European Policy Office

CONTENTS

CONTENTS **5**

GLOSSARY OF MAIN ACRONYMS **6**

FOREWORD **7**

INTRODUCTION **8**

CHECKLIST FOR STRONG IMPLEMENTATION OF THE ENERGY EFFICIENCY DIRECTIVE **10**

I SETTING OBJECTIVES AND TARGETS **12**

I.1 SUMMARY OF COALITION RECOMMENDATIONS 13
I.2 BACKGROUND 14
I.3 THE EU ENERGY SAVINGS TARGET FOR 2020 AND BEYOND (ARTICLES 1 AND 3 AND RECITAL 2) 16
I.4 INDICATIVE NATIONAL ENERGY EFFICIENCY TARGETS (ARTICLE 3) 19
I.5 BINDING ENERGY END-USE SAVINGS TARGETS (ARTICLE 7) 23

II REACHING THE TARGETS **30**

II.1 ELIGIBILITY OF MEASURES FOR THE ENERGY END-USE SAVINGS TARGET (ARTICLE 7, ANNEX V) 31
II.2 ENERGY EFFICIENCY OBLIGATION SCHEMES & ALTERNATIVES (ARTICLE 7) 37
II.3 PUBLIC BUILDING RENOVATIONS (ARTICLE 5) 44
II.4 ENERGY EFFICIENCY IN PUBLIC PROCUREMENT (ARTICLE 6) 49
II.5 ENERGY AUDITS (ARTICLE 8) 55
II.6 ENERGY EFFICIENCY SERVICES (ARTICLE 18) 60
II.7 SUPPLY SIDE EFFICIENCY AND DEMAND RESPONSE (ARTICLES 14 AND 15) 66

III GETTING ON TRACK **76**

III.1 NATIONAL BUILDING RENOVATION STRATEGIES AND PLANS (ARTICLE 4) 77
III.2 FINANCING THE MEASURES (ARTICLE 20) 84

IV REFERENCES **90**

ANNEXES **91**

A. TIMELINE OF THE ENERGY EFFICIENCY DIRECTIVE OBLIGATIONS 91
B. ELIGIBILITY OF MEASURES AND SAVINGS TO COUNT TOWARDS THE ENERGY END-USE SAVINGS TARGET 93
C. BUILDING RENOVATION CONCEPTS 101
D. GOOD PRACTICES IN PRACTICE: BOOSTING THE ENERGY SERVICES MARKET 102
E. CASE STUDIES: INNOVATIVE USE OF STRUCTURAL FUNDS FOR EE FINANCING 103
F. OVERVIEW OF MAIN EU ENERGY EFFICIENCY LEGISLATION 104

GLOSSARY OF MAIN ACRONYMS

CA	Comprehensive assessment
CBA	Cost-benefit analysis
CCS	Carbon capture and storage
CHP	Combined heat and power
COM	European Commission
DHC	District heating and cooling
DSO	Distribution system operator
EEAP	Commission's Energy Efficiency Action Plan from 2011
EED	Energy Efficiency Directive (2012/27/EU)
EEO	Energy efficiency obligation
EMS	Energy management system
EPBD	Delegated Regulation (EU) No 244/2012 supplementing Directive 2010/31/EU on the energy performance of buildings
EPC	Energy performance contracting
ERDF	European Regional Development Fund
ESCO	Energy service company
ESD	Directive 2006/32/EC on energy end-use efficiency and energy services (soon to be repealed with the approval of EED)
GDP	Gross domestic product
GHG	Greenhouse gas
HE	High efficiency
LCCA	Life-cycle cost analysis
Mtoe	Million tonnes of oil equivalent
NEEAP	National Energy Efficiency Action Plans, first required under the ESD and now the EED
NEEF	National energy efficiency fund
MS	Member State of the European Union
PP	Public procurement
RES	Renewable energy source
SAVE	Council Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency
SME	Small- to medium-sized enterprise
TSO	Transmission system operator

FOREWORD

With the Energy Efficiency Directive the EU has given itself a legal framework to put energy efficiency in the limelight. Reaching the 20% energy savings target by 2020 and paving the way for ongoing energy efficiency improvements will help to embed energy savings and efficiency improvements in energy and economic policies.

In a world of finite resources where we are already straining ecological, financial and societal boundaries, the EU should abandon the habit of exploiting the remaining dangerous, polluting energy resources. The time is right to adopt new norms and establish a new economic balance by stepping up efforts to reduce our energy consumption. Investing in domestic energy efficiency improvements will create new and local jobs, reduce our €400 billion energy trade deficit and boost competitiveness in the green economy, all while improving the quality of our environment. In this way we can ensure that we pursue our climate objectives in overcoming the economic crisis, not in spite of it.

Correct and strong implementation of EU Directives, particularly when local action is required, has always posed a colossal challenge. History has shown us that two factors largely determine their success: clear targets and public participation.

Much remains to be done on both of these fronts. The EED's targets are not yet complete: though a first step, the binding end-use target must be completed with a binding economy-wide energy savings target for 2020 and within the EU energy and climate package for 2030. Public participation in energy policy and decision making needs to increase. Though public debates on topics like electricity prices help expose problems they do not empower citizens in energy system decisions.

We are encouraged by the Coalition's Guidebook for the strong implementation of the Energy Efficiency Directive. It will enlarge the group of EU and national stakeholders to participate in and constructively influence national and EU implementation decisions, so that energy savings targets will be reached to the benefit of Europe's efforts to overcome the economic, financial and ecological crises at hand.

The Friends of the Coalition for Energy Savings

Caroline Lucas *(UK Member of Parliament)*

Anders Wijkman *(Co-president of the Club of Rome)*

Prof. Owen Lewis *(Former CEO of the Sustainable Energy Authority of Ireland)*

Gianni Silvestrini *(Director of the Kyoto Club)*

Prof. Diana Ürge-Vorsatz *(Director of the Centre for Climate Change and Sustainable Energy Policies)*

INTRODUCTION

About the Energy Efficiency Directive

The Energy Efficiency Directive (EED) entered into force on 4 December 2012 and repeals the Cogeneration Directive (2004/8/EC) and the Energy End-Use Efficiency and Energy Services Directive (2006/32/EC).

The EED is as close as the EU comes to an EU-wide energy efficiency strategy anchored by legislation. It is a framework directive which sets overarching objectives and targets to be achieved by a coherent and mutually reinforcing set of measures covering virtually all aspects of the energy system: from supply, transformation, transmission and distribution to consumption. Member States (MSs) must transpose the EED into national law by 5 June 2014 within their own legal, social, environmental and economic culture.

Why energy efficiency matters

The European Union has three climate and energy targets to be reached before 2020: a 20% reduction in greenhouse gas emissions, 20% of energy derived from renewables and a 20% increase in energy efficiency. If these 2020 targets are not met, a sustainable, secure and affordable energy system will be exceedingly difficult and expensive to achieve.

The Coalition believes that the quality of implementation of other directives has been relatively poor. MSs often transpose EU directives with a view to meeting only the minimum levels of ambition, avoiding complexity or changes to existing national law, even though going beyond minimum requirements can often bring numerous economic advantages and other types of benefits. All actors within the value chains of the sectors covered in the EED, be it industry, buildings, appliances, transport or energy supply, have a vested interest in supporting good implementation. MSs have made a political commitment to the 2020 targets and the Coalition will work to help them follow through on that commitment. The Coalition wants to stress that this guidebook is part of a long-term endeavour, rather than a one-off attempt that will end with its publication.

About this guidebook

This document is a detailed guidebook for a strong and effective implementation of the EED.

The Coalition hopes that compiling all the elements of the EED in one easy-to-use guide will help an ambitious implementation of the legislation, achievement of the EU's energy savings target and paving the way for increasing energy efficiency beyond 2020.

Who should use this guide?

This guidebook is intended for members of the Coalition and other national, regional and local implementers and stakeholders of the EED, including industry, manufacturers, utility companies and non-profit organisations.

The Coalition also welcomes government officials at all levels to use this guide, which clarifies many aspects of the EED, puts them in the context of overall energy efficiency policies and provides recommendations for good practices.

The Coalition understands that other and similar forms of support exist for administrations. The Commission is planning to provide its understanding and interpretation of various articles. MSs also have access to a "Concerted Action" dealing with the EED. Active already for many years under the Energy Services and Combined Heat and Power (CHP) Directives, this Concerted Action is a network funded by the Commission to allow officials to meet and share experiences, find common solutions to specific challenges and identify best practices.

This guide is not intended to replace much needed actions, like a common implementation strategy led by the Commission, but rather be a valued and useful complement to the Commission's efforts in this area. Moreover, we hope it will foster greater transparency of the implementation process and improve the understanding and accessibility of this complex piece of EU legislation by providing additional clarifications, comparisons, recommendations and best practice examples.

It is lastly important to note that this guide reflects the perspective of the Coalition as a whole, rather than that of its individual members, and that its recommendations are based on our own legal interpretation of the legislation.

How the guidebook is structured

Instead of taking on the legislation article by article, the guidebook is broken down into themes, as many appear in multiple parts of the EED. The chapters contain legal checks, or ensuring that requirements of the legislation have been fulfilled, and/or good practice recommendations that the Coalition has developed to facilitate the most ambitious and effective implementation of the EED. Note that three themes are in gray; this designates that they are not covered in this guide.

Part I provides an overview of the EED and its objectives and targets *(see orange circles in figure below)*. It explains how targets should be established and used to drive efficiency measures.

Part II provides details about the main efficiency measures of the EED *(see orange boxes in figure below)*. The chapters provide a background for each of the subject areas, the requirements of the EED and recommendations for effective transposition, implementation and monitoring.

Part III considers the overarching measures which bring all the pieces together and lead beyond 2020 *(see blue boxes in figure below)*. It includes recommendations on how to use financing strategies and national building renovation strategies.

The below figure will appear at the beginning of each chapter to show how it fits into the book and into the EED as whole. Please note that information for market actors, metering and billing and qualification, accreditation and certification are not covered in this guidebook for capacity reasons, but should be covered in future updates.

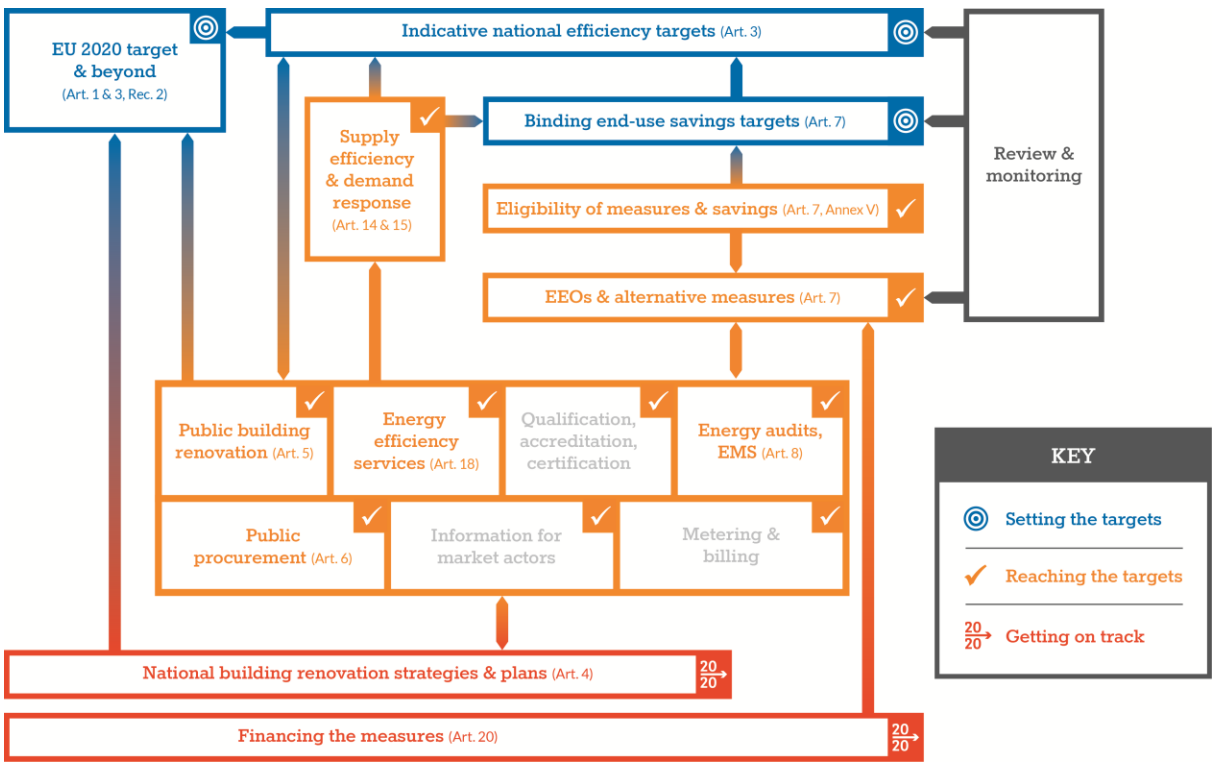

Figure 1 – Guidebook Overview Map

CHECKLIST FOR STRONG IMPLEMENTATION OF THE ENERGY EFFICIENCY DIRECTIVE

This checklist sets out what the Coalition believes are the twenty most important criteria for an ambitious and successful implementation of the Energy Efficiency Directive, which means achieving the EU 2020 target and paving the way for improving energy efficiency beyond that date. The criteria are based on the Coalition's recommendations for checking legal requirements and promoting good practices presented in this guidebook.

Ambitious and meaningful targets

1. National energy efficiency targets, which are to be reported at the latest by 30 April 2013, reflect increasing ambition, lead to new actions to reach national energy saving potentials in 2020 and beyond and contribute a fair share to the EU 20% target.
2. An annual 1.5% energy end-use saving target is put in place by end of 2013, securing at least 10.5% savings in the year 2020, and the use of exemptions is kept to an absolute minimum.

Broad mix of robust instruments

Proper counting of savings

3. The methodology for calculating the impact of energy efficiency measures to achieve the binding 1.5% annual end-use energy savings target to be reported by 5 December 2013 does not exaggerate claimed savings. It counts only the savings that are realised during the period 2014-2020, deliver savings until at least the end of 2020 and are additional to a baseline, thus excluding savings from EU product or building standards.
4. The only savings counted result from policy measures that explicitly aim to improve energy efficiency (no general taxation, like VAT, for example) and whose impact is verified. Double counting is avoided.

"Switching on" the efficiency market with energy efficiency obligation schemes

5. Obligation schemes are put in place and are an integral part of the mix of national energy efficiency measures.
6. Their costs to end-use customers and potential market players are made transparent and the value of longer lived energy efficiency measures is fully reflected in the accounting and target design of the energy efficiency obligation schemes.

Public buildings to lead the way for deep renovation

7. The public sector undertakes a comprehensive and accurate inventory of its own building stock, including energy performance and other relevant energy data that will serve as a starting point for renovations and as a model for an equivalent inventory of the national building stock.
8. The public sector leads by example and implements well-planned, high-quality deep renovations (including staged deep renovations) in all of its buildings. This activity should prepare and stimulate the entire market for the long-term deployment of such renovations, as part of the national renovation strategies.

More guidance to enable the efficiency potential of public procurement

9. Additional energy efficiency criteria in public procurement are set in a sufficient level of detail to avoid misunderstandings in their implementation.

Business leadership: from audit to action

10. Energy audits that meet the financial and economic criteria and demands of so-called investment grade audits are promoted. They are based on life-cycle cost analysis and provide guidance for future investments and maintenance.
11. SMEs and households are given clear and strong incentives to undertake audits and implement the recommended measures that result from these audits.

Removing barriers to the market of energy efficiency services

12. Interpretations of accounting rules on public debt and deficit are modified so that investments in energy efficiency under energy service contracts are not necessarily counted as deficits in national and public accounts.
13. Energy performance contracts and other types of overall energy service contracts are included as justified cases in public procurement, to ensure that public bodies are not obliged to divide contracts into separate lots when a holistic approach is more cost-effective and brings more energy efficiency improvements.

Integrating supply and demand

14. Spatial planning rules are linked to national comprehensive assessments of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling to ensure an "integrated approach" to energy supply and demand.
15. Cost-benefit analyses for efficient heating and cooling options, particularly those at installation level for power plants and industries, are done in a transparent and participatory manner and explicitly include socioeconomic costs.
16. Distribution and transmission system tariffs are set in a transparent manner and to empower consumers, and those incentives are removed which are detrimental to improving energy efficiency activity, in particular demand response and energy efficiency obligations carried out by energy companies.
17. Clear provisions are provided for demand response actors and those able to provide other energy efficiency services to be included in market design in a non-discriminatory fashion to improve overall network efficiency.

Getting on track

National building renovation strategies for 80% savings

18. National building renovation strategies are in place and aim at an 80% energy consumption reduction target for the country's entire building stock, to be achieved through the gradual and systemic improvement of the energy performance of all buildings by 2050.
19. The multiple benefits arising from deep renovations are integrated into a policy framework to stimulate deep renovation (including staged deep renovations) of the building stock.

Financing it: Energy Efficiency Funds and public support

20. Energy Efficiency Funds that are capable of blending various streams of financing and backing high quality national energy efficiency investment programmes are in place.

I SETTING OBJECTIVES AND TARGETS

Part I: provides an overview of the EED and its objectives and targets. It explains how targets should be established and used to drive efficiency measures.

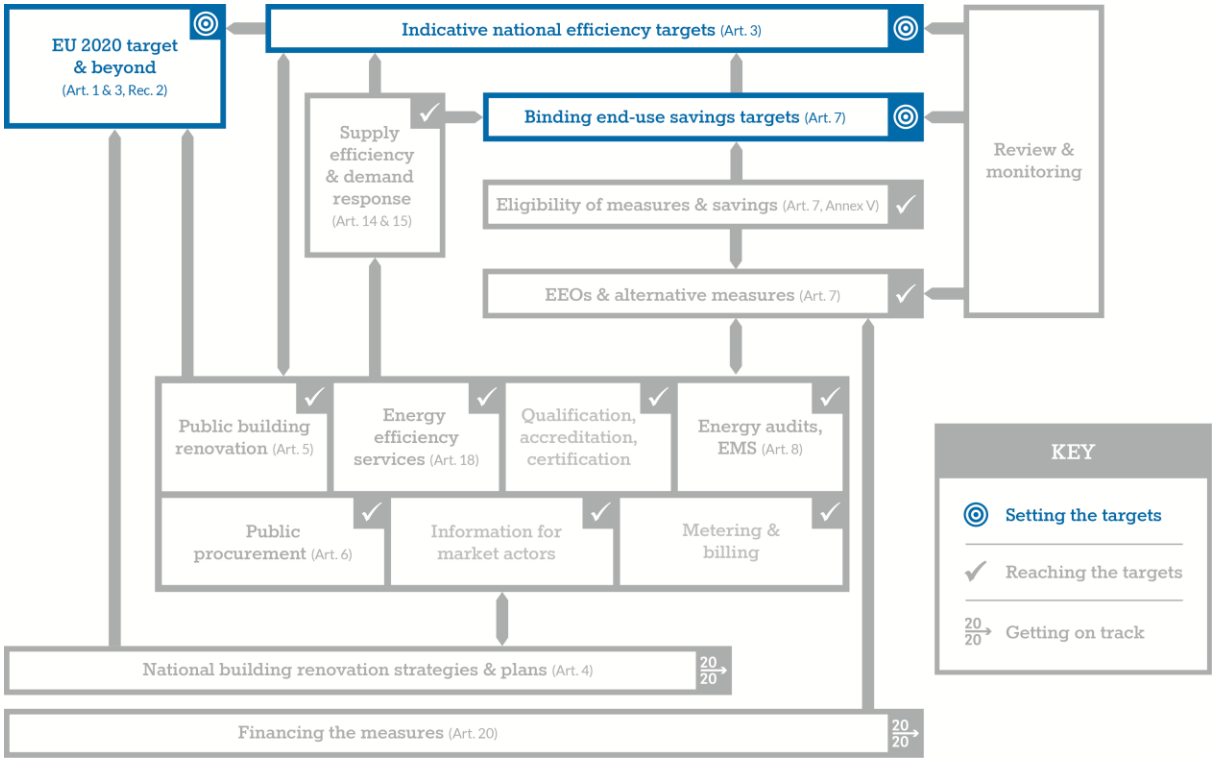

Figure 2 – Guidebook Overview Map: Objectives and targets

I.1 Summary of Coalition recommendations

Setting robust and coherent targets in a transparent way, as required by the EED, is essential to drive the EED measures, realise the saving potentials and pave the way beyond 2020. Therefore we recommend the following actions:

1. Verify that the 2020 indicative national target (Article 3, to be completed by 30 April 2013) is:

- Building on existing national energy and climate policies for 2020 and beyond;
- Adequate to realise the national cost-effective potentials of energy savings;
- Making a clear and adequate contribution to the EU 20% target in 2020; and
- Considered a first step towards 2030 and 2050 targets.

Note: By the end of June 2014 the Commission will assess whether the EU's 2020 target is likely to be met (Article 3.2). If the Commission concludes that this is not the case, it will make further proposals to ensure the gap is closed (Article 24.7).

2. Ensure that the binding energy end-use savings target (Article 7, which should be defined by 5 December 2013):

- Demonstrates how it will help achieve the indicative national target for 2020 in combination with other measures (Article 3);
- Uses the minimum number of exemptions, namely the exclusion of transport or discounting savings realised in the past (early actions); and
- Takes into account the benefits of putting in place progressively increasing annual energy savings and the targets that are likely to be set for after 2020.

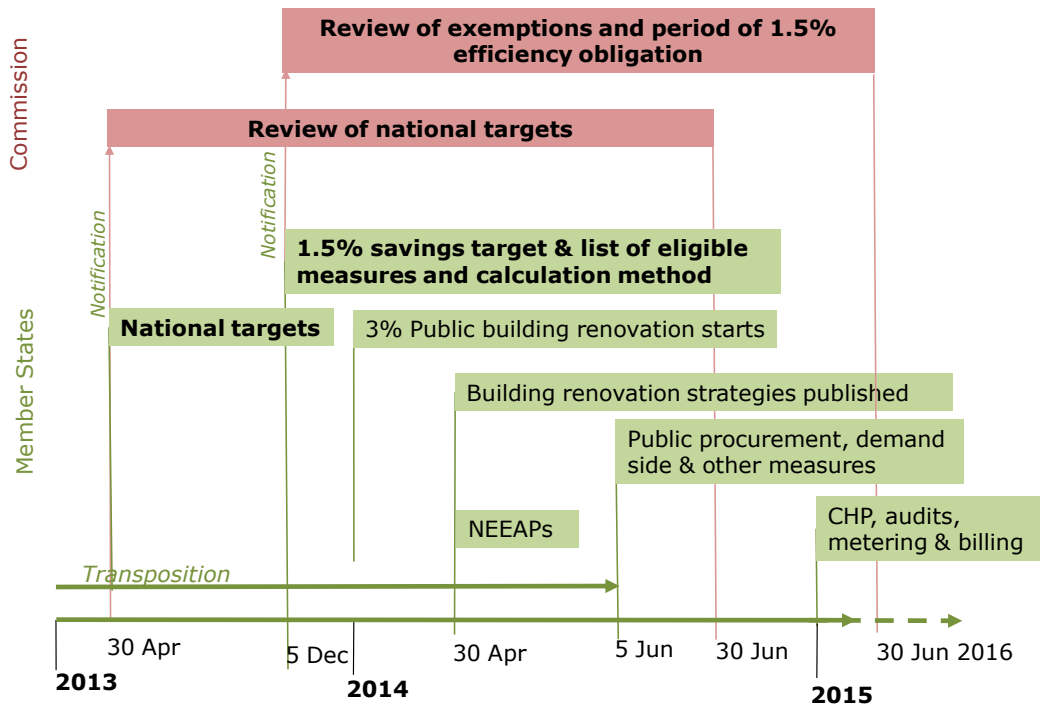

Figure 3 – Relevant deadlines regarding targets (in bold)

I.2 Background

Measures put in place for implementing the specific EED requirements must, in addition to fulfilling the specific minimum legal requirements for those measures, ensure in their totality that objectives and targets are achieved.

Targets in EU policies and legislation play an important role in:

- Creating high level accountability;
- Allowing benchmarking and monitoring of results;
- Sending long-term signals to investors; and
- Providing guidance for further policymaking.

The EED contains several targets and sets for the first time in its Article 7 a binding energy end-use savings target for MSs. This complements the EU's climate and energy package, which so far only includes legally binding greenhouse gas (GHG) and renewable energy (RES) targets, and goes beyond the 2006 Energy Services Directive (2006/32/EC)[1].

The EED's three main cross sectoral targets[2] are:

1. **The 20% EU energy savings target.** The EED's overarching objective (Article 1.1) is *"to ensure the achievement of the Union's 2020 20% headline target on energy efficiency and to pave the way for further energy efficiency improvements beyond that date"*. The 20% target is defined in Article 3.1(a) as a maximum of 1474 Mtoe primary energy or 1078 Mtoe final energy consumption in 2020. The energy savings gap under current policies is estimated to be around 190 Mtoe[3].
2. **The indicative national efficiency targets.** In terms of making this operational, the EED stipulates that MSs must set their own overall indicative national energy efficiency targets, which the Commission will assess as sufficient or not to reach the EU target and thereafter consider proposing a binding target (Article 24.7).
3. **The national binding target for end-use savings**. Article 7 sets a general binding target to deliver 1.5% cumulative annual energy end-use savings.

As these targets are closely linked, MSs will have to account for their interaction and ensure that the measurement and verification methods used for the different targets are coherent and compatible with one another as much as possible. In addition, the setting of the indicative national target must be framed so that the MS makes its full, proportional contribution to the overall EU goal for 2020. The setting

Efficiency, savings, consumption targets?

Different terms are used, often with little precision or accuracy, to express targets in the area of energy efficiency policy. The Coalition adheres to the definitions provided in the EED, which establish a clear relation between *'energy savings'* and *'energy efficiency'*. Specifically, energy savings are defined as the result of improvements of energy efficiency. Savings are measured as the difference in energy consumption before and after the efficiency improvement has taken place, taking into account the impact of external factors such as weather or level of economic activity. Using these definitions, the Coalition calls for a binding energy savings target, as an absolute amount of energy saved, to be achieved principally through efficiency improvements that will result in a reduction of energy consumption compared to a baseline.

[1] The energy savings target set out in Article 4 of Directive 2006/32/EC requires MS to "adopt and aim to achieve" an overall national indicative energy savings target of 9% for the ninth year of application of the Directive. The Article thus requires MS to take measures intended to meet the target. Because most of this Article has not been repealed by the EED, the 9% target for 2016 is still in effect, and the measures adopted to reach it shall be taken into account when implementing the EED.

[2] There is also a quantified sectoral target for central government buildings set in Article 5. MSs must ensure the renovation to minimum standards of 3% of the useful floor area on an annual basis of these buildings, or, alternatively, take other measures providing at least the equivalent energy savings in the buildings.

[3] The target, how it is derived and the remaining gap are illustrated in Figure 6.

of the binding element required by Article 7 can cover a significant percentage of the volume of savings that the indicative national target must deliver.

Important definitions

The following definitions from Article 2 of the EED are worth recalling here as they are relevant to this section of the Guide:

'Primary energy consumption' means gross inland consumption, excluding non-energy uses *(Article 2.2).*

'Final energy consumption' means all energy supplied to industry, transport, households, services and agriculture. It excludes deliveries to the energy transformation sector and the energy industries themselves *(Article 2.3).*

'Energy efficiency' means the ratio of output of performance, service, goods or energy to input of energy *(Article 2.4).*

'Energy savings' means an amount of saved energy determined by measuring and/or estimating consumption before and after implementation of an energy efficiency improvement measure, whilst ensuring normalisation for external conditions that affect energy consumption *(Article 2.5).*

I.3 The EU energy savings target for 2020 and beyond (Articles 1 and 3 and Recital 2)

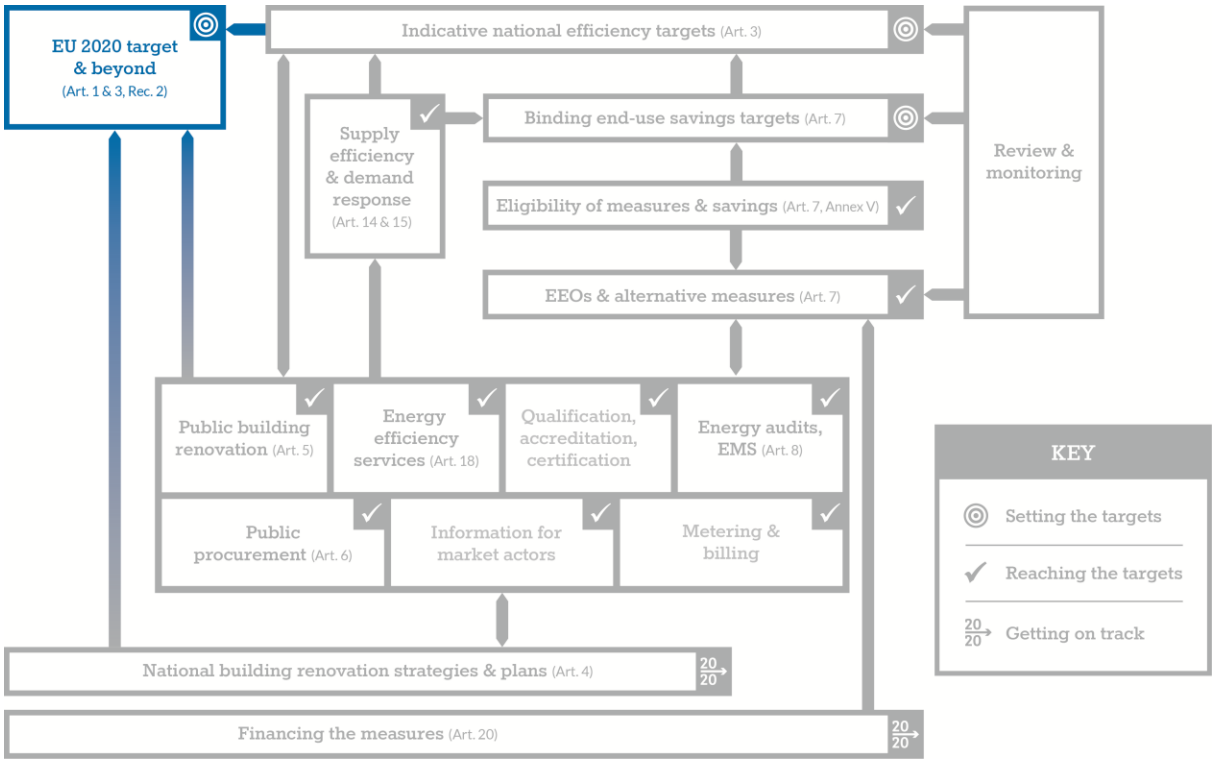

Figure 4 – Guidebook Overview Map: EU energy savings target for 2020 and beyond

The EU energy savings target for 2020 is set in the broader context of a long-term decarbonisation strategy: the EU has committed to an 80-95% reduction of GHG emissions by 2050, and various projections have shown that energy savings have the potential to deliver the lion's share of this reduction[4]. Article 1.1 of the EED explicitly states that the measures of this directive should pave the way for further energy efficiency improvements beyond 2020.

The 20% target is defined in Article 3.1 of the EED as a maximum of 1474 Mtoe primary energy or 1078 Mtoe final energy consumption in 2020 and according to Article 1, its achievement is the objective of the framework of measures established by the Directive.

The derivation of this figure is explained in Recital 2 as saving 20% primary energy (368 Mtoe) compared to the 2020 projections (1842 Mtoe) made in 2007, when the target was adopted by the EU heads of state and governments. The result of these savings is a maximum primary energy consumption of 1474 Mtoe in 2020.

[4] European Commission Communication 2011/0885 *Energy Roadmap 2050*, 15.12.2011.
Fraunhofer, *Concrete Paths of the European Union to the 2°C Scenario*, 2012.
Greenpeace, *Energy R[evolution] scenario for EU-27*, 2012.
Ecofys, *Renewable energy: a 2030 scenario for the EU*; 02.2013.
International Energy Agency, 'Efficient World Scenario', *World Energy Outlook 2012*, 12.11.2012.

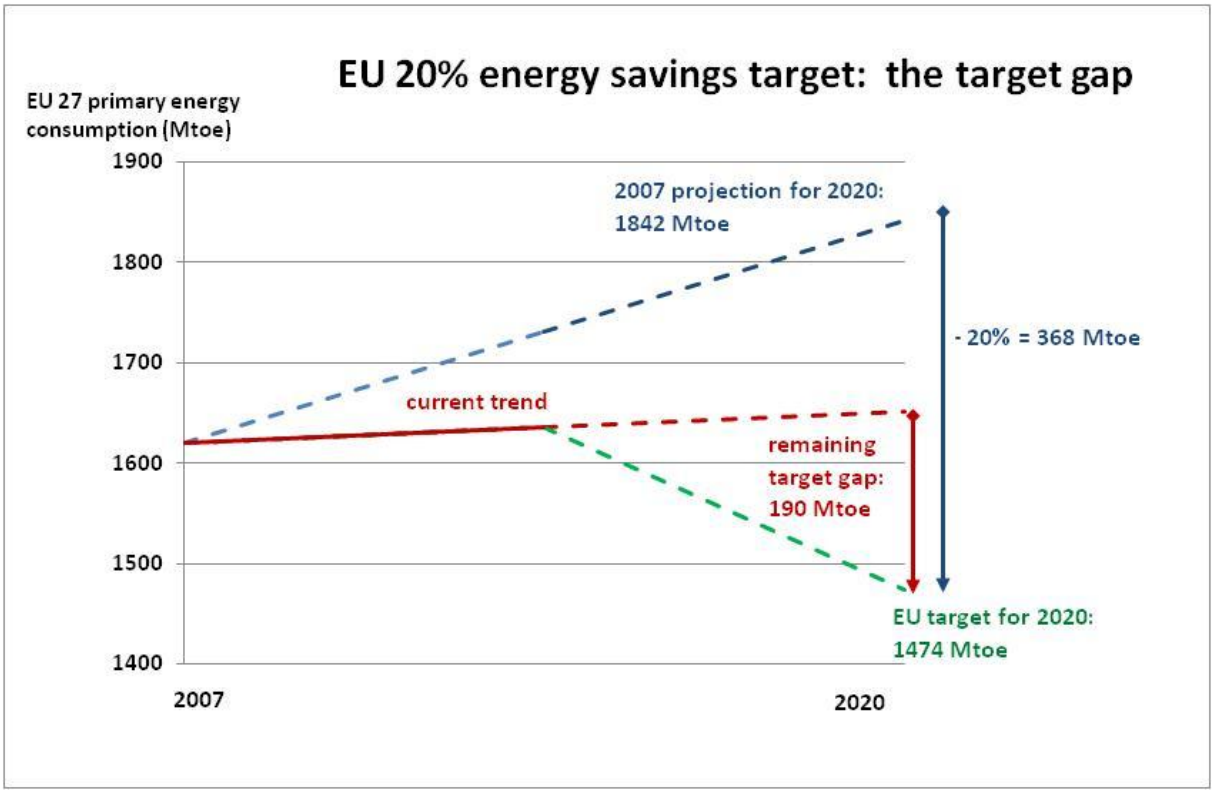

Figure 5 – Illustration of the EU target definition, method and target gap before adoption of the EED (current trend)

The 20% corresponds to the economic savings potential identified in 2007 based on the PRIMES model[5]. Derived from a projected use of energy in 2020 it includes assumptions about economic and demographic developments.

It is important to understand that the minimum requirements for the specific efficiency measures as laid down in Articles 4 to 20 will, according to available assessments, be insufficient to reach these objectives and targets. The Coalition's Gapometer shows that the EED minimum requirements for measures adopted in the EED will not be enough to achieve the EU energy savings target and will, in fact, leave a gap of around 94 Mtoe.

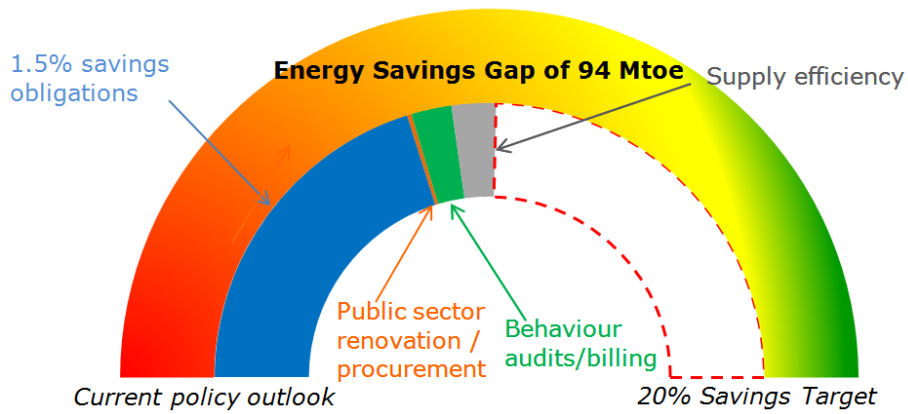

Figure 6 – Coalition for Energy Savings Gapometer showing the impact of the EED on reaching the EU energy savings target for 2020 (energycoalition.eu)

[5] PRIMES is the energy system model used by the European Commission for the EU's energy projections. The projections were revised in 2009 after it was assessed that the economic crisis would have durable effects. The projections for growth (and energy consumption) were revised down. As a consequence, reaching 1474 Mtoe was made "easier", although delivering 368 Mtoe of savings became more difficult and expensive, due in part to a lower rate of investment in new, more energy-efficient technologies.

In the EED, MSs are explicitly allowed to go beyond the minimum requirements set for specific measures (see Article 1.2), and they will have to do so, as an adequate and complete implementation of a Directive requires that its objectives and targets are met.

MSs will need other appropriate measures to make sure that the gap between the binding energy end-use savings target and the indicative national energy efficiency target is closed.

This gap is illustrated in Figure 7 below, which shows how the combination of the indicative targets with their measures and the binding savings required by Article 7 must add up to the total amount of savings required by the EU target.

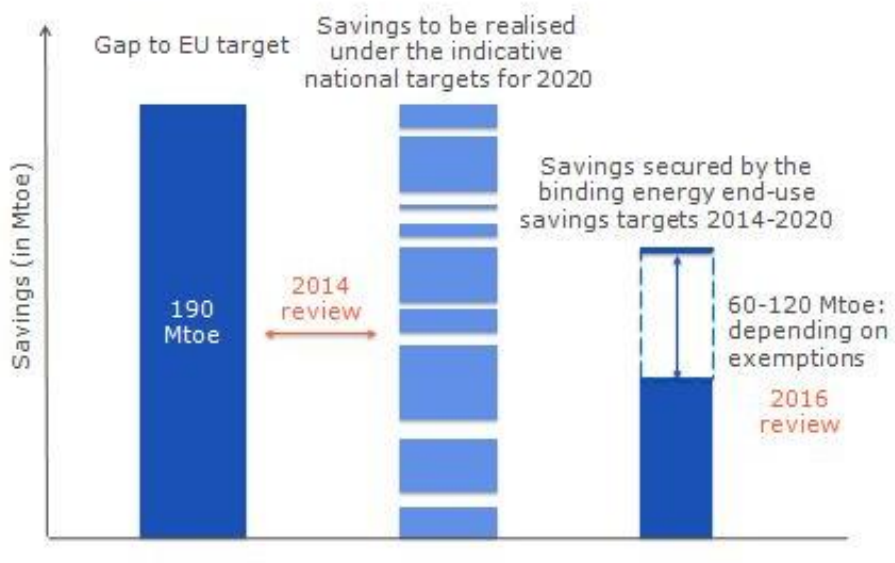

Figure 7 – Illustration of the new targets introduced by the EED and their interaction with the EU target (i.e. target gap) and upcoming reviews

I.4 Indicative national energy efficiency targets (Article 3)

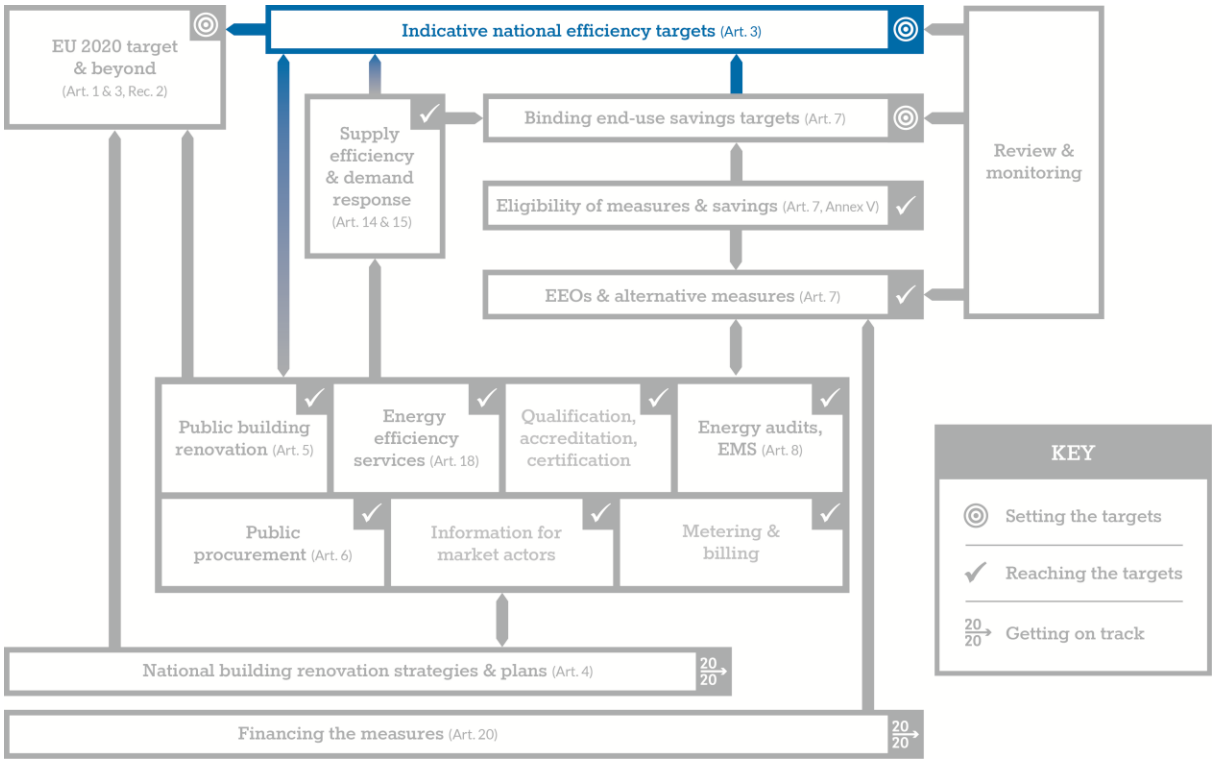

Figure 8 – Guidebook Overview Map: Indicative national efficiency targets

I.4.1 Main requirements

MSs are required to set indicative national energy efficiency targets that are aligned with the EU target. The targets must be expressed in both primary and final energy consumption by 2020 in order for the Commission to be able to assess and compare them with the EU target.

The targets should have been communicated to the Commission by 30 April 2013 under Article 24.1.

When setting their targets, MSs must do the following:

- Choose a methodology based on primary or final consumption, primary or final savings or intensity.
- Ensure alignment with the EU target: the level of consumption resulting from the methodology and level of ambition chosen should account for a maximum of 1474 Mtoe (primary energy consumption) / 1078 Mtoe (final energy consumption) by 2020.
- Explain how the target was set, why a certain level was chosen and which data were used to define this level.

Among the considerations permitted to account for national specificities are:

- Remaining cost-effective energy saving potential and early actions, provided the latter can be proven to have a continued impact on energy savings in 2020[6]: MSs can set their target in a way that ensures that the most cost-effective energy savings measures are prioritised.

[6] This is to ensure coherence with Article 7.2(d).

- GDP evolution and forecast: MSs can take into account their specific economic developments, in particular their GDP if they choose to set energy intensity targets. If energy intensity is used, it must be calculated on a disaggregated level in order to be able to correct for structural effects, such as the increased or decreased share of less energy-intensive goods and services.
- Parameters related to the energy mix structure, including changes in energy imports and exports and CCS: MSs are allowed to take these into account when designing targets and their expression in terms of energy consumption. For example, a generalised adoption of CCS technologies would deliver GHG cuts but also considerably decrease the efficiency ratio of electricity generation. The proportion of fossil fuel, nuclear or renewable electricity generation directly influences the conversion factor between final and primary energy.

I.4.2 The 2014 review of indicative national targets

By 30 June 2014 the Commission has to assess the progress and the likelihood of achieving the EU target of 1474 Mtoe primary and 1078 Mtoe final energy consumption.

The details of this review are laid down in Article 3.3 stating that the Commission shall:

- Add up the reported indicative national targets (as given in primary and final consumption);
- Assess the reliability of these targets to evaluate overall progress towards the EU target based on MS reports under Articles 24.1 (target progress report) and 24.2 (NEEAP);
- Carry out its own complementary analysis based on an assessment of energy statistics and modelling exercises for future energy trends; and
- Compare the results (aggregation of indicative national targets once verified as robust and made comparable) with the linear trajectory towards a 1474/1078 Mtoe consumption in 2020.

I.4.3 Setting the targets

Indicative national target setting is already part of the National Reform Programmes that MSs are required to submit under the European Commission Communication *Europe 2020: A Strategy for Smart, Sustainable and Inclusive Growth*[7]. As Table 1 shows, by 2011 all countries except the UK, the Netherlands, the Czech Republic and Slovenia had declared a target, though several targets were unclear or in an non-comparable format. Only a few of the MSs that provided a comparable target format set ambition levels similar or above the EU target ambition.

[7] European Commission, Europe 2020 – Key Documents, 01.06.2012.

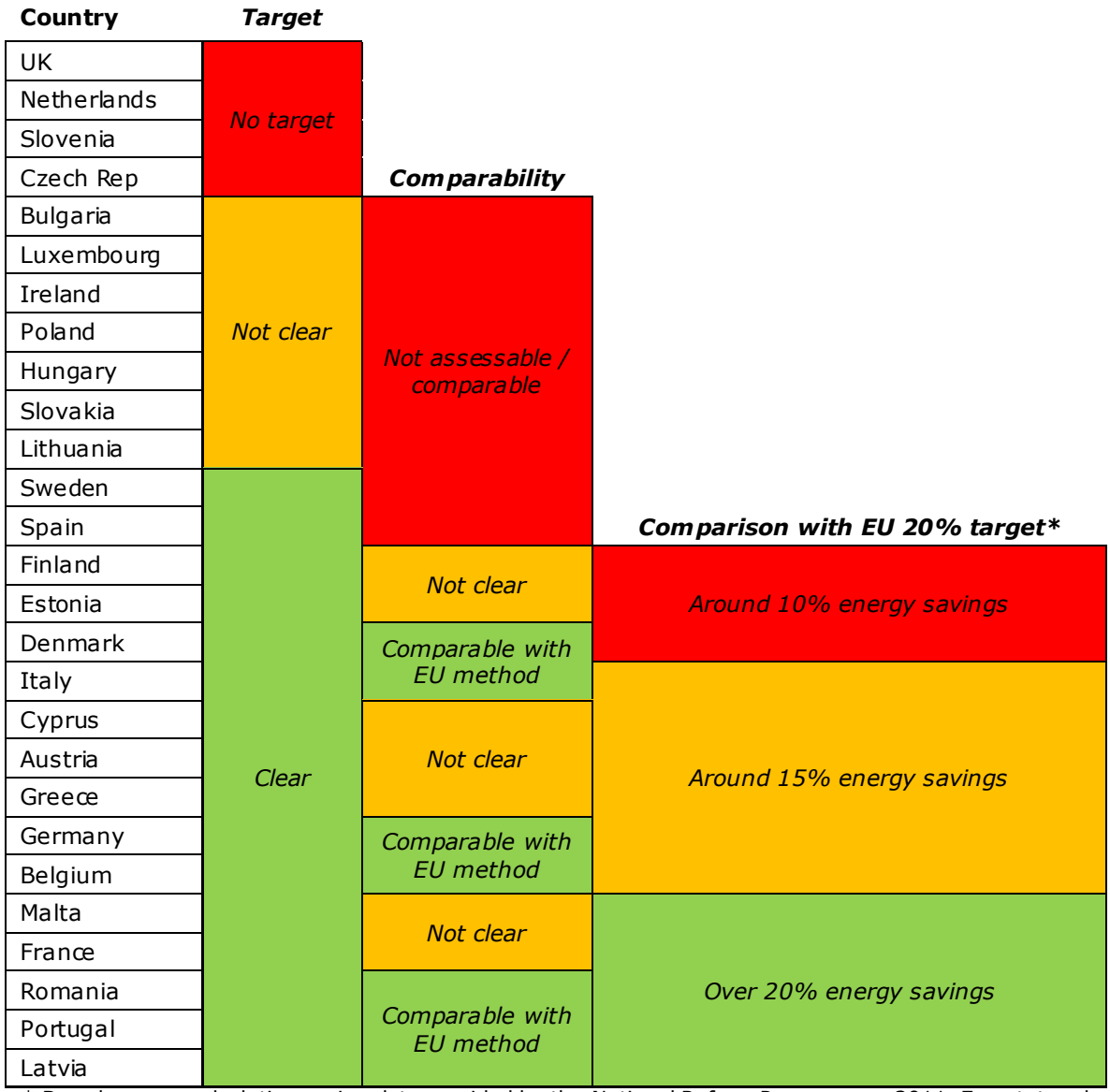

Table 1 – Review of 2011 national efficiency targets, Stefan Scheuer, May 2011

I.4.4 Legal checks and recommendations

Legal checks

1. **Request information on how the indicative national energy efficiency target is set by the 30 April 2013 deadline, and check whether the following minimum information is available and adequate:**

    - Explanation of how the target is converted into absolute final and primary energy consumption levels in 2020 (see Article 3.1, first paragraph). MSs have to provide at least the projections of GDP and energy demand, if the national target is expressed in energy saving volumes or energy intensity improvements.
    - Explanation of how the target contributes to achieving the EU 2020 20% energy savings target (see Article 3.1(a)). In order to assess whether this contribution is appropriate we recommend using the Commission's non-

paper[8], the relevant proposals for effort-sharing by EP's ITRE[9] and ENVI[10] committees (Figure 9 illustrates the effort sharing concept) as well as the latest EU reference projections for energy demand for the MS until 2020[11].

- Explanation of how the different EU and national efficiency improvements measures are contributing to achieve the target (see Article 3.1(b)-(d)).

Good practice recommendations

1. **Ask for the indicative national target to:**
    - Be at least as ambitious as existing national objectives;
    - Be adequate to realise the national cost-effective potentials of energy savings;
    - Make a clear and adequate contribution to the EU 2020 target; and
    - Be considered as a first step towards 2030 and 2050 targets.
2. **Remind implementers that the Commission will review indicative national targets by the end of June 2014 to assess whether the EU's 2020 target is likely to be met and whether to propose binding national targets.**

The EED does not impose a legal obligation on the level of indicative national targets. However the requirement to "take into account" the EU target implies that each MS should take up its fair share of the 20% so that the levels of consumption resulting from the 27 targets add up to the level of EU target. One possible way of sharing the effort is to set for each country a target equivalent to 20% energy savings in 2020 compared to specific national projections from 2007 (see Figure 9).

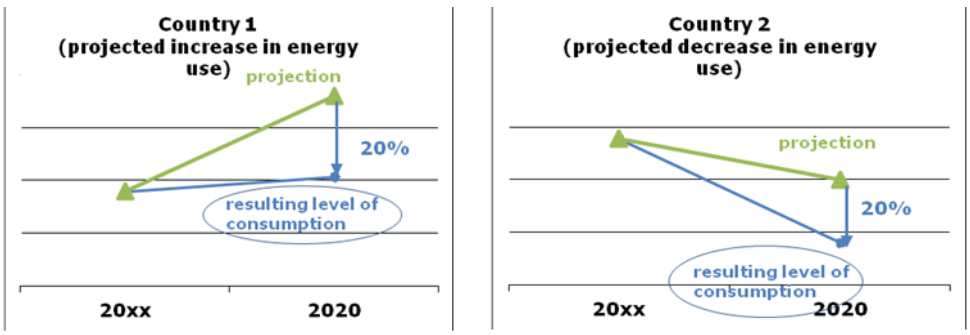

Figure 9 – Illustration of an implicit effort-sharing of the EU target methodology

[8] European Commission Non-paper, *Achieving 20% energy efficiency*, 2011.
[9] European Parliament Committee Industry, Research and Energy (ITRE) Committee, Amendments, 28.02.2012.
[10] European Parliament Environment, Public Health and Food Safety (ENVI) Committee, Draft Opinion, 5.10.2011.
[11] European Commission, *EU energy trends to 2030 – Update 2009*, 04.08.2010.

I.5 Binding energy end-use savings targets (Article 7)

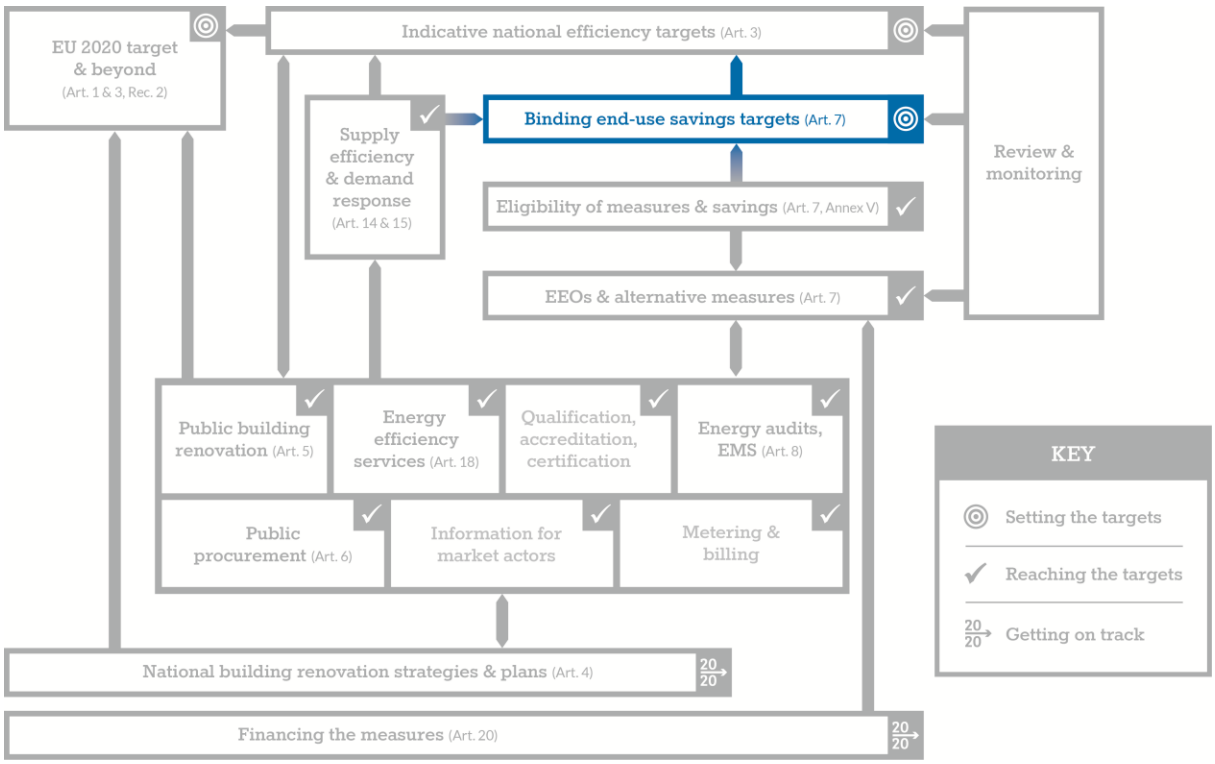

Figure 10 – Guidebook Overview Map: Binding energy end-use savings targets

I.5.1 Main requirements

Article 7 of the EED requires MSs to deliver a certain quantity of final energy savings in end-use sectors, an important aspect to achieving the overarching 20% target.

The target is cumulative, which means that it is based on incremental annual savings that deliver a total volume of savings at the end of the obligation period in 2020.

Article 7 changed considerably during the course of the EED negotiations, beginning as a requirement to set a supplier obligation scheme and becoming a binding national savings target. This followed the decision to allow alternative measures to fulfil the objectives of the supplier obligation scheme. The result is a rather complex legislative text, whose legal interpretation requires reference to other articles in the EED for full comprehension. In particular the Article 7 target requirements must be understood in relation to:

- The EED's purpose, which is to achieve the EU 2020 20% headline energy savings target and pave the way for further energy efficiency improvements beyond that date (Article 1); and
- The requirement for MSs to set indicative national targets taking into account *inter alia* the EU target and the EED measures.

The energy end–use savings target must be equal to achieving new savings of at least 1.5% each year from 1 January 2014 to 31 December 2020. This equivalence means:

- The savings delivered by 31 Dec 2020 must be at least 10.5% (1.5% times seven years) stemming from new saving measures since 1 January 2014 (see 11);
- The volume of savings delivered over the whole seven-year period must be at least equal to 1.5% in year 1, 3% in year 2 and so on. In practice this results in a total savings volume representing 42% of the annual final energy use which makes up the base for calculation (see Figure 11); and

- An incremental effect must be ensured, with new savings being delivered each year on top of those from previous years' measures. This is the only way to obtain meaningful and persistent energy savings, though this may not change the overall savings to be achieved. This means that if one starts slow, one has to do more towards the end of the period leading up to 2020 or apply the limited exemption (see chapter I.5.2.1).

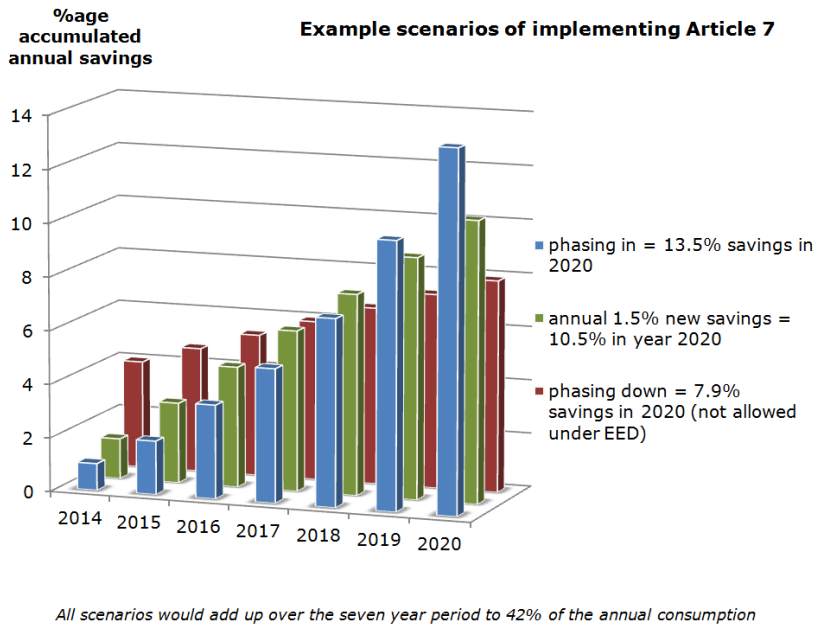

Figure 11 – Illustration of the equivalency conditions to be met: the 10.5% savings by 2020

This equivalence is also essential to ensure that Article 7 is coherent with and contributes to meeting the EU 20% target in 2020 (Article 1) and the indicative national targets (Article 3).

MSs may deliver these savings in any end-use sector(s) they wish via an obligation scheme on energy companies or through other means (more details in chapter II.1).

It should be noted that the Article 7 targets, and the means that MSs adopt to reach them, represent by far the largest portion of the elements in the EED towards meeting the EU 20% target (see Figure 12).

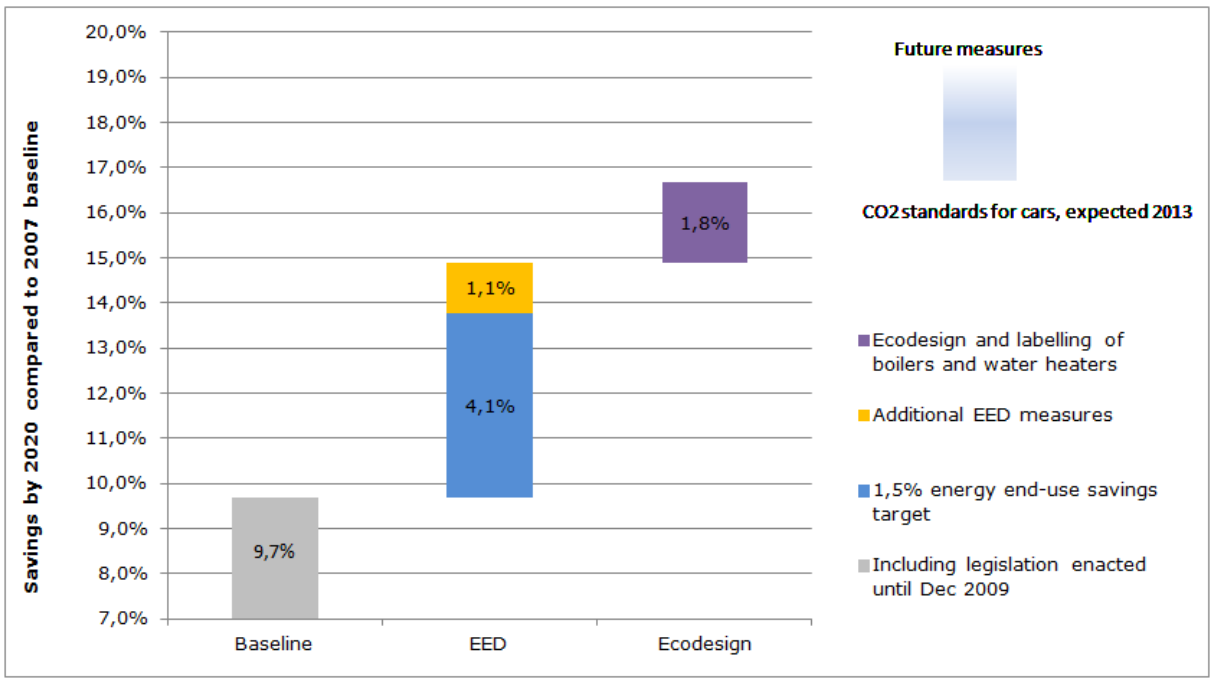

Figure 12 – Relative savings contributions from different elements of the EED and further EU measures in the pipeline in relation to EU 2020 target

I.5.2 Calculation of the energy end-use savings target volume

As laid out in Article 7.1, the scope for calculating the 1.5% target (i.e. the average annual energy sales volume base against which it is calculated) covers all final energy sales to final customers of all energy distributors or all retail energy sales companies, with some exceptions:

- Energy that is not sold (in-house consumption of own energy generated); and
- The sales of energy used in transport (may be partially or fully excluded, as discussed in I.5.2.1).

When it comes to delivering the savings, the target is not sector-specific. MSs and/or obligated parties may choose where to deliver the required amount of end-use savings.

The 1.5% target implies both a total amount of energy savings over the obligation period and a year-on-year accumulation of new savings:

- The total amount of energy savings over the obligation period must be at least equivalent 1.5% savings per year (Figure 11). But Member States are not confined to a linear trajectory and may decide how the calculated quantity of savings will be phased over the period. In practice this allows for the necessary learning period for such large-scale schemes.
- The design of annual targets must ensure that the incremental effect is equivalent to that of adding an additional 1.5% new savings volume each year, i.e. the volume of obligated savings is increasing year after year ("old" savings must keep delivering, be renewed or replaced, which requires considering the lifetime of savings).

Lifetime of savings

When calculating this target, it is essential that savings lifetimes are accurate and do not lead to a reduction of the amount of real savings to deliver.

The goal of the interventions MSs make as a result of the EED should be to deliver long-term structural changes which make their infrastructure, processes and citizens' lifestyles progressively more efficient. In this respect it is important not to simply consider the savings volume as a one-off obligation to be achieved as quickly as possible through quick-fix, short-term savings which will stop delivering partway through (or even at the end of) the seven-year period.

I.5.2.1 Exemptions

Partial or full exclusion of energy used in transport from the target volume (Article 7.1)

The EED allows sales of energy to transport to be excluded from the base against which the target is calculated. The impact of this exemption varies considerably from one MS to the other; it is high for insular MSs and low for more central MSs or those with a very energy intensive industry. For instance a full exclusion of sales to transport would have the effect of reducing the savings target by more than 60% for Malta and Luxembourg, by more than 50% for Cyprus, by more than 40% for Greece, Spain, Portugal and Ireland and by less than 30% for most other MSs (see Table 2).

Other exemptions (Article 7.2)

The exemptions listed below (phasing in, exclusion of energy sold to the emissions trading scheme (ETS) industry, supply side savings and early actions) may be combined but cannot lead to a collective reduction of more than 25% of the target as defined in Article 7.1.

For example, a country might choose to exclude energy sold to its ETS sector or count early actions or a combination of both as long as it does not exceed 25%.

Article 7.2 provides several possible exemptions that lower the target volume, to a limited degree:

- MSs may choose to progressively phase in the 1.5% target: 1% in 2014 and 2015, 1.25% in 2016 and 2017 and 1.5% in 2018, 2019 and 2020. In practice this means using a lower percentage to calculate the full amount of savings that must be delivered over the 2014-2020 period (Article 7.2(a)). The full use of this progressive phase-in would result in a target that is equivalent to a 1.29% annual savings, i.e. a 14% reduction of the target[12].
- Member States may exclude part or all of the energy sold to ETS industries from the calculation (Article 7.2(b)).

The other exemptions set out in Article 7.2 reduce the amount of real end-use savings to be delivered – and therefore further reduce the target:

- The target defined in Article 7.1 is intended to be delivered through end-use energy savings. However there is a limited possibility to count savings achieved in the energy transformation, distribution and transmission sectors towards the target under Articles 14 and 15.
- Savings resulting from energy saving actions newly implemented between 31 December 2008 and the beginning of the obligation period that continue to have an impact in 2020 can be counted against the target.

Watch out!

Article 7.7(c) allows obligated energy companies to bank and borrow delivered savings over a certain period of time. But this must not impact the overall target set by Article 7.1. Since it is effectively another means of counting early action, this provision must not be used by MSs on top of the 25% exemption 'bundle'. Doing so would significantly reduce the amount of actual new, additional savings realised during the 2014-2020 period and undermine the effectiveness of the Article. In the United Kingdom it would reduce the minimum target (after full use of exemptions) by another 2,338 toe to 4,675 toe.

The possible use of exemptions is supposed to help MSs design the most appropriate target to trigger their specific national potentials. Fully using the 25% exemption would, however, prevent an optimal approach to the EED requirements. Article 7 holds the greatest potential to contribute to the Article 3 targets, since it requires a reliable

[12] This would mean that an MS choosing to use this option in full would have to limit their use of the other exemptions permitted in Article 7.2 in order to not lower the target by more than 11%, since the exemptions in Article 7.2 must not reduce the target by more than 25%.

measurement and verification framework to be put in place and may be met using self-financing measures (see chapter II.2). Amongst the flexibility mechanisms that can be used in the context of Article 7, it should be noted that an ambitious implementation of Articles 14 and 15 (the supply side measures) would be less detrimental than the other exemptions, as the actual energy savings resulting from their implementation help reach the indicative national target set under Article 3. Note that the volume of the indicative national target cannot be reduced through exemptions.

I.5.2.2 Energy end-use savings targets and resulting EU savings

Table 2 provides the different energy end-use savings targets in ktoe final energy with maximum use of exemptions and the resulting savings for the EU in 2020 based on their average consumption between 2008 and 2010.

The data are based on Eurostat figures. The maximum scope of the national Article 7 targets should equate to the total final energy consumption of 1146 Mtoe in all 27 MSs. The sum of the resulting energy end-use savings targets would be equivalent to 120 Mtoe energy savings in the EU by 2020 (10.5% of baseline) and 481 Mtoe of cumulative energy savings over the whole period 2014-2020 (42% of the base line).

The energy end-use savings targets are subject to a series of exemptions that may be used to reduce the actual amount of energy end-use savings to be delivered. If exemptions become the rule (for example, excluding transport energy from the calculation of the target and using the maximum 25% through counting savings from early actions), the overall result for the EU would drop to 61 Mtoe by 2020, which means only 5.3% savings would be realised by 2020 or 245 Mtoe over the whole period (21% of the baseline).

Figure 13 shows the possible effect of using exemptions on closing the gap to the EU 20% energy savings target.

Energy end–use savings in ktoe final energy by 2020, baseline=average annual consumption 2008-2010			
	Without exemptions	**Excluding transport from baseline: see I.5.2.1**	**Excluding transport and full use of 25%: see I.5.2.1**
Austria	2,874	1,958	1,468
Belgium	3,795	2,652	1,989
Bulgaria	954	642	482
Cyprus	204	95	71
Czech Republic	2,649	1,961	1,471
Denmark	1,605	1,048	786
Estonia	305	223	168
Finland	2,682	2,167	1,625
France	16,566	11,267	8,450
Germany	22,899	16,426	12,319
Greece	2,129	1,222	916
Hungary	1,755	1,264	948
Ireland	1,285	766	575
Italy	13,094	8,601	6,450
Latvia	437	309	232
Lithuania	504	333	250
Luxembourg	445	172	129
Malta	48	19	15
Netherlands	5,442	3,828	2,871
Poland	6,640	4,874	3,656
Portugal	1,921	1,147	861
Romania	2,434	1,884	1,413
Spain	9,626	5,584	4,188
Slovenia	526	329	247
Slovakia	1,149	877	658
Sweden	3,444	2,535	1,902
United Kingdom	14,963	9,350	7,013
EU 27	120,374	81,535	61,152

Table 2 – Result of target calculations for each MS considering the possible exemptions

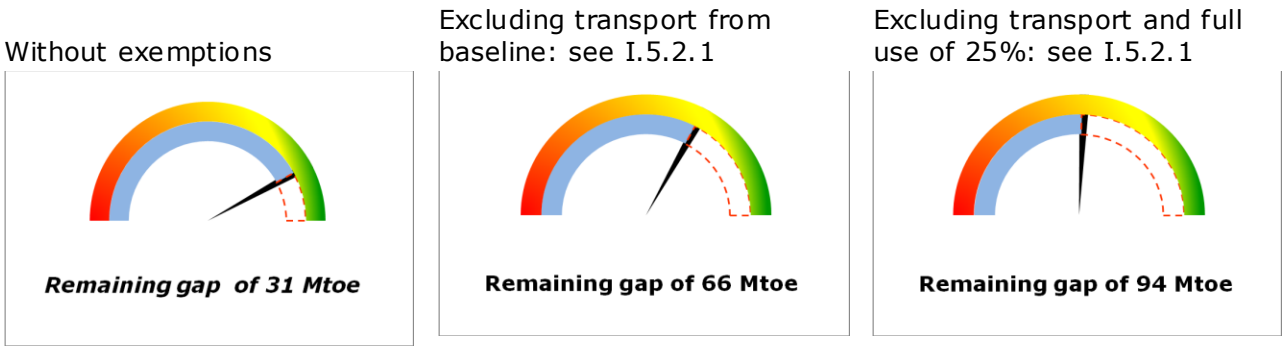

Figure 13 – Impact of use of exemptions on closing EU target gap in Mtoe primary energy

I.5.3 Reporting and enforcement

MSs must calculate their target upfront and submit both the target and their plans to deliver it to the Commission by 5 December 2013. They must also note whether and which of the exemptions under the 25% flexibility clause they intend to use by 5 June 2014 (Article 7.3).

This target will be legally binding for each MS. If they fail to meet it the Commission will be able to launch infringement proceedings.

MSs are required to put in place measurement, control and verification systems under which at least a statistically significant proportion and representative sample of the energy efficiency improvement measures is verified.

MSs already had a 1% annual indicative target under the 2006 Energy Services Directive. In effect this target is a continuation of that up until 2020, with a similar volume (the ETS industry is included but transport is excluded, and each represent a similar portion of EU energy use) but made legally binding.

I.5.4 2016 Review

The Commission will submit a report to the European Parliament and Council on the implementation of Article 7 by 30 June 2016. If appropriate this will be accompanied by legislative proposals to change or extend the lifetime of the target, review the provisions on how to calculate the target and which exemptions are allowed and propose new measures.

I.5.5 Legal checks and recommendations

Legal checks

1. Challenge a possible use of the banking and borrowing possibilities for Energy Efficiency Obligation schemes (see Article 7.7(c)) which would reduce the energy end-use savings target but be in breach of the law, in the Coalition's opinion.

Good practice recommendations

1. Request the minimum use of exemptions, namely the exclusion of transport from the base against which the savings volume is calculated or discounting savings realised in the past (early actions).
2. Ask for information on how the target contributes to meeting the national target in 2020 (see Article 3.1) and realises remaining cost-effective potentials (see Article 3.1(a)).
3. Stress the benefits of putting in place progressively increasing energy savings, thereby keeping an outlook on energy end-use savings targets that are likely to be set for after 2020.

II REACHING THE TARGETS

Part II details the main elements of the EED, providing a background for each of the subject areas, the requirements of the EED and recommendations for effective implementation and monitoring. Because many subject areas are covered by more than one article, each is treated separately here. Part II starts by reviewing Energy Efficiency Obligations, then follows with the public sector and energy audits, and ends with a discussion of supply side efficiency and demand response.

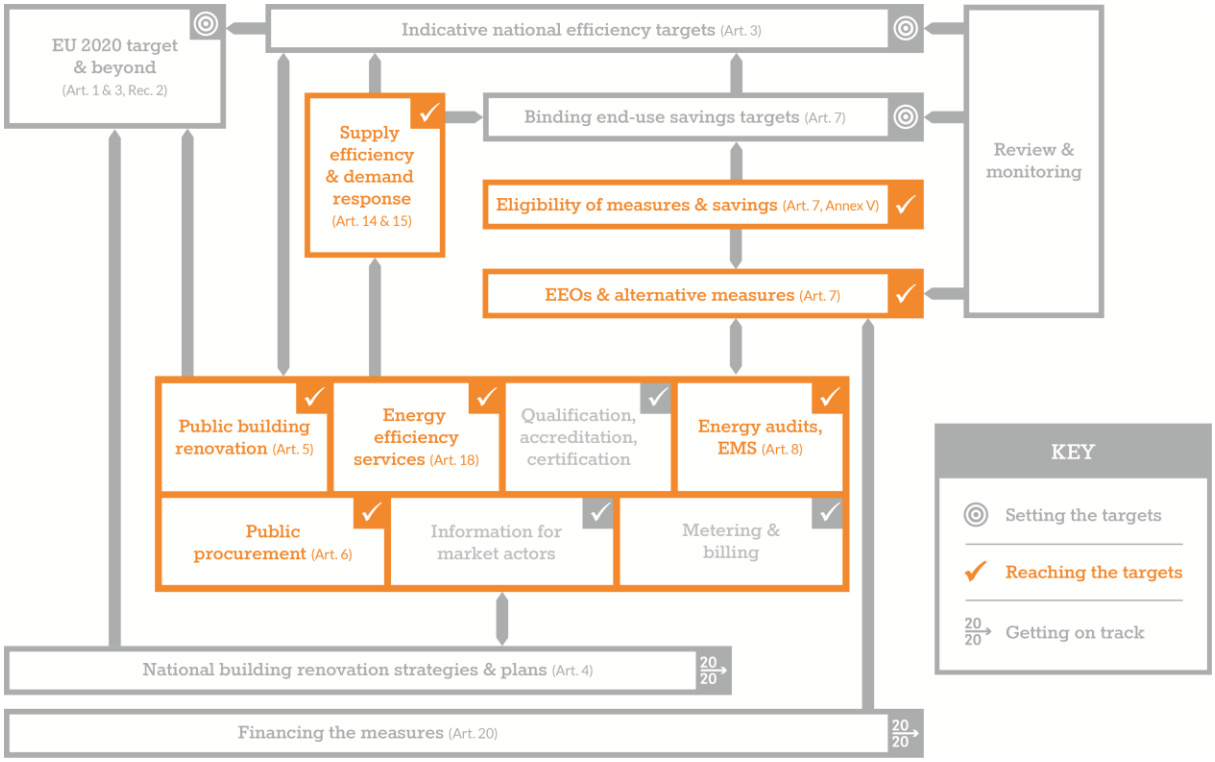

Figure 14 – Guidebook Overview Map: Reaching targets and objectives

II.1 Eligibility of measures for the energy end-use savings target (Article 7, Annex V)

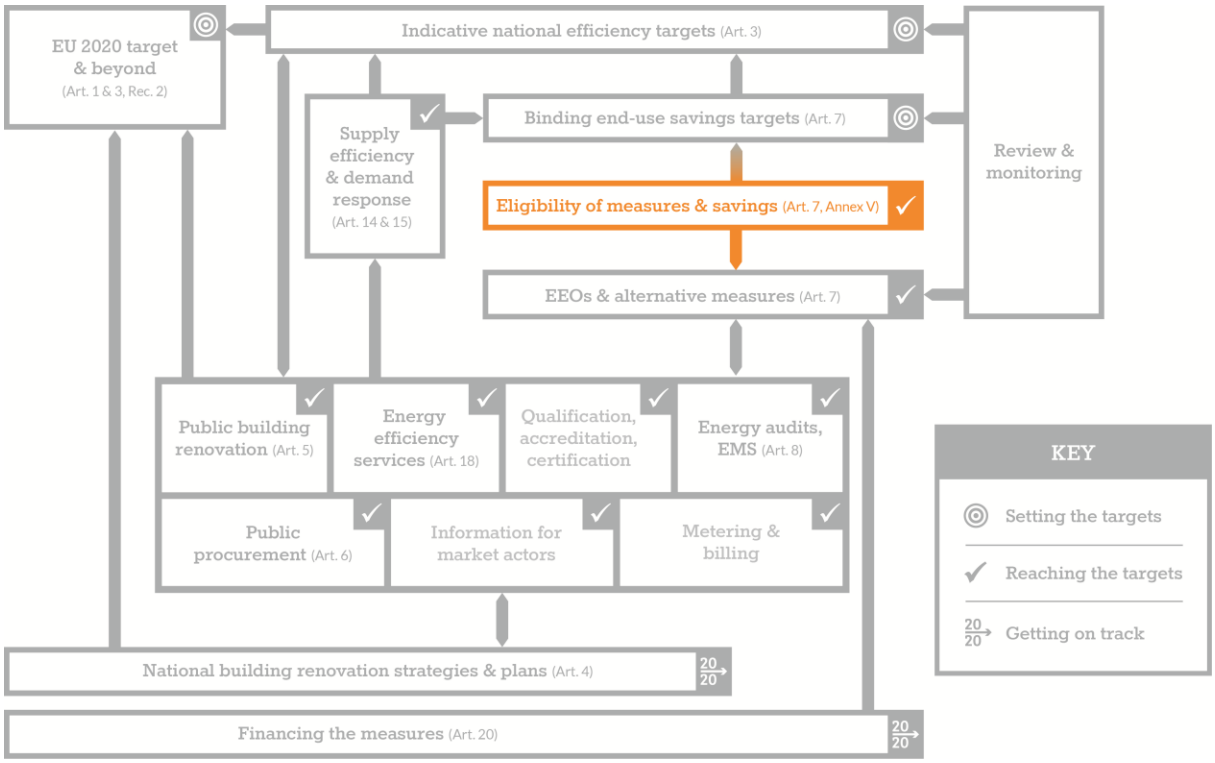

Figure 15 – Guidebook Overview Map: Eligibility of measures

II.1.1 Summary

Article 7 not only requires MSs to set an energy end-use savings target for the period 2014-2020, but also puts in place the criteria and conditions for eligible measures and how savings can be counted towards the target. Only if those measurement and verification requirements as set out in Article 7 and Annex V are strictly applied will MSs be able to count their energy savings towards the target defined in Article 7.1.

Only new savings, that is, savings resulting from additional energy end-use efficiency measures during the period 2014-20 that are above the baseline, are eligible to be counted towards meeting the energy end-use savings target. In addition savings must be the result of measures with the explicit aim to improve energy efficiency. This can then also include pricing or transport measures, even if, in the latter case, MSs make use of the possibility to exclude that sector when calculating and thus reducing the target, though this could be challenged from a policy coherence perspective.

Note also that, because the 1.5% target is cumulative, the energy efficiency measure has to deliver savings up to 2020 – otherwise additional measures will have to be put in place to replace the lost savings. For example, a low flow showerhead installed in 2014 with a lifetime of 5 years would stop delivering savings in 2019, so action would have to be taken at that time to "replace" this portion of the cumulative target.

MSs will need a system to ensure that measures are not claimed twice towards the energy end-use savings target by different delivery partners or when different policy measures are contributing to making the same measure happen.

MSs should consider energy efficiency measures in terms of their lifetime energy savings as this will be the most cost-effective technique to progress on the pathway to the 2030 and 2050 targets. As lifetime savings are derived from an annual energy saving multiplied by the lifetime with future savings frequently discounted at a societal discount

rate, it is straightforward to establish the annual energy savings in the period to meet the energy end-use savings target. Existing programmes have shown that taking a long-term approach, with regular reviews, works well.

For more details about how savings can be counted towards the Article 7 end-use savings target, refer to Annex B.

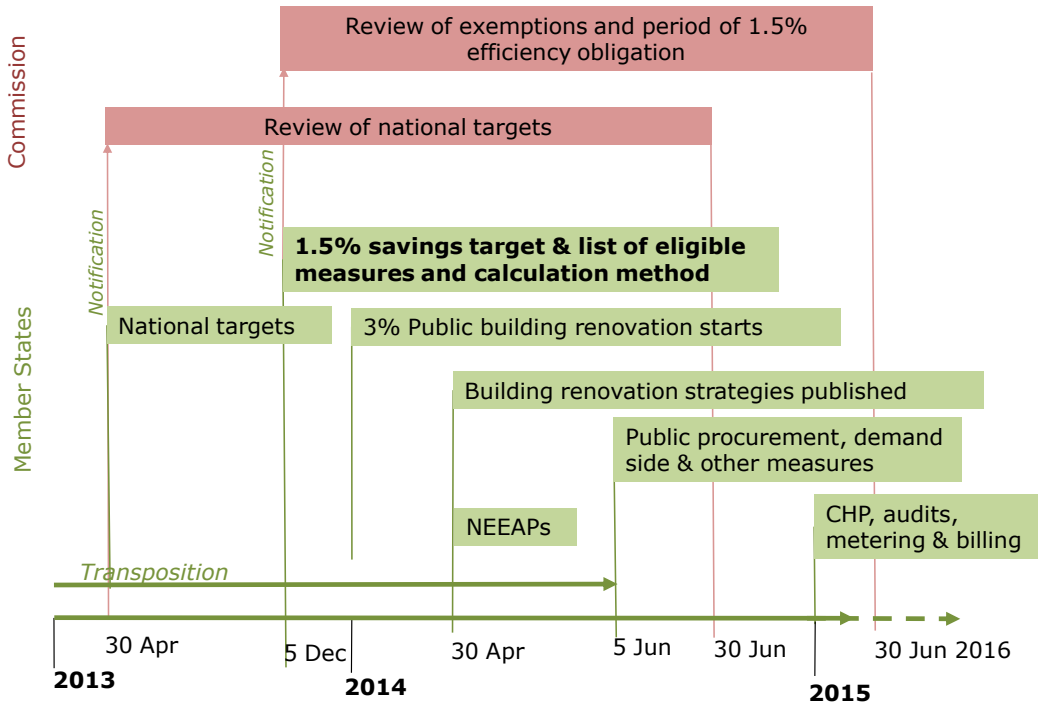

Figure 16 – Relevant deadlines regarding measures in this part of the guide (in bold)

II.1.2 Challenges

Only savings beyond "business as usual" are eligible. The following are challenges that may be encountered with deciding which savings are eligible and how they are counted:

- **A vague baseline (see also Annex B)**
    - Regulatory requirements are to be included in the baseline. This includes regulations for new buildings and major renovations resulting from the Energy Performance of Buildings Directive, which should in principle be benchmarked in accordance with the cost-optimal calculation methodology as set out in Commission Delegated Regulation (EU) No 244/2012. Only regulations above that level would be eligible to be counted as savings. However, policy measures, including financial support, that increase the rate of new build or renovation may be eligible to be counted as delivering energy savings even if they are based on energy performance requirements that simply meet the cost-optimal level.
    - In the field of energy efficient appliances and products, the Ecodesign Directive sets minimum energy performance standards in a variety of applications. In all cases, only energy efficiency improvements encouraged beyond these minimum requirements may be counted for additional and new energy savings unless higher standards exist already in the marketplace.
    - A scrapping scheme for replacing products with more efficient ones within market average might only deliver eligible savings for a short period of

time until replacement would have been necessary. In the case of short-lived products or efficiency requirements set by the EU, the eligible savings might become negligible and will be significant only if attached to products performing above regulatory standards and the market average.

- Support schemes for building efficiency improvement measures will have free riders, or people who would have undertaken the work anyway. Those have to be discounted by using a baseline for ongoing efficiency improvement works.

- **Double counting**. In France and Italy, for example, some energy efficiency measures are supported by energy retailers and the end user is eligible for a tax break. For EED purposes, the measure can only be counted once. In general any pricing measure for efficiency (an energy tax which provides a general incentive for consumers to take efficiency measures, for example), can be expected to overlap in its effect with specific support programmes, like financial or fiscal incentives for building refurbishment and product replacements. A simple adding up of deemed savings from those different measures is therefore not correct. A method for calculating the effect of overlapping or double counting of the impacts that results from separate impact assessments of the two measures is necessary. In this calculation, there may also be some positive synergy effects to be taken into account.

- **Not all policy measures are eligible**. To count towards the target, savings must be the result of an efficiency obligation scheme or other policy measures (Article 7.9), with the explicit aim to improve energy efficiency according to the definition set out in Article 2.18:

  > *"'policy measure' means a regulatory, financial, fiscal, voluntary or information provision instrument formally established and implemented in a Member State to create a supportive framework, requirement or incentive for market actors to provide and purchase energy services and to undertake other energy efficiency improvement measures"*

  Under this interpretation, any energy or a carbon tax would only qualify as a policy measure if its explicit aim is to increase energy efficiency. It is also clear that general taxation such as road or network charges, value added tax or taxes introduced to support other energy policy objectives (such as a feed-in tariff for renewables) would not count, any more than would price fluctuations of energy due to world market conditions or business cycles. Increases and reductions in VAT, even when energy is included in their scope, are not considered eligible measures, because of the fiscal design of VAT and for the same reasons as other exogenous price changes.

- **Short lived and decreasing impact of pricing policies, like taxation.** The size of any energy savings resulting from pricing policies designed to increase energy efficiency are governed by the product of the percentage increase through pricing measures, like energy or CO_2 taxation, from previous levels and the price elasticity. Among the principles stated in the EED for the use of price elasticities is that they should use "recent and representative official data" (Annex V.3(b)). Alone, this is inadequate guidance, as price elasticities can be measured in a variety of ways, and the range of results from individual studies is large. Most reliable evidence comes from expert reviews or "meta-analyses" that assess a range of different empirical studies. These are relatively few in number (see Annex B for examples and literature).

  Elasticities are calculated on the basis of empirical price and consumption data, within a framework econometric or correlation analysis. The results are, in actual fact, to a large extent determined by how the data sets reflect the availability and costs of technological or other substitutes during the analysis period. It is the substitution of energy through the implementation of existing or newly developed technologies and techniques that allow reduction of energy consumption. The

amount of time that is taken into account for this substitution to take place is also a crucial factor in determining the size of the elasticity or response.

The key methodological issue is thus the choice between long- and short-run price elasticities. In essence, short-run elasticities measure the effect of change of consumer behaviour on substitution, using technology from the existing stock of capital (vehicles, buildings, appliances, etc.). Long-run elasticities allow for the effect of consumer prices on the development of the capital stock as it changes and improves over time (as equipment suppliers react to the changing balance in capital and fuel costs). Long-run elasticities are larger (more negative) as they incorporate the short-run effect as well as allowing changes in the capital stock. For the purposes of the EED, there are two reasons why lower, short run elasticities should be used:

1. Significant changes in capital stock resulting from policy-induced price changes are unlikely to occur within the timeframe of the EED (2014-2020). Most energy-using capital equipment has a relatively long planning horizon and lifetime. It takes years for the equipment suppliers to develop improved designs, re-tool manufacturing plants and roll out new products through the relevant supply chains. Within the obligation period, price-induced changes in the capital stock as a whole will therefore be small.

2. In most cases, the efficiency of energy using capital plant and equipment is heavily affected by requirements of other European Directives, in particular for light vehicles (under EC Regulation No 443/2009), buildings (under the Energy Performance of Building Directive 2010/31/EU and consequential building regulations in MSs) and appliances (under the Ecodesign Directive 2009/125/EC and the Labelling Directive 2010/30/EU).

   In practice, these regulatory requirements will drive new product efficiency rather than energy taxes. As it is highly likely that there will be forthcoming EU directives which will further improve the energy performance of vehicles, buildings and appliances, this represents the capital stock improvements mentioned above. Consequently, the use of long-run price elasticities of demand would likely breach the provisions of Annex V.2(a) and risk double counting of energy savings in breach of Article 7.12.

In addition, studies indicate that price elasticities are not linear[13]. This means that several incremental price changes over a longer period of time cannot necessarily be added. Such small price changes as annual tax increases may have an accumulated effect that is still very low because the changes are adapted to (absorbed) rather than substituted for, while single large, highly visible price changes of the same total magnitude can have a more proportionate impact.
This means that energy savings from pricing policies prior to 2014 are unlikely to produce significant savings during the obligation period of 2014-2020 under early actions. It also means that the savings would not accumulate and would contribute very little to the target of 10.5% savings in the year 2020, unless the pricing measure is increasing constantly, substantially and predictably in at least real price terms. If the pricing measure is kept at a constant price level, the savings effect is diminished. If during this period, disposable income is also rising, the impact of the price increase becomes even less than the price elasticities would indicate.

- **Fuel switching effects**. At the end user level, a fairly common fuel switch occurs with heating systems, when, for example, a gas boiler is replaced with an electric system. In Europe, an average 2.5 kWh of primary fuels are necessary to deliver

[13] Rittenberg, L. and Tregarthen, T., 'The Price Elasticity of Demand', *Principles of Microeconomics*, Web Books Publishing, 2010, chapter 5.1.

1 kWh of electricity, meaning that only an electric heating system that reduces end-use energy by a factor above 2.5 would deliver eligible savings.

Another type of fuel switch occurs when the high-efficiency cogeneration and/or efficient district heating and cooling (DHC) have a lower primary energy factor than the previous solution. This conversion leads to verifiable reduced primary energy consumption. For example, if the efficient combined heat and power (CHP) or DHC has a primary energy factor of around 1 or lower[14], this means that a conversion from electric heating with an assumed primary energy factor of 2.5 to efficient CHP or DHC can lead to a reduced primary energy consumption of 1/2.5 or 60% or more. This is a primary energy savings, and eligible under paragraph 2 of Article 7 as an energy efficiency improvement measure in the transformation sector, provided it does not lead, together with other eligible measures under paragraph 2, to a reduction of more than 25% of the amount of energy savings, as referred to in paragraphs 1 and 3 of Article 7, for fulfilling the 1.5% annual target[15].

By the same token, primary energy savings resulting from fuel switching which contribute to transforming non-efficient DHC/CHP into efficient DHC/CHP should also be considered as eligible measures under Article 7.2, if MSs decide to make use of exemptions under Article 7.2.

In any case, only proven and verified primary energy savings resulting from fuel switching should be considered as an eligible measure.

II.1.3 Legal checks

Legal checks

1. **Ask for access and give attention to the methodology for calculating the impact of efficiency measures for the target achievement, which is due 5 December 2013 (see EED Annex V).**
2. **Check whether the methodology meets the following minimum standards:**
   - Additionality: Only savings which would not have happened anyway and are additional to a baseline (see Article 7.1 wording for 'new savings' and Annex V.2(a)) can count toward the target. This means that in particular the following savings must be excluded:
     - savings resulting from EU standards for products, such as cars, vans, boilers and electric motors, or buildings (see Article 7.9(d) and Annex V.2(a)); and
     - savings from taxation measures which do not exceed EU minimum levels and whose impact is not verified using recent data on price elasticity (see Annex V.3 and the caveats listed above regarding the calculation and use of elasticities).
   - New savings and materiality: only savings from policy measures with the objective of improving energy efficiency (Article 2.18) realised during 2014-2020 (Annex V.2(e)), which are material to new activities (Annex V.2(c)) and are not counted twice (see Annex V.2(d)) are eligible to count toward the

[14] This is the case on average – to be verified case by case.
[15] To ensure comparability and to differentiate between fuel switching effects and energy savings, refer to Annex IV of the EED for relevant conversion factors. In this context, also to ensure system efficiency, the difference between "energy", "exergy" and "anergy" should be borne in mind. "Exergy" is the part of an energy flow that yields high-grade energy or capacity to carry out work, for example to power mechanical processes. "Anergy" is what is left, or the low-value part of an energy flow. The bulk of waste heat from power plants, for instance, is anergy. Efficiency in energy-consuming structures calls for minimum use of high-value energy (exergy) and maximum use of low-value energy (anergy). Low-value anergy sources can be used in a rational, environmentally sustainable way for heating and cooling, thus saving high-value exergy for appliances and lighting. See "Energy = Exergy+Anergy: a foruma for energy-efficient buildings", *OPEN Energy Technology Bulletin*, International Energy Agency (IEA), Issue No. 35, 05.07.2006.

target. Existing programmes that are expanded in scope or level of activity may, however, be considered to fulfil additionality criteria.

3. **Ensure that the conversion factors (see Article 21 and EED Annex IV) are applied to ensure comparability of savings and to prevent "fake" savings from fuel switching.**

II.2 Energy efficiency obligation schemes & alternatives (Article 7)

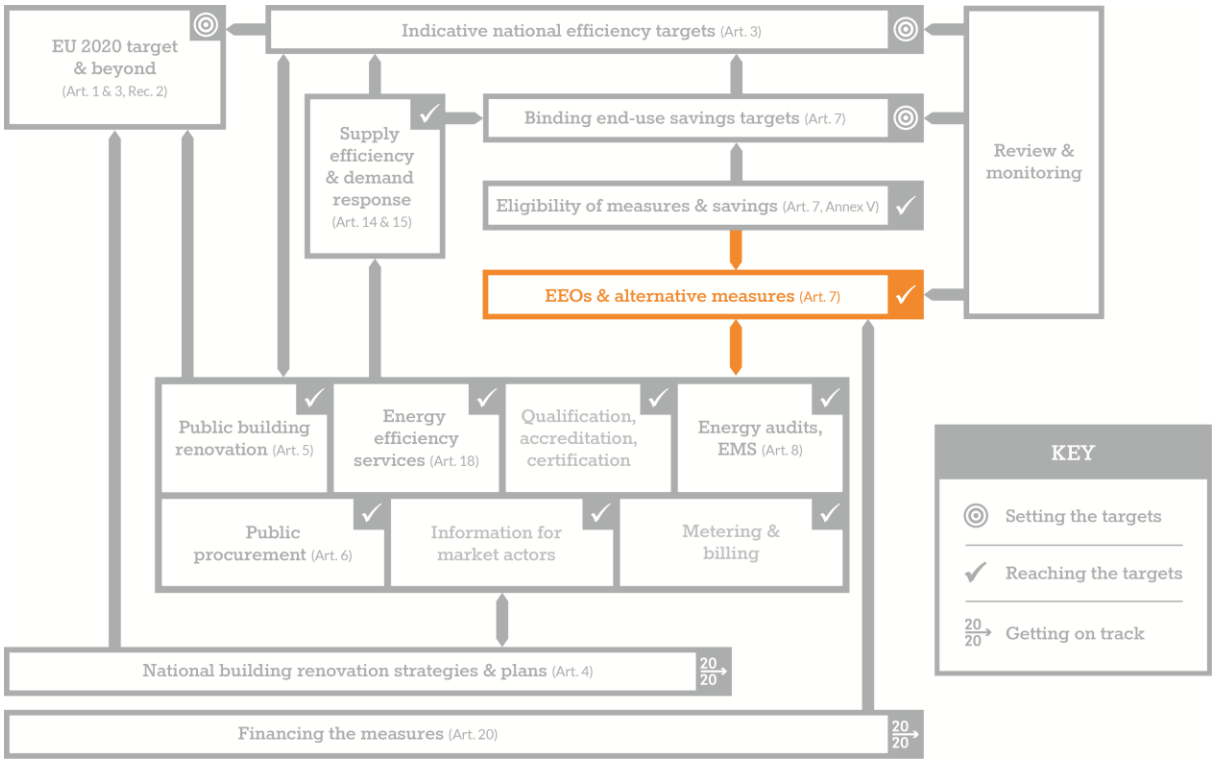

Figure 17 – Guidebook Overview Map: EEOs

II.2.1 Summary

Essential for the EED is the binding energy end-use savings target up to and including the year 2020, as set out in Article 7.1 (see chapter I.5). The subject of chapter II.2 is the vehicle or mechanism through which these savings are delivered. One important mechanism set out in Article 7 is to establish an energy efficiency obligation (EEO), with the intention to boost the market for energy efficiency services. MSs may, however, opt for alternative mechanisms and measures including taxation schemes, Energy Efficiency Funds (see EED Article 20 and chapter III.2 of this guide), regulations and standards or other efficiency-promoting tools that exceed EU norms.

Under an EEO, some part of the company has an obligation to save energy in end-use customers' premises or homes. Financial penalties will be incurred if they fail to deliver those savings. In this way, an actor which has both legitimacy and competence in energy matters and access to end users is clearly tasked with the responsibility to carry out efficiency actions, or to delegate this to a third party.

Such schemes can have a transformative effect on the role and activities of energy companies, as well as opening up an internal market for energy services. If used effectively, EEOs can play a key role in delivering and financing other measures, including the long-term renovation of the building stock (Article 4).

There are many different modalities in the design and operation of an EEO. In any case they all have to ensure target achievement using robust measurement and verification. Good practices include the following:

- MSs should clearly define the roles within the EEO and set the energy savings target for the obliged parties.

- Energy regulators should establish regulatory mechanisms to enable energy providers under an EEO to recover the costs of meeting its targets, if the EEO is placed on a regulated part of the energy company or if the price of energy is regulated.
- EEO administrators should ensure that any obligation introduced will recognise the importance of low-income households both in the way that the costs are passed through and also in ensuring that they are not neglected in actual energy efficiency measures installed.
- MSs must clearly set out how equivalence will be established and that the levy mechanism is transparent to and fair on all obligated parties, if they decide to permit obligated parties to pay into an Energy Efficiency Fund rather than undertake energy savings measures directly.
- MSs should endeavour to achieve the greatest synergies possible between their EEOs and other energy savings policies.

Whether MSs opt for an EEO or an alternative approach, the actions undertaken under it, and therefore expected to count towards meeting the Article 7 target, must meet certain standards of quality and additionality. More details on this can be found in chapter II.1 and in Annex B. Key recommendations are that:

- In order to engender a long-term perspective for savings delivery under Article 7, the "sunset date" for the 1.5% target, after which no new savings are required, should be removed when the Commission reviews Article 7 in 2016. In the meantime, MSs should ensure that the value of longer-lived measures is fully reflected in the accounting system used.
- Methods for measuring energy savings and ensuring additionality should follow international best practice.
- MSs will need to set up a system to ensure that energy efficiency measures are not claimed twice towards the energy end-use savings target by different delivery partners or double counted where different policy measures are contributing to making the measure happen.

II.2.2 Background

II.2.2.1 *What they are and how they work*

EEOs on energy retailers (also known as suppliers) or distributors have been used in certain EU countries since the 1990s. To date, there are seven MSs with existing or imminent EEOs[16]. The longest running have all been evaluated by their governments and subsequently expanded in recent years. Around €2.5 billion per year is now being spent by energy companies in the EU to deliver energy efficiency under EEOs. This figure still only represents between 1 and 4.5% of the energy bill to customers depending on the MS[17].

Governments set the overall targets for the EEO and the scheme administrator (a government department, energy agency or energy regulator) shares out the target among the obligated companies. The target for any particular energy company is related to its market share in the volume of energy supplied or distributed by it. The EEO administrator is also responsible for approving the energy companies' actions or schemes on energy efficiency (including any product specification requirements); determining the energy savings at the completion of each scheme; verifying the claimed energy savings are valid and accurate; and taking enforcement action to ensure compliance with the EEO statutory order.

[16] UK, Italy, Denmark, the Flanders region of Belgium, France, Ireland and Poland.
[17] Lees, E., *Energy efficiency obligations – the EU experience*, European Council for an Energy Efficient Economy, 2012, p. 2.

In most MS EEOs, energy companies are not restricted to saving energy from their own customers; they can save energy from any eligible end-use customer. The key steps are to set a target, rules for determining the energy savings and procedures for monitoring and verifying that those measures have in fact been installed. Governments may also highlight or ring-fence any particular social or technological issue to which the MS wishes to give priority.

EEOs can be coupled with various trading options: trading of certified energy savings, trading of eligible measures without formal certification or trading of obligations. There is increasing innovation on how these schemes are developed and a growing body of best practice examples available globally to accelerate the development and deployment process[18].

Obliged entities can do the work directly themselves or outsource it to third parties.

EEOs have evolved from operating within vertically integrated electricity monopolies to operating in fully liberalised energy markets. Indeed, with some of the longer running obligations (Denmark, Italy and the UK) there is evidence that the retail arms of energy companies are developing energy service businesses alongside the traditional retail offering[19]. For example, British Gas has publically stated that they expect energy service income to match energy supply (retail) income in a few years[20].

EEOs offer a number of advantages beyond designating responsibility for ensuring efficiency actions are undertaken, including:

- Satisfying the "polluter pays" principle, as end users ultimately pay for the costs of the EEOs to energy companies (see II.2.2.3);
- Remaining independent of public expenditure, since financing comes ultimately from end users;
- Providing a more stable outlook that is not subject to changing government budgetary decisions;
- Creating a transformative effect on the market for energy services if the EEO design ensures that there is no abuse of market power by energy companies and that the market is open to third parties other than the obligated energy companies to participate; and
- Being a cost-effective solution. For example, the Danish Government has evaluated its various energy efficiency policies and concluded that the Danish EEO is one of the most cost effective[21].

Energy savings for specific energy actions can of course be directly measured and this happens in the larger energy using processes. However, in the EU, most of the delivered energy savings have come through the use of deemed or *ex ante* savings for specific energy efficiency measures. Such measures (insulation, moving a customer purchase from an A-rated appliance to an A+ appliance, installing a more efficient boiler or heat pump than the market average) have been technically proven to save energy and have been independently measured to establish the actual energy saving values. The power of this approach is that there are many end uses in all sectors which are both widespread and with well-proven energy savings. This deemed energy saving approach has the additional advantage of making monitoring and verification analogous to a financial audit (i.e. a sample of the claimed energy savings by the obligated energy company is independently verified by the EEO administrator to ensure that such an installation took place and is still in use).

Clearly, for the European Commission to have confidence in the energy savings arising from EEOs (or indeed any energy efficiency policy involving the deemed energy saving

[18] Regulatory Assistance Project, *Best Practices in Designing and Implementing Energy Efficiency Obligation Schemes*, 06.2012.
[19] Bang, U., *Kick starting the market for energy services by energy efficiency obligations*, 2012 [presentation].
[20] 'Sam Laidlaw, Chief Executive, Centrica: "The old utility business model is dead"', *Centrica*, 16.09.2012.
[21] Bang, U., *Kick starting the market for energy services by energy efficiency obligations*, 2012 [presentation], p.5.

approach), there needs to be evidence from MSs that they have in place robust and transparent processes to ensure that such deemed savings are proven, independently verified and real.

This also applies for the intermediate approach between deeming and directly measuring energy savings from specific actions via the scaled engineering estimate. For example if an industrial scale heat pump is known to save a certain amount of energy at a particular power rating, then engineering estimates can scale those savings to a heat pump with a different power rating in a similar application.

II.2.2.2 *Financing options*

The obvious costs involved with the installation of energy efficiency measures or the purchase of energy efficient products under an EEO are met by energy companies in the form of subsidies along with contributions from customers, landlords (especially social landlords), local authorities, charities, manufacturers and other actors. Evidence from existing EEOs can help to determine the level of subsidy needed to entice customers to take up efficiency measures, and how much they are likely to be willing to contribute themselves. There is an additional cost to the energy company for marketing, selling, reporting or planning their activities under the obligations.

Costs falling to the energy company are distinguished by the way that they are passed on to the end-use customers. If the EEO is on an energy retailer in a liberalised market, the cost of the EEO simply becomes a cost of business like other environmental requirements and will be passed on to the end customer, with competition ensuring that the energy companies deliver their obligations at the lowest cost possible. In contrast, if the EEO is on a regulated part of the energy company, such as a distributor or any supply price regulations in place, the costs are normally included in the regulated tariff that is charged to the end customers. However, the experience both within Europe and globally shows that over time, the EEO will save money on individual customers' bills and possibly all customers' bills by reducing peak demand and costs to the grid.

In Flanders, France and the UK, for example, requirements have been put in place to ensure that low-income customers are given priority. The UK requires that 40% of the energy company's savings comes from low-income households.

It is usually the role of the energy regulator to establish regulatory mechanisms that enable the energy providers to recover the costs of meeting EEO targets, if appropriate, and to remove perverse financial incentives for increased energy carried or penalties for reduced energy carried when setting the distribution and transmission price controls (refer to chapter II.6 or Article 15.4 of the EED)[22].

II.2.3 Challenges

The detailed operations of existing and planned EEOs in MSs reflect the local status of the energy market (liberalised or otherwise), the energy efficiency history of the energy companies, climate, energy saving opportunities and culture. The common principle is that some part of the energy provision chain is clearly obligated to deliver energy savings.

Historically in the EU, energy efficiency measures have largely been delivered by energy companies through bilateral contracts between an obligated company and an energy efficiency market actor, such as an insulation company, appliance retailers, manufacturers or heating installers, by outsourcing the delivery of the energy efficiency measures. The Italian and the French EEOs differ in that accredited parties, and not just the obligated energy companies, can earn White Certificates (the name for the energy saving certificate from the EEO administrator) in their own right and that these can be subsequently traded and ultimately bought by the obligated energy companies. Globally, the early EEOs operated in regulated (often integrated) utilities and required energy

[22] Regulatory Assistance Project, *Best Practices in Designing and Implementing Energy Efficiency Obligation Schemes*, June 2012.

savings to be made only in the regulated energy end uses. Nowadays, most EU EEOs permit the saving of any end-use fuel.

The European Commission's assessment of the possibility of establishing an EU White Certificate scheme showed that, in the current situation, such a system would create excessive administrative costs and risk concentrating energy savings in a number of MSs. The Commission concluded that the objective of such a scheme could be better achieved, at this stage, by means of national EEO schemes for energy utilities or other alternative policy measures that achieve the same amount of energy savings.

Perhaps more importantly, the existing EU EEOs have different rules for measuring energy savings and for dealing with the issues of deadweight or free riders (those end users that would have undertaken the efficiency measures even in the absence of the EEO). Greater use of best practices in determining energy savings in this area is clearly essential to achieve the EED objectives as set out in the eceee and RAP report[23].

There is growing recognition that setting a target for which only the first year's energy savings[24] from a measure are counted results in undervaluing measures with longer lifetimes. For example, an insulated structure can have a 30- to 40-year lifetime, compared to a ten- to twelve-year lifetime for an appliance. If the target counts first-year energy savings only, the three to four times longer lifetime of insulation is not valued in terms of the total energy savings realised. There will thus be a commercial incentive for the energy company to invest in the shorter lived measures rather than the longer, more cost-effective energy saving measures. To counteract this problem Denmark has introduced weighting factors dependent on the lifetime of the energy efficiency measure, and Italy has introduced lifetime recognition to value longer lived measures. France and the UK consider lifetime energy savings.

Finally, to avoid "stop-go" market activity for the energy efficiency industry, it has been good practice to permit the banking of energy savings from one phase of the EEO to the next[25]. Some EEOs permit borrowing of energy savings from one phase to the next, meaning they have to deliver both the shortfall from the first phase and the energy savings target of the second phase. Such banking and borrowing is explicitly recognised in EED Article 7.7(c) and should not be confused with the requirements on MSs to deliver the Article 7.1 target from individual actions that take place between 2014 and 2020. This must not be used by MSs *on top* of the 25% exemption bundle. Doing so would significantly reduce the amount of actual new, additional savings realised during the 2014-2020 period and greatly undermine the effectiveness of the Article. In the case of the UK it would reduce the minimum target (after full use of exemptions) by another 2,388 toe to 4,675 toe.

II.2.4 Alternatives to EEOs

It is important to first note that alternative measures will miss out on the previously mentioned transformative effect on energy companies (see chapter II.2.2.1) that is associated with EEOs.

The EED permits delivery of part or all of the target by alternative measures that have the effect of reducing end-use consumption (Article 7.9). These include:

- Energy or carbon taxes;
- Financing instruments or fiscal incentives;
- Regulations or voluntary agreements;

[23] Lees, E. and Staniaszek, D., *Determining Energy Savings for Energy Efficiency Obligation Schemes*, European Council for an Energy Efficiency Economy and the Regulatory Assistance Project, 04.2012.

[24] As was historically the case in Italy until November 2011 and Denmark until January 2011, the savings were counted over a five- to eight-year period depending on the measure.

[25] Before banking was introduced in the UK's EEO, the energy retailers met their targets early and ceased installing insulation measures for the phase ending in 2000. This reduced insulation industry activity by 20% compared to the previous twelve months. As the industry had invested in expected increased activity (doubling of the target) this resulted in redundancies in the insulation industry and took two years to restore activity to the earlier level.

- Standards and norms;
- Labelling schemes, which must be compliant with the EU Labelling Directive 2010/30/EU and conform to the principle in the EU energy label that sets requirements for energy-related products with the highest energy savings potential. Country-specific schemes cannot use the symbol A+ and must deliver savings equivalent to those obtained with an EEO; and
- Training and education.

Article 20 also may allow for the obligations to be fulfilled by annual contributions to the National Energy Efficiency Fund (refer to chapter III.2) of an amount equal to the investments required to achieve those obligations. This option opens up the market to other players and could amass an amount of funds that might attract projects from large actors likes cities.

If a fund is established, it is necessary to arrange access to it, clearly outline its use and figure out how to calculate equivalence. A more complete discussion on financing can be found in chapter III.2 of this guide.

Arguably, the obligation to deliver real energy savings within EEOs has been crucial to their success and any funds established should replicate these aspects. The important point is that whatever the policy option chosen, it must follow similar rules when it comes to determining the resulting amount of energy savings.

Irrespective of the alternative method chosen, the energy savings have to be determined in the same rigorous way as for the EEOs to ensure that the energy savings are eligible, correctly identified as counting towards the capped or uncapped parts of the target in Article 7.1 and, for those savings counting towards the uncapped part of that target, represent new and additional energy savings over policies enacted prior to 2014. Examples of how this might be achieved are given throughout this guidebook.

II.2.5 Legal checks and recommendations

Legal checks

1. Check that the distribution and transmission price controls put in place for EEOs are in line with the requirement to remove incentives which are detrimental to energy efficiency (see chapter II.6 and Article 15.4).

2. Check that a system is in place to ensure that energy efficiency measures are not claimed twice by different delivery partners or double counted where different policy measures are contributing to making the measure happen (see EED Annex V.2(d)).

3. Request explanation of how equivalence will be established if obligated parties are permitted to pay into an Energy Efficiency Fund rather than undertake energy savings measures directly (see Article 7.11, 20.6 and EED Annex V).

Good practice recommendations

1. Regardless of where the obligation is placed, ask the administrator and/or energy regulator to ensure that the costs of the EEOs to end-use customers and potential market players are transparent. This will enable a more market-like approach to the actual delivery of energy efficiency and serve as an aid to evaluating the cost effectiveness of EEOs.

2. Ask EEO administrators to ensure that any obligation introduced will recognise the importance of low-income households, both in the way that the costs are passed through and in not neglecting them in the actual energy efficiency measures installed.

3. Encourage MSs to endeavour to achieve the greatest synergies possible between their EEOs and other energy savings policies.

4. EEO administrators should ensure that the value of longer lived energy efficiency measures is fully reflected in the way that the EEO energy savings target is set.

II.3 Public building renovations (Article 5)

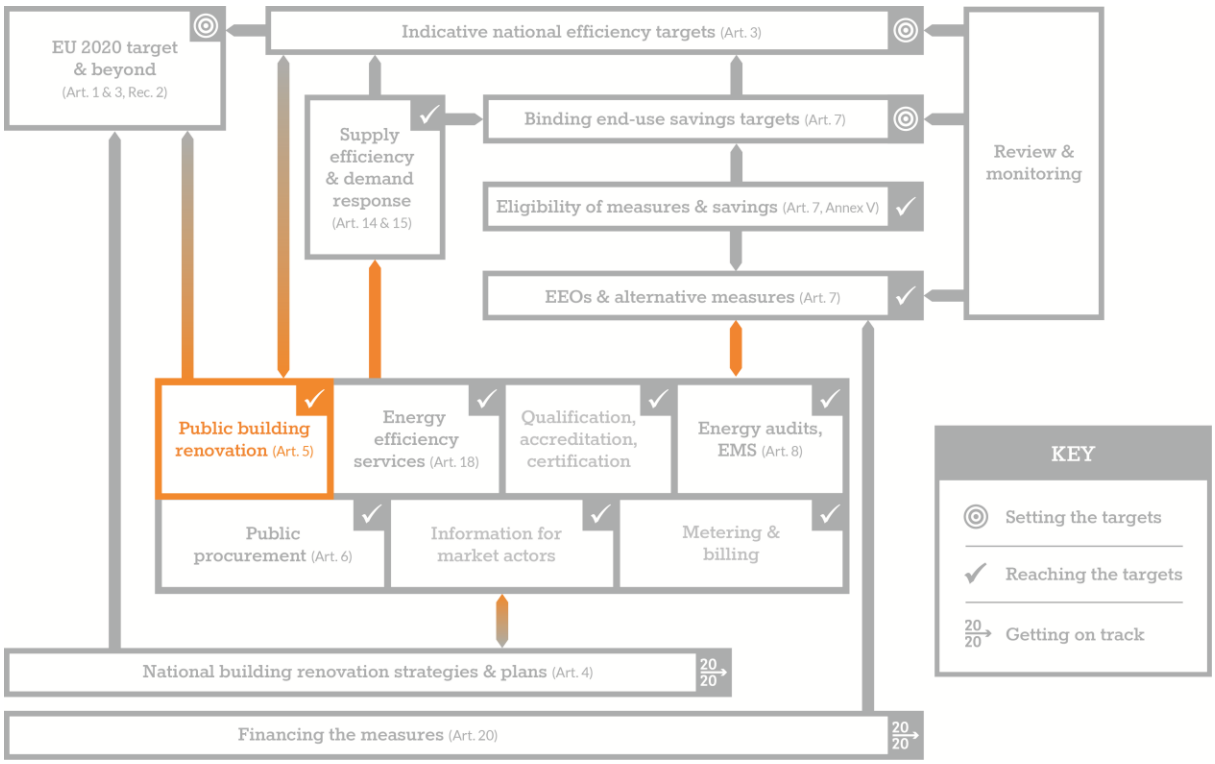

Figure 18 – Guidebook Overview Map: Public building renovation

II.3.1 Summary

The EED sets a 3% annual renovation target for public buildings owned and occupied by its central government from the beginning of 2014 onwards. Central government buildings are required to be renovated to meet at least the national minimum energy performance requirements set in application of Article 4 of the Energy Performance of Buildings Directive (EPBD). Going beyond the national minimum requirements for the renovation of public buildings will enable MSs to contribute significantly to the indicative national and energy end-use savings targets. MSs must seize this opportunity to:

- Make the public sector lead by example, providing "best practice" cases, testing and developing new building techniques and financing models to be applied;
- Make renovated public buildings the frontrunners in quality, numbers and ambition; and
- Prepare the market for wider deployment and scaling up of refurbishment programmes, as foreseen in the long-term renovation roadmaps (developed under Article 4).

We therefore recommend encouraging MSs to:

- Maximise the number of public buildings covered;
- Optimise the level of ambition of renovation of public buildings;
- Establish an inventory of their public buildings which is framed within a more comprehensive property inventory of the full building stock (to be developed under Article 4 of the EED);
- Consider buildings (and groups of buildings, where relevant) as a whole, always undertaking a comprehensive renovation;

- Ensure that cost-effectiveness assessments (and cost-optimal assessments, when available) include broader societal benefits; and
- Involve all levels of government in the renovation agenda.

MSs need to report whether they will apply the 3% renovation rate to their central government buildings or use an alternative approach to meet the requirements of Article 5 by 31 December 2013. For the MSs that apply the 3% renovation rate, this is also the deadline to establish an inventory of their central government buildings. Regardless of the approach taken, the implementation of Article 5 should start on 1 January 2014 with the central government buildings of a total useful floor area of more than 500m^2.

II.3.2 Background

The EED offers a useful complement to the Energy Performance of Buildings Directive (Directive 2010/31/EU) in terms of renovation of existing public buildings. The EPBD established requirements for MSs to set minimum energy performance standards for buildings, which must be met when a building (public or private) undergoes a major renovation. The EED takes this one step further by setting a specific renovation target for public buildings. All public buildings renovated under this 3% target must meet the minimum energy performance requirements laid out in the EPBD.

Setting a target for the renovation of public buildings means that the public sector will be a frontrunner in kick-starting the renovation market, thereby preparing the market for the long-term deployment foreseen in the national renovation strategies (developed under Article 4). It is therefore crucial that the public sector leads by example with a high quality of renovations in terms of the number of buildings and the depth of renovation. Public building renovations should work as "best practice" cases, testing and developing new building techniques and financing models to be applied eventually to the whole building stock.

Only with a high level of ambition and the will to go beyond the minimum requirements for public building renovations will the energy savings to be delivered under Article 5 contribute significantly to the indicative national and binding energy end-use savings targets.

II.3.3 EED requirements

Article 5 includes the following basic requirements:

- A 3% renovation requirement for buildings owned and occupied by central governments from 1 January 2014; the 3% rate shall be calculated on the total useful floor area of buildings that are over 250m^2 (the scope is limited to 500m^2 until 9 July 2015);
- Renovation of central government buildings to meet at least the national minimum energy performance requirements set in the EPBD;
- The establishment of an inventory of central government buildings that will include energy performance and any other relevant energy data;
- Alternatively, taking measures in central government buildings, including deep renovations and behavioural changes, to achieve an equivalent amount of savings to the 3% approach, with a milestone in 2020 for verifying this equivalence;
- Addressing the buildings with the worst energy performance first; and
- Consideration of the building as a whole when doing a comprehensive renovation (envelope, equipment, operation, etc.).

II.3.4 Legal checks and recommendations

Legal checks

1. Check that the 3% renovation rate is calculated on the total floor area of central government buildings with a total useful floor area over 500m^2 owned and occupied by central government, and that this threshold is lowered to 250m^2 by 9 July 2015.
2. For MSs that apply the 3% renovation rate, check that they establish and make publicly available an inventory of heated/cooled central government buildings with a total useful floor area over 500m^2 by 31 December 2013, and as of 9 July 2015, over 250m^2.
3. Check that the amount of energy savings by 2020 is at least the same as when the 3% renovation rate would be applied, in the event that an MS takes an alternative approach within Article 5.
4. Check that the buildings with the poorest energy performance are a priority for energy performance improvement.

Good practice recommendations

1. The number of buildings covered should be maximised.

The renovation requirements of Article 5 cover central governments' public buildings. However, Recital 17 states "(…) When in a given Member State and for a given competence no such relevant administrative department exists that covers the whole territory, the obligation should apply to those administrative departments whose competences cover collectively the whole territory". This clarification is important for including in the scope of the renovation target buildings like schools and hospitals where split competencies between different levels of public authorities apply and a great share of regional public buildings could benefit from such renovation requirements. Furthermore, the European Commission has indicated that the definition of central government used for the purposes of another European Regulation (479/2009/EC) does not only include a few ministries but extends also to entities that are directly dependent on them in terms of authority and financing.

Taking into account the many positive budgetary effects of renovating the building stock of the public sector, including the relevant economic and social co-benefits, MSs should also consider the renovation of both owned and rented buildings. This approach is consistent with the Commission Delegated Regulation No 244/2012 on Cost-Optimality[26], which explicitly covers buildings "occupied by" public authorities. At the same time, it is reinforced by the provisions laid down in Annex III of Article 6 on Public Procurement, which cover both purchase and new rental agreements for central government buildings.

2. The level of ambition of renovation of public buildings should be optimised.

As stated in Article 1, the EED lays down only minimum provisions for energy savings measures and does not prevent MSs from introducing more stringent requirements. MSs could therefore decide to refurbish their public buildings towards very low levels of energy consumption and avoid any lock-in effect by grasping the full energy savings potential with an exemplary renovation.

MSs can use the buildings covered by the provisions of Article 5 to demonstrate the economic, environmental and social co-benefits of deep renovations (for more information on deep renovations and staged deep renovations, see Annex C), while also trailblazing the renovation of all buildings to nearly zero-energy levels. This is especially relevant given that under the EPBD, MSs have to increase the numbers of such buildings.

The energy performance level of the renovated building should be brought as close as possible to requirements for newly built or nearly zero-energy buildings.

[26] OJ L 81, 21.03.2012, p. 18-36.

In any case, the starting point for a strong implementation of Article 5 is for MSs to comply by 1 January 2014 with the EPBD provisions on minimum energy performance requirements. This also implies strengthening the EPBD compliance monitoring.

3. **Keep track of whether the inventories for public buildings are the starting point for establishing and maintaining comprehensive inventories for the whole building stock.**

The inventories of buildings should start with central government or public buildings in general and be completed with data regarding the whole building stock. As such, they should be linked to the "overview" of the building stock required by Article 4. Furthermore, the inventories should be maintained in a database for future use and registration of renovations and results of monitoring and verification, as well as being linked to the energy performance certificates required by the EPBD. Therefore, all MSs should establish an inventory of their central government buildings regardless of the approach taken to meet the requirements of Article 5.

The inventories should lead to a mapping of the current energy performance of existing buildings, showing useful floor space and actual consumption (e.g. in kWh/m^2 per annum). MSs must develop building typologies based on different categories of buildings. Guidance on possible stratifications, classifications and building types is provided by the EPBD and the Commission Delegated Regulation on Cost-Optimal methodology. Furthermore, under the EPBD, buildings with a surface of more than $500m^2$ that are occupied by public authorities should have had an energy performance certificate by 9 January 2013.

4. **Highlight the importance of the leading role of public buildings, regardless of the approach taken.**

In order for public buildings to really lead by example, MSs need to go beyond the minimum requirements and showcase the benefits of comprehensive, deep renovations, which look at all aspects of the buildings (see the following recommendation). According to the EED, when an MS decides to fulfil its 3% renovation obligation with the alternative approach, it can select measures including deep renovations and measures for behavioural changes of the occupants to deliver the required savings. However, for public buildings to really lead by example, they need to showcase the benefits of comprehensive, deep renovations.

Deep renovations and targeted behavioural measures must be seen as complementary and not as separate alternatives. Behavioural measures could play an important role in relation to the energy consumption of a building during its operational phase but alone they cannot tap the potential of energy savings in buildings. Measures for behavioural changes should lead to verified and metered improvements in terms of energy consumption in buildings, in order to reinforce the energy saving impact of comprehensive renovations. They should allow a better understanding of patterns regarding the buildings' energy use and not be interpreted as general public information campaigns.

5. **In a comprehensive renovation, the building should always be considered as a whole.**

A comprehensive renovation should be understood as a renovation undertaken with the objective of bringing a building (or group of buildings) to a very high-energy performance level, incorporating best available technologies. It should also be linked to the economic, environmental and social co-benefits of deep renovations, while calculating the net present value of the investments.

It is essential to take a holistic and long-term view of the building (Article 5.1) to fully tap the energy savings potential. MSs should take measures in public buildings that will address, in a complementary and mutually reinforcing manner, the building envelope, the building equipment (including equipment and associated technical energy systems) and control systems, as well as operation, maintenance and occupants' behaviour.

6. **Ensure that the cost-effectiveness assessment includes broader societal benefits.**

It is important that "cost-effective" is not interpreted simply in terms of pay-back periods, because this will fail to capture the long-term savings benefits. Therefore, in defining "cost-effective", we need to move towards life-cycle cost analysis (LCCA). This is also relevant for public procurement in the following chapter and it is also mentioned in Annex VI of Article 8 on energy audits. LCCA will reflect the net annualised costs and benefits of investments in energy savings over the economic life of the building.

An assessment of accounting rules, especially in the public sector, is also necessary to try to remove barriers for mobilising investments, as it is also highlighted in chapter II.6.

7. Provide MSs with best practices, if possible.

For example, with the Lyon Declaration in 2011, progressive regions (The Climate Group, Région Rhône-Alpes and nrg4SD) committed, among other goals, to "implement within [their] respective jurisdictions initiatives, including public-private partnerships, to deploy large-scale programmes for the refurbishment of public buildings at a rate of 3% per year with a view to upgrading them to the top energy performance"[27].

8. All levels of government should be involved in the renovation agenda and various financial options should be explored.

In order to introduce economies of scale, it is preferable to address "groups of buildings" or "areas" instead of individual buildings when devising energy efficiency and energy plans. Public bodies at regional and local level should be involved in such processes and supported through capacity building to use the EU structural and cohesion funds available under the Multiannual Financial Framework to co-finance building renovation. This will ease access to finance and the effectiveness of financial engineering.

MSs should also ensure that the National Energy Efficiency Funds foreseen in Article 20 are designed to foster this kind of action, promoting deep and staged deep renovations (see chapter III.2).

The public sector should promote the development of energy service companies (ESCOs) that cover the whole spectrum of technologies necessary for deep renovation. This can be accomplished by establishing consortia offering financing, making them one-stop shops. Competition laws should of course be respected. Energy management systems used must include investment grade audits, based on life-cycle cost analysis, to provide guidance for future investments and maintenance.

[27] Lyon Declaration of Regions and Federated States Engaged for the Climate, nrg4SD, Région Rhônes-Alpes and The Climate Group, 24.10.2011, no. 22.

II.4 Energy efficiency in public procurement (Article 6)

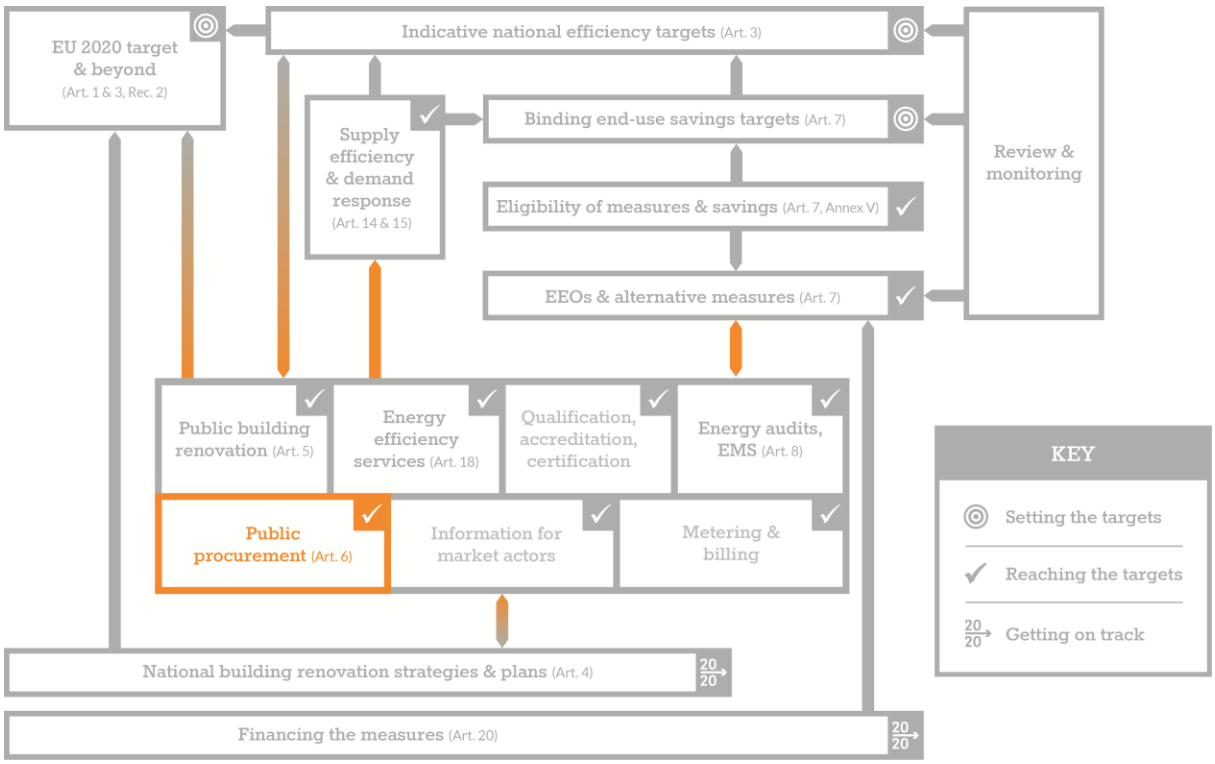

Figure 19 – Guidebook Overview Map: Public procurement

II.4.1 Summary

Public procurement can be summarised as the purchase of products, services[28], works or buildings by a public sector organisation or body[29]. To ensure transparency, non-discrimination, equal treatment of all competitors and that the best offer is selected, public administration has to follow some procedural rules (at EU level, these are established for MSs in the Public Procurement Directives 2004/17/EC and 2004/18/EC). In some cases, general rules may also exist that ensure products, services and buildings purchased correspond to certain standards, like high energy-efficiency performance rules in the EED.

The choice public authorities make when purchasing products, services and buildings is an important policy instrument to promote energy efficiency and achieve energy savings.

Article 6 and Annex III of the EED establish some requirements for the public sector to purchase high performing energy-efficiency products, services and buildings.

Article 6 requires central governments[30] to set an example through the purchase of products, services and buildings with high energy-efficiency performance insofar that it is consistent with cost-effectiveness, economical feasibility, wider sustainability, technical suitability and sufficient competition. The Article also encourages MSs to apply these public purchase requirements to other public bodies, including at the regional and local levels.

[28] For definitions of public contracts, public supply contracts and public service contracts see Article 1.2 of the Public Procurement Directive (2004/18/EC).
[29] Article 6 and Annex III of the EED do not mention the purchase of work. Therefore, it is not discussed further in this document. Purchase of buildings, although covered by the EED, is not part of the public procurement directives 2004/17/EC and 2004/18/EC.
[30] "Central government" is defined in Article 2.9 of the EED as "all administrative departments whose competence extends over the whole territory of a Member State."

Annex III provides more details on what should be considered as high energy-efficiency performance for some products, as well as in the case of services and buildings. It seems that for products not covered by Annex III, "energy-efficiency performance" would not be mandatory, although MSs are free to request it, as this chapter shows.

Two elements related to energy-efficiency performance criteria and the public sector should be underlined:

- Energy-efficiency performance requirements applied by the public sector set an example for the private sector. If private companies also apply energy efficiency criteria when purchasing products, services and buildings, at the end important energy savings can be achieved.
- By setting public procurement requirements correctly, the government can act as a "launching customer", driving innovation in energy efficiency design.

As the EED public procurement provisions do not capture all the potential benefits, one must keep in mind that MSs can go beyond the EED requirements.

The Coalition recommends the following measures regarding public procurement:

- Description, preferably in law, of additional criteria referring to energy efficiency in public procurement in a sufficient level of detail to avoid misunderstandings in their implementation;
- Guidance, preferably in law, on stages of public procurement procedure at which energy efficiency should be assessed;
- All levels of administration (at national, regional and local level) to apply energy efficiency public procurement requirements; and
- MSs to apply standards higher than requested under the EED public procurement provisions, including requesting "high energy-efficiency performance" for products not covered by Annex III.

II.4.2 Background

Public procurement rules concern purchase of products, services, works and buildings[31] by the public sector. In 2009, the public sector spent over €2,200 billion on goods, services and works – around 19% of EU GDP[32]. Much of this is spent in sectors with high environmental impacts, such as transport, buildings and food.

At EU level Public Procurement Directives, 2004/17/EC and 2004/18/EC ("PP Directives")[33] establish rules for MSs of *how* to purchase (procedures for the public sector to follow when purchasing), while *what* to purchase (i.e. additional conditions for compliance for purchased products, services and buildings such as products' energy-efficiency performance) is described in sectoral legislation like the EED.

Useful provisions of Public Procurement Directive 2004/18/EC

- Technical specifications: Annex VI.1(a) and (b)
- Award of contracts: Article 44.1
- Exclusion and selection criteria: Articles 45–52
- Award/evaluation criteria: Article 53

The rules established in the PP Directives list the steps of the procedure that must be followed for purchases over a certain value depending on the type of contract[34].

[31] See footnote 29 on previous page.
[32] European Commission Staff Working Paper, 'Impact assessment accompanying the document'. *Proposal for a Directive of the European Parliament and of the Council on Public Procurement and the Proposal for a Directive of the European Parliament and of the Council on procurement by entities operating in the water, energy, transport and postal sectors*, 20.12.2011, SEC(2011) 1585 final, p. 11.
[33] In December 2011 the European Commission adopted proposals for the revision of PP Directives 2004/17/EC and 2004/18/EC (COM(2011)895 final and COM(2011)896 final). The legislative process is ongoing.
[34] For the exact thresholds, see Article 7 of the PP Directive 2004/18/EC and Article 16 of the PP Directive 2004/17/EC. See also Article 9.1 of the PP Directive 2004/18/EC and Article 17 of the PP Directive 2004/17/EC

A contracting authority must first establish the technical specifications for a public contract that it will award through the public procurement process. Technical specifications define the characteristics required of a product or a service, thereby allowing potential contractors to prepare an offer that meets the needs of the contracting authority. Following the receipt of offers, the suitability of the economic operators is considered (falling under exclusion criteria, economic and financial standing, professional and technical knowledge or ability). The winning offer is either the cheapest offer or the highest scoring offer following evaluation against a range of criteria that the authority has established.

Although the PP Directives 2004/17/EC and 2004/18/EC do not apply to building contracts[35], it is supposed that in these cases MSs follow similar rules.

II.4.3 EED provisions

Provisions in the EED address a specific aspect of public procurement: energy efficiency standards applied to products, services (in particular concerning new products for activities carried out within a service contract) and buildings purchased.

The link between PP Directives and the EED is very strong. To be effective, energy efficiency standards must be applied at the right stage of the public procurement procedure.

The main public procurement requirements of the EED are as follows:

- According to Article 6, products, services and buildings purchased by central governments (though MSs should also encourage other public bodies to purchase such products) should be of high energy-efficiency performance;
- Annex III provides details on what is to be considered the high energy-efficiency performance for some particular products as well as in the case of services and buildings:
    - the highest energy efficiency class possible under the Energy Labelling Directive (2010/30/EU) considering the need to ensure sufficient competition;
    - compliance with Ecodesign benchmarks[36] for some new products under the Ecodesign Directive (2009/125/EU), provided that the specific product is not covered by the rules of the Energy Labelling Directive;
    - compliance with energy efficiency requirements as demanding as those of the EU-US Energy Star Agreement;
    - compliance with the criterion of the highest fuel energy efficiency class as defined in the Regulation on the labelling of tyres (1222/2009) with respect to fuel efficiency and other essential parameters;
    - purchase by service providers for the purpose of providing the service under the service contract of products complying with all of the above mentioned requirements; and
    - purchasing or making new rental agreements[37] only for buildings which comply with the minimum efficiency requirements that the MS has set under the EPBD (see chapter II.3). As stated in Article 9.1(b) of the EPBD, all new

("The calculation of the estimated value of a public contract shall be based on the total amount payable, net of VAT, as estimated by the contracting authority. This calculation shall take account of the estimated total amount, including any form of option and any renewals of the contract. Where the contracting authority provides for prizes or payments to candidates or tenderers it shall take them into account when calculating the estimated value of the contract.").

[35] For a definition of a building contract, see Article 101.1 of the EU Financial Regulation 966/2012 and Article 121.1 of the Commission Delegated Regulation 1268/2012.

[36] Indicative benchmarks are included in annexes to implementing measures and indicate the best available technology on the market for a regulated product at the time of entry into force of the implementing measure. These are not to be confused with the ecodesign minimum efficiency requirements.

[37] For buildings, Annex III widens the scope of Article 6 and mentions rental agreements in addition to purchases.

buildings occupied and owned by public authorities after 31 December 2018 must be nearly zero-energy.

"High energy-efficiency performance" is thus defined for many products and for buildings in EED Annex III by a reference to standards established by EU energy efficiency law.

When a product is not defined in EU laws mentioned in Annex III, a "high energy-efficiency performance" criterion could apply only if an MS decides to apply measures more stringent than the EED requirements[38]. In such a case, having national ambitious standards of what "high energy-efficiency performance" is would be very helpful.

The EED obligation to purchase products with high energy-efficiency performance is also subject to additional conditions of cost-effectiveness, economical feasibility, wider sustainability, technical suitability and sufficient competition.

These terms are not defined in the EED so it is extremely important that they are described at national level with a sufficient level of detail to avoid any misinterpretation. The main elements which should be underlined are:

- *cost-effectiveness*: comprising the up-front price of a product, operational costs of its use and indirect costs, such the costs of treatment of any health impact caused by carbon dioxide emitted by the electricity used by the product over its lifetime. Cost-effectiveness should always prevail over economical feasibility;
- *economical feasibility*: concerns the financial ability to purchase a more energy efficient product. National authorities have to plan their investments in advance in order to purchase a quality energy efficient product that is inexpensive to use and low-cost for society;
- *wider sustainability*: a contradiction between high energy-efficiency performance and other environmental criteria (for example, the toxicity of a product) is possible; however, there might be a risk of an abusive use of this criterion allowing the avoidance of applying the high energy-efficiency requirement;
- *technical suitability*: a purchased product should function with the equipment already in use. Any contradiction between the technical suitability and energy efficiency must be treated cautiously to avoid abusive use of this criterion ; and
- *sufficient competition*: contracting authorities do not have to desist from seeking ambitious levels of performance merely because there are few contractors able to supply such products, as case law of the EU Court of Justice shows[39].

Article 6 and Annex III of the EED give flexibility to MSs as to the exact implementation of its requirements. Therefore,

- Guidance is needed for additional conditions not defined in the EED to avoid misinterpretation.
- Most importantly, the EED requirements (including the ones on public procurement) are minimum requirements, meaning MSs may maintain or introduce more stringent measures as long as they are compatible with EU law (Article 1.2). Applying more stringent energy-efficiency performance requirements (for example requiring "high energy-efficiency performance" of products not covered by Annex III) could be of interest to MSs. This provision could allow them to achieve much more than savings in the public sector by setting an example for and encouraging the private sector to save energy through its purchases. MSs could end up obtaining important savings towards meeting the overall 20% energy savings target.

[38] Purchase of these products would also be subject to additional criteria described further in this chapter.
[39] Case C-513/99, Concordia Bus Finland Oy Ab, formerly Stagecoach Finland Oy Ab v Helsingin kaupunki and HKL-Bussiliikenne, [2002] ECR I-07213, paragraph 85.

II.4.4 Recommendations

Good practice recommendations

1. **Encourage MSs to describe, preferably in law, additional criteria referring to energy efficiency in public procurement in a sufficient level of detail to avoid misunderstandings in their implementation.**

Transposition of the EED public procurement provisions should be done in a way which would help to avoid misunderstandings about certain terms, in particular additional criteria (see chapter above), or the way and at what stage energy efficiency criteria should be implemented in the procurement procedures (see below).

2. **Encourage MSs to provide guidance, preferably in law, on stages of public procurement procedure at which energy efficiency should be assessed.**

A contracting authority shall determine Annex III energy efficiency requirements prior to drafting the technical specifications. These could be minimum requirements if energy efficiency requirements are also assessed at the award stage. At the stage of technical specifications, a contracting authority should also assess whether the energy-efficiency performance requirements are consistent with the additional conditions of Article 6 and Annex III (cost-effectiveness, technical suitability, etc.).

In addition, energy efficiency could be included at the award stage, when the contracting authority has opted to evaluate offers on the basis of the "most economically advantageous tender" (only the price is taken into account when assessment is based on the lowest price). There are two possible ways of doing this:

- Awarding higher scores to better energy performing products within a given energy-efficiency performance class (some A products can perform better than others) where the minimum requirements specify an energy-efficiency performance class. Submitted offers should include a technical fiche as provided by the Energy Labelling Directive; or
- Awarding higher scores to products with better energy efficiency than the minimum requested by a contracting authority in technical specifications.

These rules should also apply in relation to new products purchased by service providers for providing the services.

MSs could apply requirements higher than the minimum requested under the EED already at the stage of Technical Specifications.

3. **Ask all levels of national administration, including at regional and local level, to apply energy efficiency public procurement requirements.**
4. **Encourage MSs to apply standards higher than requested under the EED public procurement provisions, including requesting "high energy-efficiency" performance for products not covered by Annex III.**

Good practices in practice

The Municipality of Rotterdam (Netherlands) identified the need to make cost, resource and energy savings in its €2 billion worth of real estate. It also had high CO_2 reduction targets. Public swimming pools were identified as key facilities for potential improvement. Rotterdam had the additional objective of improving the swimming conditions for users.

Due to the uncertainty regarding the potential of energy savings, an Energy Performance Contract (EPC) was awarded using the competitive dialogue procedure.

In 2010, as a pilot initiative, the City of Rotterdam tendered a ten-year EPC covering nine pools with payments based on actual energy savings delivered (this approach reflects austerity measures and the commitment to reduce CO_2 emissions by 50%).

The award of the contract was based on the energy savings offered by the bidders and on the maintenance costs. The contract involved guaranteed energy savings, building conditions (maintenance) and improvement in user comfort, all subject to penalties. The contractor guaranteed annual energy savings of 34% and was subject to a financial bonus for energy savings over 34% each year and penalties if savings are not achieved.

II.5 Energy Audits (Article 8)

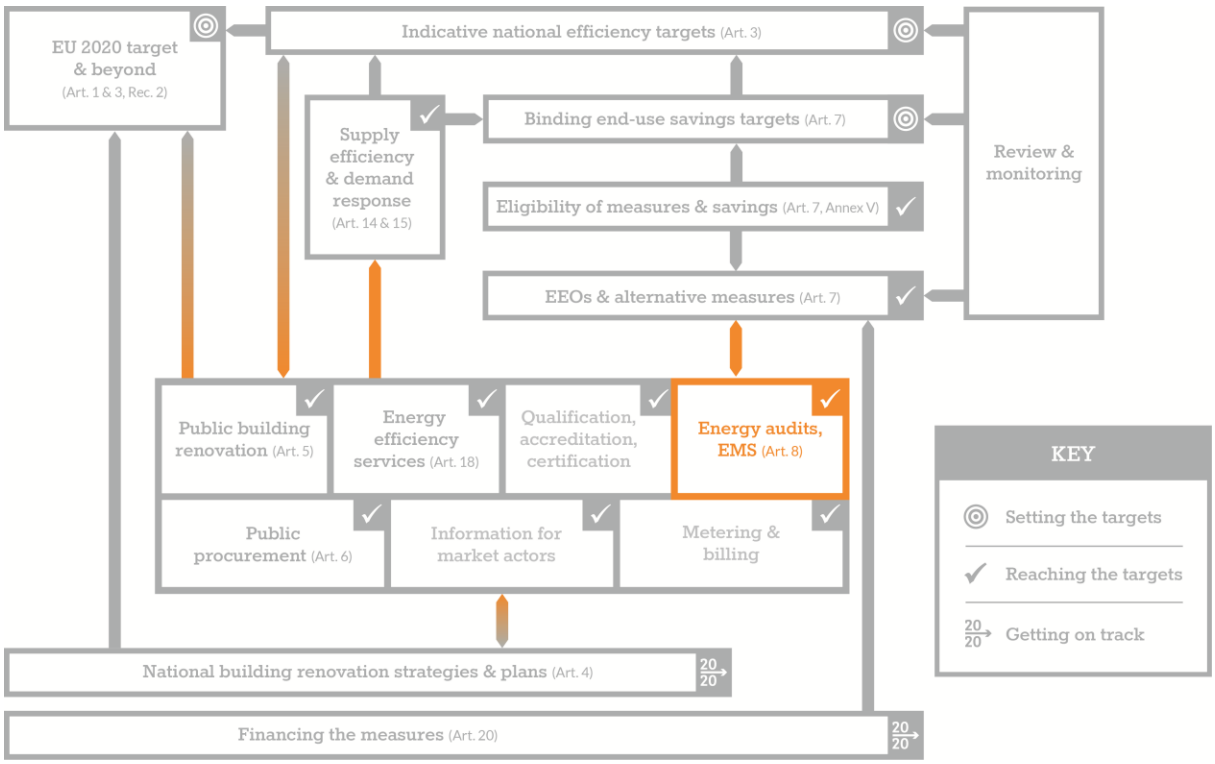

Figure 20 – Guidebook Overview Map: Energy audits

II.5.1 Summary

In the EED, energy audits are defined as "systematic procedures" used to identify, quantify and report existing energy consumption profiles and energy savings opportunities in buildings, industrial or commercial operations or installations, and in private or public services. Energy management systems (EMS) are defined as sets of elements of plans establishing energy efficiency objectives and strategies to achieve these objectives. Energy audits are an integral part of energy management systems.

The EED requires MSs to promote high-quality energy audits in their territories and ensure that their large enterprises are subject to regular energy audits at least every four years. The EED thus differentiates clearly between the requirement for MSs to promote and encourage the use of energy audits in small and medium-sized enterprises (SMEs), households and other small end users, and the requirement for MSs to oblige large enterprises to carry out regular energy audits.

For SMEs**,** households and all smaller final customers, MSs must promote the availability of high quality, cost-effective energy audits, *inter alia* by developing programmes to encourage SMEs to undergo energy audits and implementation of the recommendations resulting from these audits. In addition, MSs will establish advice and awareness-raising programmes to inform households of the benefits of energy audits.

For large enterprises, however, MSs must ensure that they carry out energy audits of their buildings and installations at regular intervals not exceeding four years, starting 5 December 2015 at the latest.

National legislation to transpose the energy audit obligations for both SMEs and large enterprises, including all necessary regulations and administrative provisions, must be brought into force in MSs by 5 June 2014. Penalties for non-compliance with the obligations on large enterprises to carry out energy audits must also be communicated to the Commission by that date.

For reporting, MSs will inform the Commission on a regular basis of the total number of energy audits undertaken in their territory and complete an inventory of the number of obligated large enterprises in operation, as well as the number of energy audits carried out in these enterprises. MSs must also include information on the available qualification, accreditation and certification schemes for the providers of energy audits in their National Energy Efficiency Action Plans. Article 16 of the EED requires MSs to ensure the availability of these schemes by 31 December 2014 for providers of energy audits and for energy managers and, if necessary, to establish suitable training programmes for them.

II.5.2 Background

The EED gives energy audits and energy management schemes a substantial role to play in improving energy efficiency in the end-use sectors. The 2006 Energy Services Directive (ESD)[40] established an obligation for MSs to ensure the availability of efficient, high-quality energy audit schemes to all final consumers, including smaller domestic, commercial and small and medium-sized industrial customers. The EED goes further than the ESD by creating a clear obligation placed on large enterprises to carry out energy audits regularly.

The justification for setting a threshold for the size of the enterprises required to carry out energy audits lies in the fact that large enterprises consume more energy than SMEs, and thus have greater energy saving potentials. In addition, energy audits, including audits that are part of an energy or environmental management system, are less of a cost burden for large enterprises than they would be for SMEs, not to mention households and other small end users.

It is important to bear in mind the intended use of energy audits in the EED. In addition to identifying, quantifying and reporting current energy consumption, an energy audit is also designed to provide reliable technical and economic information for formulating feasible and cost-effective recommendations for energy efficiency improvement measures and packages of measures that would lead to measurable energy savings if implemented.

The usefulness of energy audits thus depends to a large extent on the expedient and effective implementation of their resulting recommendations, and systematic application of energy management schemes. The importance of the implementation of these recommendations is indicated in paragraphs 1(b) and 2 of Article 8, where MSs are required to develop programmes to "encourage SMEs to undergo energy audits and the subsequent implementation of the recommendations from these audits." Though the EED does not require MSs to provide financing or otherwise ensure the implementation of the audit's recommendations, even highly cost-effective ones, the financial facilities to be established under Article 20 or the use of the Structural Funds could be useful sources of funding.

The EED also encourages MSs to set up support schemes for SMEs and to conclude voluntary agreements to defray or cover the costs of the actual energy audits and implementation of the recommendations. Several MSs already have such voluntary agreements and subsidy schemes for this purpose. It is important that these agreements do not conflict with State Aid rules.

II.5.3 EED requirements and provisions

In addition to the key elements of energy audits and energy management in the summary to this chapter, it is important to be aware of a number of details set out or implied in Article 8, Annex VI and other parts of the EED.

[40] OJ L 114, 27.4.2006, p. 64-85.

SMEs, large enterprises and the scope of their obligation

An SME, including a micro-enterprise, is defined in the EED as an enterprise that employs fewer than 250 persons and has an annual turnover of €50 million or less, and/or an annual balance sheet total of €43 million or less. Excepting households, all other entities, regardless of their legal form, engaging in economic activity that exceeds these thresholds are considered large enterprises. Any linked or partner enterprise, defined as holding 25% of capital or voting rights, or vice versa must be added to the enterprise to determine whether it is a large enterprise or not.

National labour rules apply as regards the definition of employees, normally excluding apprentices and students with training contracts, as well as those on maternity or parental leave.

Inclusion of transport systems

Where they constitute a share of the energy consumed in overall operations, transportation systems within or related to an enterprise shall also be included in the energy audit of the enterprise, according to Annex VI of the EED.

Certification and quality assurance

Article 16 of the EED requires MSs to ensure the availability of certification, accreditation and/or qualification schemes by 31 December 2014 for providers of energy audits and for energy managers and, if necessary, to establish suitable training programmes for them. The criteria for determining the necessity of establishing such schemes and training programmes are left up to MSs to determine, based on a judgment of whether the existing national level of technical competence, objectivity and reliability is considered sufficient or not. Fulfilling the national certification, accreditation or qualification scheme also allows "in-house" experts or auditors to carry out energy audits of their own installations and buildings.

Annex VI sets out a number of quality criteria for the energy audits themselves. These criteria, or national schemes based on the criteria in Annex VI and prepared by the MS, have to be met by the energy audits being used in the MS to fulfil the obligations in Article 8 and the other articles pertaining to energy audits.

Recommendations from the audits

Recommendations from the energy audits described in the EED are the result, in accordance with Annex VI, of representative and quality data collection and calculations. These calculations shall build whenever possible on life-cycle cost analysis (LCCA), instead of Simple Payback Periods (SPP). As such, the recommendations are based on detailed and validated calculations for the proposed measures, taking into account the full service life and residual values of the individual measures and their investments.

Audits meeting the criteria set out in Annex VI will thus provide clear and reliable information on potential investments and savings, by calculating net present values, cash flows and the resulting discounted savings over time. This enhances considerably the quality and value of the recommendations. As such, the calculations and audits become "investment-grade" in the sense that they can readily be understood by financial institutions and other investors.

Exemptions, including the use of EMS

Large enterprises may be exempted from or be considered as already fulfilling the requirement to undergo regular audits, provided one of following conditions is met:

- The enterprise in question has been and will continue to be subjected to equivalent and equally regular energy audits that are implemented under a voluntary agreement, and the audits meet the minimum criteria set out in Annex VI of the EED. The voluntary agreement must be between an appointed body and an obliged stakeholder organisation and supervised by the concerned MS, a delegated body or the Commission; or
- The enterprise is implementing a certified energy or environmental management system according to a relevant European or International Standard, such as EN

ISO 50001 or EN ISO 14000/1, that also includes an energy audit, like EN 16247-1. It must also meet the minimum criteria set out in Annex VI.

EN ISO 50001

EN ISO 50001 is a European and International Standard for energy management systems. It helps all types and sizes of organisations to establish, evaluate and report on systems and processes to improve their energy performance. It is compatible with environmental management standards such as EN ISO 14001 and quality management standards such as EN ISO 9001.

EN ISO 50001 stresses the involvement of executive leadership.

Public buildings and energy audits

According to Article 5 of the EED, MSs shall also encourage public bodies, including those at regional and local level, to put in place EMS, including energy audits.

Use of Annex IX on cost-benefit analysis

Part I and Part II of Annex IX on cost-benefit analysis of the EED are primarily designed to be used in the framework of Article 14 on the promotion of efficiency in heating and cooling, though this annex can provide valuable guidance on methodologies, assumptions and reference values. This guidance could well prove to be useful in mandatory energy audits, where these technical systems are often included. Annex IX also provides a link between the energy audit at enterprise or site level and the cost-benefit analysis undertaken at local, regional or national level and in a societal context.

Penalties

Because the implementation of Article 8 requires MSs to impose obligations on third parties, MSs must also establish effective, proportionate and dissuasive penalties for non-compliance with the obligations on large enterprises to carry out energy audits. They must also be communicated to the Commission within 18 months of the EED's entry into force.

II.5.4 Legal checks and recommendations

Legal check

1. Following the definitions and criteria established in the EED for large enterprises, check that a consistent and updated database of these obliged entities is established by an authorised implementing body, and that they are notified at the appropriate time of their regular energy audit obligation (see Articles 2(26) and 8.4-8.6).
2. Ensure that a system is in place to check the quality of all energy audits and that correct methods are being used in carrying out the audits, including life-cycle cost analysis (LCCA). Link this system with clear rules and notifications for penalties for non-compliance and substandard compliance (see Article 13 and Annex VI).
3. Ensure proper and recognised certification and approval procedures are in place when obliged entities apply for exemptions from carrying out energy audits on the basis of pre-existing or new voluntary agreements or certified energy or environmental management systems according to a relevant European or International Standard (see Articles 8.4-8.6 and 16.1).

Good practice recommendations

1. **Encourage MSs to promote the development of energy audits that meet the financial and economic criteria and demands of so-called investment grade audits.**

These audits should be able to predict with considerable precision the net present values and cash flows created by investments in different energy efficiency measures and packages of measures in buildings, in industrial sites and processes and in transport systems.

2. **Encourage MSs to provide clear and strong incentives for SMEs and households to undertake audits and implement the recommended measures.**

MSs should go beyond the EED requirements to cover the cost of audits and subsidise the cost of implementation of those resulting recommendations with favourable net present values that the market might not otherwise take up, due to barriers such as their long-term nature or high upfront costs. High upfront costs, which often worsen the "economic feasibility" of investments, can be overcome using proper LCCA, provided limited incentives such as default guarantees or soft loans are made available. Such high quality audits allow the needed precision for these investment decisions to be carried out. The implementation of recommendations from audits is much more likely when EMS are fully in place and benchmarks and economic calculation methods (such as LCCA) prove the economic viability of the proposed measures. This risk of waste serves as an economic justification for incentive schemes linked to audits.

3. **Encourage MSs to raise the quality of audits used in building certification in the EPBD.**

Audits required in the EPBD[41] may not be of sufficiently high quality to meet the criteria set out in Article 8 and Annex VI of the EED. MSs should take advantage of the spill-over effects of the higher EED requirements for energy audits, in order to improve the quality of audits associated with the EPBD.

4. **Encourage large enterprises to be early adopters of audits.**

Regarding the EED requirement for large enterprises, even audits undertaken before 5 December 2015 have a lifetime of four years, making a strong argument for early transposition. For example, if an audit is undertaken in December 2013, the next one can take place in December 2017.

5. **Ensure that energy audits and EMS account for peripheral use of energy.**

In the further development of energy audits and energy management schemes, the focus on processes in industry should not lead to reduced emphasis on improving energy efficiency in peripheral energy uses, such as lighting, control systems and heat losses from industrial buildings, heat losses from infrastructures serving high-temperature processes and other installations related to industrial processes, such as piping, storage facilities and ventilation systems. These areas can be addressed through improved standards, ambitious default values in planned energy supplier obligations, incentive schemes and benchmarking systems.

6. **Use benchmarks to determine best performance levels in industrial processes and peripheral applications.**

Audits and energy management schemes can and will provide much information on how much to improve energy efficiency in an economically effective manner. There will continue to be a need for best practices and benchmarks to determine best performance levels in processes and peripheral applications. MSs are therefore recommended to increase their efforts in benchmarking exercises and in the sharing of best practices as a natural complement to the increased use of energy audits.

[41] OJ L 153, 18.06.2013, p. 13-35.

II.6 Energy efficiency services (Article 18)

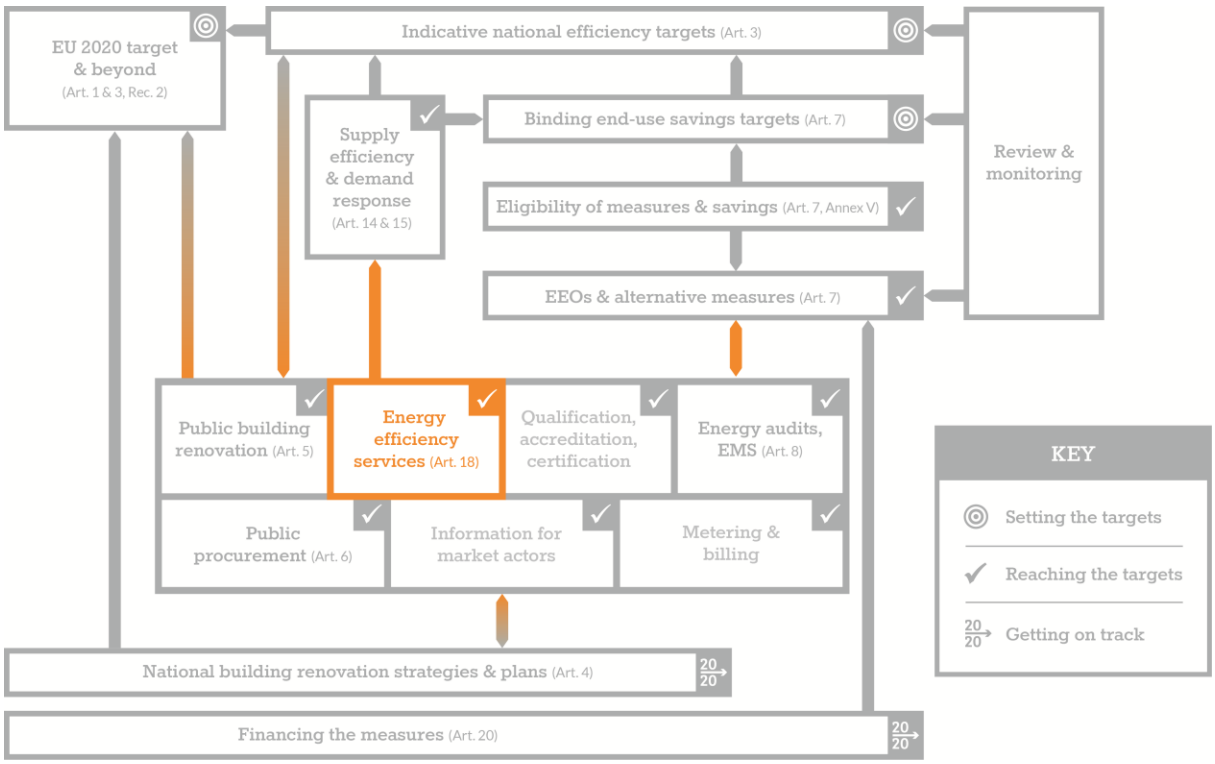

Figure 21 – Guidebook Overview Map: Energy efficiency services

II.6.1 Summary

EU energy efficiency policy has the potential to transform the energy market into one which focuses on the delivery of energy *services* – i.e. the useful outcome of using energy – rather than purely on the delivery of energy itself. Companies and business models which are organised in this way already exist, but so far market conditions and the legislative framework are not as supportive or effective as they could be. Article 18 of the EED seeks to address this with an explicit requirement on MSs to promote the energy services market and to support its proper functioning by, for example, providing information to final consumers.

The EED also adds certainty to the market by providing useful definitions, including one for Energy Performance Contracting (EPC), and by requiring EPC model contracts to be provided by MSs. Three key characteristics qualify a contract as EPC: a precise definition of energy performance goals to be achieved within a certain duration of time, measurement and verification and contractually agreed energy savings.

MSs should particularly focus on removing regulatory and non-regulatory obstacles to performance contracting and energy services. They should also cooperate with each other and with the European Commission against continuing EU-wide barriers, such as an interpretation of the EUROSTAT rules regarding qualifying investments by energy service companies (ESCOs) as public deficit that hinders a development of energy services. The Coalition also urges that MSs consider obstacles to energy efficiency investment caused by the necessity for public bodies to count investment as "capital expenses" and reduced costs as "operational expenses".

Regarding energy efficiency services, the following is recommended:

- Ask MSs to specify the following three notions of EPC as the core ones:

- A precise definition of energy performance goals to be achieved within a certain duration of time;
- Measurement and verification of contractually agreed savings with prior measurement of energy consumption before and after a contract enters into force; and
- Contractually agreed energy savings.

- In creating an information platform by which to catalogue energy service providers, ask MSs to categorise providers by clearly defined criteria (their specialisation, for example).
- Support the European Commission in actions to modify the interpretations of EUROSTAT rules on public debt and deficit, which considers investments in energy efficiency under energy service contracts as public deficits in the National Accounts even if organised under ESCOs.
- Encourage MSs to take into account EPC and other overall types of energy service contracts in order to not oblige public bodies to divide contracts into lots, as there is a likelihood that the new Directives on public procurement will prescribe such divisions[42]. Otherwise, the use of EPC and other overall energy service contracts by the public sector will be substantially limited, which adds a risk of not achieving guaranteed energy savings[43].
- Encourage the grouping of SMEs in tendering procedures.

In terms of reporting and monitoring requirements, Article 19 requires MSs to notify the Commission in the first National Energy Efficiency Action Plans (NEEAPs) due 30 April 2014 what measures will be taken to remove barriers to energy efficiency. MSs are additionally required to put in place certification and accreditation schemes or their equivalent (including suitable training programmes) for energy service providers by 31 December 2014 under Article 16.1.

II.6.2 Background

Energy services are without a doubt one of the key tools to achieve energy savings. Existing provisions under the Energy Services Directive (2006/32/EC) have been an important starting point, as they encourage the public sector to lead by example in making use of energy services. However, they have not resulted in unlocking the full potential of savings that could be offered if energy services were widely used. Therefore, a focus on both supply and demand of energy services, including other actors as companies, was necessary and recognised by the European Commission when putting forward its proposal for the EED.

Apart from supportive measures, the EED provides important clarification on definitions and a basis for appropriate qualification and certification schemes for providers of such services. By the time the EED was adopted, the market could use EN 15900 standards on energy efficiency services, which have been serving the market actors on supply and demand side as the main point of reference. However, this norm alone was not sufficient to ensure the stability of the market and its further development.

In parallel with the growing needs for energy services, the EED offers adequate and clear provisions to address the competition issue between energy and energy service providers.

[42] Public Procurement Directives 2004/17/EC and 2004/18/EC are currently being amended and the legislative process is ongoing.

[43] This is due to the following: 1) energy efficiency projects under EPC and other overall energy service contracts require coordination between different actions in order to achieve a guaranteed amount of energy savings, 2) splitting energy efficiency into separate actions can cause lock-in effects (after completing one action, the decision to take another one may take years) and 3) comprehensive actions have the potential to bring more energy savings and be more cost-effective.

Good practice examples, according to the European Commission Joint Research Centre's ESCO market report[44], come from MSs where national energy agencies cooperate with stakeholders from public and private sectors to stimulate the energy efficiency market. In countries with a challenging combination of rising energy prices, high energy efficiency potential, limited financial resources and experience, an improvement of the legal framework is extremely important for a growth of ESCOs. Please refer to Annex D for specific examples.

II.6.3 EED requirements

Article 18 indicates how MSs will promote the energy efficiency market by listing actions such as providing model contracts for energy performance contracting and disseminating information on energy services and their providers to clients.

Importantly, MSs shall address barriers to energy efficiency service models including EPC. According to Article 19 MSs are also obliged to evaluate and engage themselves, if necessary, in removing regulatory and non-regulatory barriers[45] such as administrative practices regarding public purchasing, annual budgeting and accounting and the split incentives between tenants and owners.

Useful definitions

'Energy service' means the physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings.

'Energy service provider' means a natural or legal person who delivers energy services or other energy efficiency improvement measures in a final customer's facility or premises.

'Energy performance contracting' means a contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings.

Dissemination of information

The measures that MSs must undertake include disseminating information on available energy service contracts and clauses, making available information on financial instruments to support energy service projects (Article 18.1(a)) and creating and updating a public list of energy service providers who are qualified and/or certified (Article 18.1(c)). Alternatively, MSs may set up an interface where energy service providers can provide information.

Empowering final customers

Specific provisions on measures targeted at final customers (Article 18.2) include:

- Identifying and publicising points of contact with information on energy services;
- Considering putting in place or assigning the role of an independent mechanism, such as an ombudsman, to ensure the efficient handling of complaints and out-of-court settlement of disputes arising from energy service contracts; and
- Enabling independent market intermediaries to play the role of market stimulators on both demand and supply side.

[44] Bertoldi, P., Boza-Kiss, B., Marino, A. and Rezessy, S., *Energy Service Companies Market in Europe - Status Report 2010*, Joint Research Centre, European Commission, 2010.

[45] The barriers to ESCOs are described in detail in the following report: Bertoldi, P., Boza-Kiss, B. and Rezessy, S., *Latest development of energy service companies across Europe – A European ESCO update*, Joint Research Centre, European Commission, 2007.

Certification and qualification schemes

The provisions on certification schemes, accreditation schemes and/or equivalent qualification schemes constitute a substantial contribution of the EED towards the development of the market for energy services. However, a great margin of flexibility is left to MSs, as they decide whether such schemes are necessary. Schemes must be in place by 31 December 2014. If necessary, they will also make available training programmes for providers of energy services, energy audits, energy managers and installers of energy-related building elements in accordance with the Energy Performance of Buildings Directive (2010/31/EU).

Energy Performance Contracting (EPC)

A definition of EPC in Article 2 contains an important element to the effect that investments (work, supply or service), if any, in the energy efficiency improvement measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings. This clarification explains that investments made by a party other than the contract provider, possibly a third financing party, are not always fully recouped by energy savings within the duration of the contract.

The EED also puts a requirement on MSs to provide model contracts for EPC with the public sector and best practice examples including cost-benefit analysis using a life-cycle approach (Article 18.1(d)). Model contracts have to contain the minimum list of items enumerated in Annex XIII of the EED. A general aim of this list is to develop a market for energy services by making the contracts clear and transparent.

Other measures

The EED also requires a qualitative review to be provided in the framework of NEEAPs regarding the current and future development of the energy services market (Article 18.1(e)).

The notion of fair competition also appears in the final text. MSs shall ensure that energy distributors, distribution system operators and retail energy sales companies refrain from any activities that may impede the demand for and delivery of energy services or hinder the development of markets for such services and measures, including foreclosing the market for competitors or abusing dominant positions (Article 18.3).

II.6.4 Legal checks and recommendations

Legal check

1. **Ensure that MSs evaluate and remove regulatory and non-regulatory barriers to energy efficiency (Article 19.1). The results of this need to be described in the first National Energy Efficiency Action Plan due 30 April 2014.**

The variety of barriers towards energy services include *inter alia* public procurement and accounting rules, regulated energy pricing, a lack of appropriate forms of financing, split incentives between tenants and landlords, lack of guarantees and low awareness.

2. **Check that MSs ensure that energy suppliers are not impeding energy services and their market development.**

Good practice recommendations

1. **Encourage MSs to specify the three notions of EPC as the core ones:**
    - A precise definition of energy performance goals to be achieved within a certain duration of time;
    - Measurement and verification of contractually agreed savings with prior measurement of energy consumption before and after a contract enters into force; and
    - Contractually agreed savings.

2. **As for other valuable characteristics of EPC that add clarity and transparency, ask MSs to consider the following items that are missing in Annex XIII:**
    - Definitions of "third party", "verification body" and "energy auditor";
    - Characteristics of the reference period, taking into account that an EPC may require at least one year of collecting data (degree days, primary energy consumption and energy mix, for example) to define a reference period;
    - Reference characteristics for buildings (surface, volume and temperature, for example);
    - Reference characteristics regarding users of buildings (number of persons, time of presence or specific behaviour);
    - Adequate monitoring and performance guarantees, such as penalty or reward caps during the lifetime of a contracts;
    - Performance criterion that refers to the energy saved instead of money saved, expressed, for example, in MWh/year, in comparison with reference consumption and normalised measurement;
    - The saved primary energy calculated and priced according to the prices during the contract period;
    - An agreement for the verification procedure; and
    - A list of changing framework conditions that affect the content and outcome of the contract.
3. **In creating an information platform by which to catalogue energy service providers, ask MSs to categorise providers by clearly defined criteria (their specialisation, for example).**

In addition, they should include details about possible types of works, equipment and services in order to explain possible solutions to final customers in the simplest and most efficient way. Otherwise, the information platforms would add more confusion than visibility to the market of energy services. The usefulness of information platforms on energy service providers will increase significantly if the Commission provides a template clearly indicating the criteria by which the information should be organised and published.

4. **Support the European Commission in actions to modify the interpretations of EUROSTAT rules on public debt and deficit, which considers investments in energy efficiency under energy service contracts as deficits in the National Accounts even if organised under ESCOs.**
5. **For accounting rules, MSs should consider obstacles to energy efficiency investments by public bodies having to count investments in "capital expenses", whereas reduced costs will be registered under "operational expenses".**
6. **Encourage MSs to take into account EPC and other overall types of energy service contracts in order not to oblige public bodies to divide contracts into lots, as it is likely that the new Directives on Public Procurement will prescribe such division.**

Otherwise, the use of EPC and other overall energy service contracts by the public sector will be substantially limited, potentially preventing achieving guaranteed energy savings.

7. **As an alternative measure, ask MSs to consider encouraging grouping SMEs in tendering procedures.**
8. **Work to develop energy services through the implementation of Article 7.2(c) with respect to Article 15.2(b), which mentions energy efficiency improvements in the network infrastructure. In cases where MSs decide**

to apply exemptions quoted in Article 7.2(c), actions made by ESCOs that will benefit the final client should be eligible to be counted towards the 25% exemption within the binding energy end-use savings target discussed in Article 7.1 and chapter I.5 of this guide.

Good practices in practice

The FRESH project, which is funded under the Intelligent Energy Europe Programme, looks into the possibilities for EPC in the social housing sector. The social housing sector is specific due to ownership structures – a single project can easily comprise several buildings. However, the nature of social housing allows less flexibility in rent increases following refurbishment measures. The FRESH project identified possible solutions to tackle the split incentives problem, such as mechanisms that divide financial savings between the owner and the tenant, and explored possible financing tools and incentives like tax abatements.

Read more at http://www.fresh-project.eu.

II.7 Supply side efficiency and demand response (Articles 14 and 15)

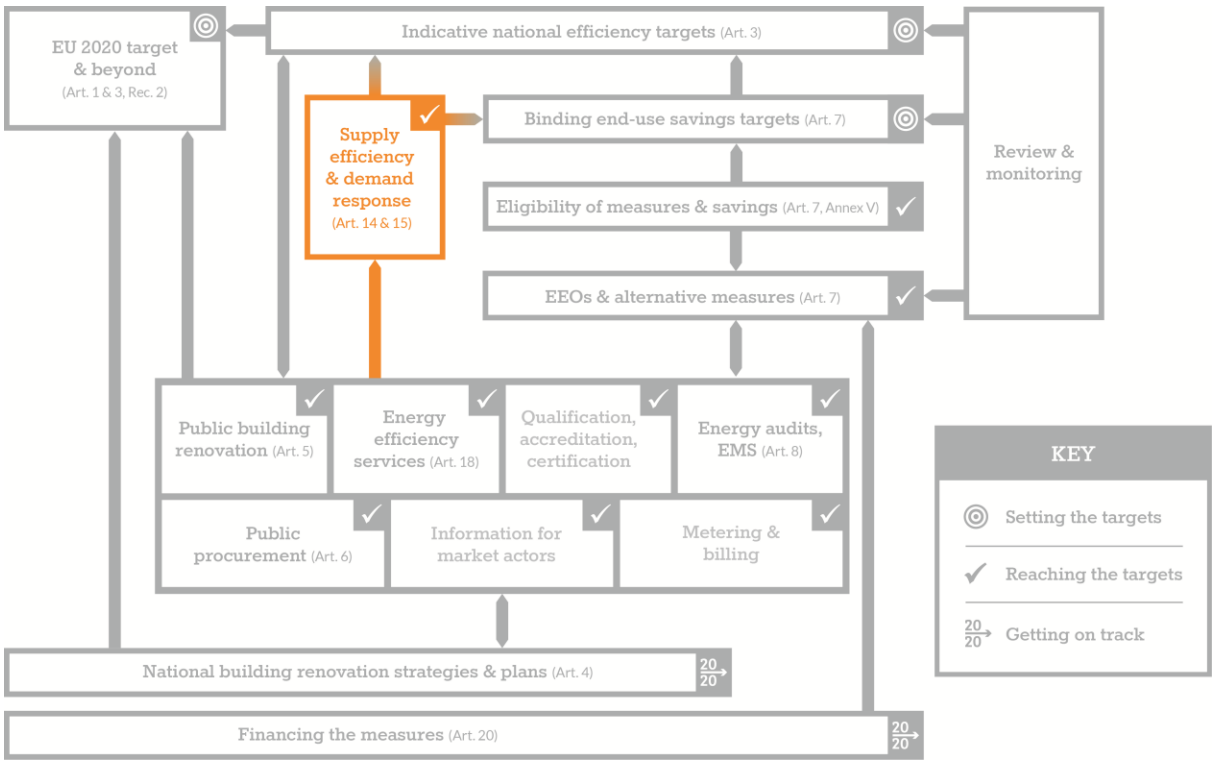

Figure 22 - Guidebook Overview Map: Supply side efficiency and demand response

II.7.1 Summary

The guiding principle when applying Article 14 for the promotion of efficiency in heating and cooling should be to save primary fuels. MSs should recognise the value of the "integrated approach" referred to in the text and make sure that this is fully applied when carrying out their comprehensive assessments (CA) at national level by December 2015. Cost-benefit analysis (CBA) should become a dynamic and enabling instrument. Therefore we recommend that:

- spatial planning rules are linked to national level CA to ensure an "integrated approach";
- the scope is broadened and installations below 20 MW are captured by CA and CBAs to promote decentralised production of energy; and
- CBAs are done in a participatory way, include socio-economic aspects, use robust data and lead automatically to action in case of positive results.

A new element of the EED is the introduction of demand response provisions. Today, many EU energy markets are either non-existent or inaccessible to demand side participation due to a lack of awareness and an unclear regulatory framework in most MSs. As a consequence, the demand response potential is largely untapped. Demand response offers a quick, cost-effective and energy efficient capacity resource. It can substantially reduce the need for investment in generation by managing the energy consumption patterns on the customer side in response to the supply requirements of the grid. While Article 15 contains many positive attributes, there are few firm requirements on increasing demand response activity. MSs should regard Article 15 as a package of complementary recommendations which, if implemented in a coherent way, will give the greatest chance of a well-functioning, energy- and cost-efficient energy market and supply. We therefore recommend that:

- distribution and transmission system tariffs are set in a transparent manner and to empower consumers and those incentives are removed which are detrimental to improving energy efficiency activity, in particular demand response and EEOs carried out by energy companies; and
- clear provisions are provided for demand response actors and those able to provide other energy efficiency services to be included in market design to improve overall network efficiency.

In terms of the main reporting and monitoring requirements under the EED, all new or to be refurbished thermal generation installations or district heating/cooling networks over 20 MW shall be subject to a CBA by 5 June 2014 at the latest in accordance with Part 2 of Annex IX. Additionally, MSs must make available the comprehensive assessment of the potential for high-efficiency cogeneration and district heating and cooling to the European Commission by 31 December 2015.

II.7.2 Background

Article 14 deals with the promotion of efficiency in heating and cooling, and Article 15 addresses efficiency aspects of the transformation, transmission and distribution of gas and electricity, including the operation of energy markets.

The promotion of cogeneration was addressed by the combined heat and power (CHP) Directive (2004/8/EC), which will be repealed on 5 June 2014. It required MSs to quantify their CHP potential, but did little in practice to promote the use of CHP. It is important to note that before the EED, district heating and cooling (DHC) technologies did not benefit from promotional legislation at EU level. As a consequence it was estimated that an untapped potential of 25 Mtoe within the EU remained for CHP at the time the EED was being developed. The definitions, reference values and methodology of the CHP Directive have been carried over (as a harmonised set of criteria at EU level) to the EED.

Regarding the generation, transmission, distribution and supply of gas and electricity, the EU decided in 2009 to do away with the fragmented framework of energy market rules in each MS and replace them with a common set of rules to create a fully operational internal gas and electricity market.

These rules, encapsulated in the Third Internal Energy Market Package and its constituent Gas and Electricity Directives (2009/73/EC and 2009/72/EC) are designed to ensure fairer competition among market operators and higher consumer protection. However, they did not do much to promote or incentivise energy efficiency. There is little reference to the need to ensure the energy market is the right "size" (that consumption is kept as low as possible), nor is there much real incentive to use demand side resources to facilitate the operation of energy markets.

A strong implementation of the EED has the potential to fill this gap and to create the missing link in the Third Energy Package for an energy efficient optimisation of the grid.

Articles 14 and 15 of the EED offer a number of opportunities to embed efficiency more systematically in decision-making regarding the design of heating and cooling systems and the transformation, transmission and distribution of energy. There is a clear need to improve efficiency in all these aspects, noting that:

- The overall efficiency of the energy transformation sector is still low and progress has been very slow;
- Energy efficient supply solutions such as DHC networks and High Efficiency (HE) CHPs are not properly considered and supported at national level;
- Most national decision makers do not have a clear picture of the level and geographical distribution of energy demand and supply on their territory. In fact MSs hardly take an integrated approach to their energy supply and end-use sectors when designing national policies, as they rarely factor in heating and

cooling demand and supply dimensions into their power assessment and forecasting exercises;

- As regards the operation of gas and electricity networks, the traditional top-down thinking still prevails. In many countries, the electricity system is operated in a centralised and dispatchable way which can be a problem for new players like decentralised power producers and demand service providers;
- National electricity regulatory authorities are not tasked with overseeing improvement in energy efficiency or maximising demand response potential. As essentially nobody has this overall responsibility, the "efficiency first" principle is completely absent from the system;
- Development of demand response programmes in MSs is almost non-existent to date despite general acknowledgment and evidence from other countries that they would improve the efficiency of the energy market and bring environmental benefits to the grid;
- As energy production is shifting towards renewables, and in particular towards more electricity from variable renewable sources, the paradigm should shift to promoting demand that can be flexible;
- The EU and MSs are starting to consider whether a system of capacity payments should be introduced to ensure continuous match-up of supply and demand. If such a system is eventually introduced, it is vital that it adequately rewards demand side resources in a non-discriminatory way compared to providers of supply side solutions; and
- At present energy price signals do not reward or promote efficiency, as they do not reflect the real cost of energy – in general- or at particular times.

II.7.3 Requirements

II.7.3.1 Efficient supply of heating and cooling

The essential premise of Article 14 is that MSs need to carry out a CA by December 2015 of the potential for implementing high efficiency (HE) co-generation and efficient DHC and report the results to the Commission. This assessment should include both territory level CBA, on the basis of which MSs will facilitate the development of HE CHP and DHC installation cost-benefit analyses.

MSs will also mandate the carrying out of cost benefit analyses whenever existing thermal electricity generation installations, industrial installations or DHC networks are planned or substantially refurbished.

The EED requires MSs to approach heating and cooling at country level in an integrated way, by assessing both heat demand and the potential for HE CHP and efficient DHC to meet this assessed demand cost-effectively.

The CA of the potential for the application of HE CHP and efficient DHC should be based on the requirements set out in Annex VIII, which include:

- Description of heating and cooling and demand forecast for the next ten years (the base year would probably be 2013);
- A heat demand map of the national territory;
- Identification of heating and cooling demand that can be met with CHP, including micro-CHP;
- Identification of additional HE CHP for refurbishment of existing and new generation and industrial installations; and
- Strategies and policies that may be adopted up to 2020 and 2030 to realise the potential identified.

This CA should also take into account the outcome of the national reports on the CHP potential published in the framework of the implementation of the CHP Directive 2004/8/EC[46].

The cost-benefit analysis at territory level establishes the following key elements:

- System and geographical boundaries;
- An integrated approach to demand and supply options;
- A baseline;
- Alternative scenarios (to include only HE CHP, efficient DHC or efficient individual heating/cooling); and
- A method of calculation that includes:
    - assessment and comparison of total long-term benefits of heat or cooling supply options;
    - net present value as evaluation criterion; and
    - time horizon recommendations: 25 years for a gas-fired power plant, 30 years for district heating systems and 20 years for heating equipment such as boilers.

The EED requires that, in areas where the benefits are greater than the costs, MSs shall "take adequate measures for efficient DHC infrastructure to be developed and/or to accommodate the development of high-efficiency cogeneration", based on the positive outcome of the CA and territory-level CBA, and adopt authorisation/permitting decisions based on the positive outcome of CA and installation-level CBA.

It should be noted that these minimum requirements of the EED do not guarantee that a positive CBA will be followed up with action. Please see chapter II.7.4.1 for recommendations on how to ensure that the potential for CHP and DHC is fully tapped.

There are a number of opt-out cases that can be granted by MSs:

- In areas where the outcome of the territory-level cost-benefit analysis proves negative, MSs may exempt installations from carrying out individual CBA.
- Power plants may be exempted by MSs from the requirements of this Article if they fall into one of the following categories:
    - peak load and back-up electricity generating installations (less than 1,500 operating hours per year);
    - nuclear power installations; and
    - carbon capture & storage (CCS) installations.
- MSs may also lay down thresholds for exempting individual industrial installations or DHC networks (either planned or substantially refurbished) exceeding 20 MW thermal input from carrying out an installation-level CBA. Such rules must be communicated to the Commission by 1 January 2014.

[46] OJ L 52, 21.02.2001, p. 50-60.

Important EED Annexes

I - General principles for the calculation of electricity from cogeneration – no change compared to the existing legislation

II - Methodology for determining the efficiency of the cogeneration process – no change compared to the existing legislation

VIII - Potential for efficiency in heating and cooling – methodology for the Comprehensive Assessment on CHP potential

IX - Cost-benefit analysis methodologies for promotion of high efficiency cogeneration and district heating and cooling

X - Guarantee of origin for electricity produced from high-efficiency cogeneration

XI - Energy efficiency criteria for energy network regulation and for electricity network tariffs – promoting distributed generation and demand response

XII - Energy efficiency requirements for transmission system operators and distribution system operators – guidelines for transmission system operators (TSOs) and distribution system operators (DSOs) on informing and setting a reasonable timetable for new producers of high efficiency cogeneration to be connected to the grid

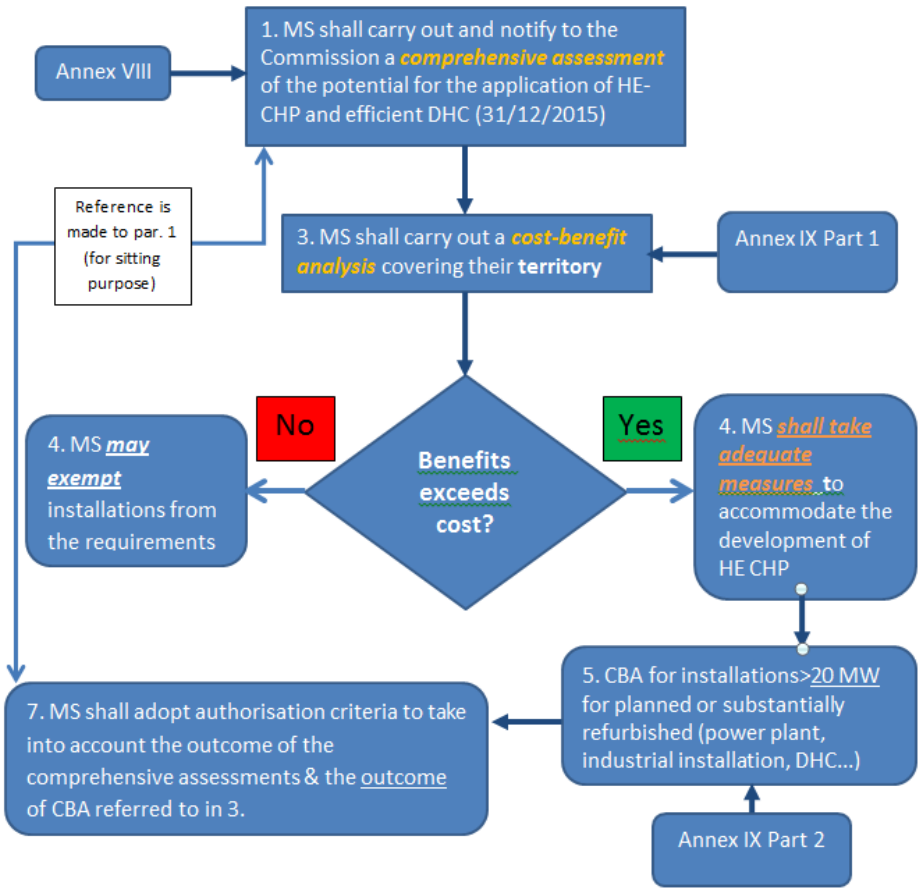

Figure 23 - Flowchart for the decision making steps under Article 14, COGEN Europe

II.7.3.2 Demand response and efficiency of distribution and transmission

Gas and electricity infrastructures in all MSs have a substantial potential for higher energy efficiency that needs to be unveiled. Article 15 sets out a number of requirements intended to promote efficiency in the transformation, transmission and distribution of energy and to remove those incentives in transmission and distribution tariffs that are detrimental to the overall efficiency (including energy efficiency) of the generation, transmission, distribution and supply of electricity.

Specifically, Article 15 sets out that:

- In each MS, regulatory authorities shall "pay due regard" to energy efficiency when implementing any measure to develop and improve the network infrastructures;
- It suggests that incentives be granted to Distribution System Operators (DSOs) and Transmission System Operators (TSOs) for them to develop efficient programmes and services consistent with both the Third Energy Package and climate and energy package objectives, including the deployment of smart grids;
- MSs must remove any incentives in tariffs that are detrimental to efficiency or which might hamper the participation of demand response in balancing markets and ancillary services procurement;
- By the end of June 2015, MSs shall ensure that an assessment is undertaken of the energy efficiency potentials of their gas and electricity infrastructure, and that "concrete measures and investments are identified for the introduction of cost-effective energy efficiency improvements in the network infrastructure, with a timetable for their introduction"; and
- A framework will be established for access to the grid and dispatching of electricity for HE CHPs. It requires that, while the security of the grid is ensured, TSOs and DSOs:
    - Guarantee the transmission and distribution of electricity from HE CHP;
    - Provide priority/guaranteed access to the grid for HE CHP; and
    - Provide priority of dispatch of electricity from HE CHP.

Note that CHP cannot take priority over variable RES-E when ranking different types of generators, as MSs must ensure that priority access or dispatch for energy from variable renewable energy sources is not hampered. The two can be equal.

MSs are also invited (but not obliged) to particularly encourage priority and ease of access to the grid by small-scale and micro-cogeneration units and require TSOs and DSOs to reduce the connection and system charges for HE CHP that is sited close to demand points. This could be achieved by:

- Ensuring that national electricity regulators "encourage demand side resources, such as demand response, to participate alongside supply in wholesale and retail markets", and to "treat demand response providers, including aggregators, in a non-discriminatory way". Suggestions include defining technical modalities for participation of these providers in such markets;
- Encouraging demand response, balancing and other operational services, for instance by ensuring a market for energy sold at hourly cost and by eliminating entry barriers to new operators. A relevant entry barrier is the access to data on grid balancing conditions;
- Allowing and regulating the availability of time tariff schemes for final consumers; and
- Allowing time and price signals to create the right context for evaluating investments on grid efficiency and sustainability. For CHP units, comprehensive and reasonable costs and timetables for grid connection (transparent and non-discriminatory) shall be set at national level.

Look out!

To ensure the uptake of demand response participation, smart meters must be able to measure consumption according to time of use periods. MS should therefore mandate that smart meters be technically capable of this to avoid locking in the opportunity for demand response for the lifetime of those meters.

Look out!

Network Codes developed by the European Network of Transmission System Operators (ENTSO-E)

In 2011 the EU mandated the establishment of European Network Codes as a prerequisite for the creation of an internal energy market. These codes would notably ensure security of supply and further integrate low carbon generation. The development of these network codes by ENTSO-E creates this unique opportunity to fulfil the following Article 15 objectives: enhancing security of supply, decarbonising the energy sector and deploying demand side participation.

Among the Network Codes developed by ENTSO-E, the Demand Connection Code aims at defining the grid connection requirements of demand-side facilities (including end users and/or their household and industrial appliances) which are considered as necessary for the preservation or the restoration of electricity network stability.

This Code is seen as a first opportunity to move away from the old top-down approach of increasing supply to face the increase in demand. This Code has been identified as a priority in the Commission communication on the internal energy market and should be finalised in 2013.

It must be ensured that the Code embraces the fundamental principles stated in Article 15 that all demand response service providers are treated in a non-discriminatory way and that demand side participation should be rewarded appropriately. "System services to network users" determined by the system operators should indeed be offered and not made mandatory. Emphasis should be put on voluntary and rewarding demand response services to ensure comparable treatment of demand side with supply side.

II.7.4 Legal checks and recommendations

II.7.4.1 Efficient supply of heating and cooling

Legal checks

1. Confirm that the comprehensive assessment of the potential for high-efficiency cogeneration and district heating and cooling contains all information set out in Annex VIII by 31 December 2015.
2. Check that, from 5 June 2014, all new or to be refurbished thermal generation installations or district heating/cooling networks over 20 MW are subject to a cost-benefit analysis in accordance with Part 2 of Annex IX.

Good practice recommendations

1. Link spatial planning rules to national level CA to ensure an "integrated approach".

The most effective way to apply the integrated approach would be to strongly link spatial planning rules to the EED. Therefore, the planners of thermal electricity generating and industrial installations should be given guidance on where best to site these in terms of heat demand and supply.

2. Conduct CBA in a transparent and participatory manner and include socio-economic costs.
3. Where a CBA returns a positive result for the use of CHP and/or DHC, its application should be automatic and the adequate measures shall aim to alleviate the risk for CHP operators associated with power markets for their heat load units.
4. Parameters and price assumptions for the CBAs should be taken from harmonised European sources (*Energy trends 2030* and DG Environment for pollutant emissions costs) and agreed with national stakeholders.
5. Treatment of Article 8, which deals with energy audits and energy management systems, should consider the evaluation of the implementation of CHP and/or DHC at installation level (energy saving potential and technical possibility).

6. The scope of Article 14 should be expanded to capture more installations below 20 MW and promote decentralised production of energy. Those installations should be covered by the CA and the CBA at installation level.

While the scope of Article 14 sets requirements for installations with a thermal input greater than 20 MW, there are benefits for MSs to expand the scope or at least some parts of the new legal environment brought by the EED (i.e. carrying out the CBA at installation level and adopting authorisation criteria to build on the CBA outcome) to installations with thermal input of less than 20 MW. It is worth recalling that significant heat and supply point definition of 20 GWh a year equates to only a 4 MW combustion installation operating 5,000 hours per annum.

Description of successful implementation indicators

To complement these recommendations related to supply, monitoring the following indicators would help implementers, decision makers and CHP and DHC stakeholders track their evolution and propose appropriate action:

- Amount and share of cogenerated electricity in total electricity production;
- Cumulative amount of CHP capacity;
- Share of cogenerated heat in total heat consumption;
- Proportion of the assessed national CHP potential being realised; and
- Progress towards achieving the identified economic potential.

Good practices in practice

Germany passed a CHP law in summer 2012, with a target of 25% of generated electricity to come from CHP installations by 2020 (up from 14.5% in 2010).

The KWKG (combined heat and power law) features a series of policy instruments to more effectively tap into the national potential for cogeneration:

- Support for cogenerated electricity through differentiated bonus (premium) payments depending on the capacity of the CHP plant. In short, bonuses for new and refurbished plants will range between 1.8 and 5.41 cents/kWh (see table below). It should be noted that the bonus received by CHP operators is complemented by payment from DSOs on the basis of both the avoided purchase cost of electricity from the generation mix and the distribution grid losses;
- The total level of support to the sector is capped at €750 million/year;
- Micro CHP up to 50 kW electricity operators (defined as mini-CHP in Germany) will be able to choose between receiving support for ten years and 30,000 full operating hours;
- Micro CHP up to 2 kW electricity operators (very small CHP in Germany) can opt for a one-time payment equivalent to the amount of 30,000 full time operating hours;
- Reaffirmation of the priority access rule for cogenerated electricity (in full parity with renewable energy sources);
- Promotion of the construction and expansion of heating and cooling networks operated with heat from CHP plants. Heating networks will receive €100 per meter, up to 40% of investment for pipelines below 100 mm in diameter and up to 30% for pipelines above 100 mm in diameter; and
- Support for heat storage infrastructure by €250/m^3, up to 30% of investment costs and capped at €5 million.

elektr. power (proportional*)	Bonus per kWh	Support duration
≤ 50 kW	5,41 Cent optional for ≤ 2 kW: one times payment for 30.000 foh**	10 years or optional 30.000 foh**
≤ 250 kW	4 Cent	30.000 foh
≤ 2000 kW	2,41 Cent	
> 2000 kW	1,8 Cent	
from 2013 for ETS plants	2,1 Cent	

From 2013, EU-ETS CHPs get an additional 0.3 cent (cost compensation).

A review of the impact of the German CHP Law will be carried out in 2014, and new measures might be put in place if CHP market development trajectory is not on track for achieving the 25% target by 2025.

II.7.4.2 Demand response and efficiency of distribution and transmission

Legal check

1. Ensure that MSs remove any incentives in tariffs that are detrimental to efficiency or which might hamper the participation of demand response in balancing markets and ancillary services procurement.

Good practice recommendations

1. Ask that MSs enact the requirement for TSOs and DSOs to facilitate the connection to the grid of small and micro-CHP.
2. For network operators, simplify the micro-CHP installation process by adopting a simple notification "install and inform" process.
3. Reduce the connection and system charges for HE CHP units sited close to heat demand points.
4. The action plans following the MS assessment of EE potentials by June 2015 should include bringing all parts of the network up to best available technology (BAT) standards in accordance with the Directive on industrial transmissions (2010/75/EU) and the Directive on integrated pollution prevention and control (2008/1/EC), and national requirements for all newly built installations to meet these requirements after a certain date.
5. Ask that MSs develop clear rules for markets that enable demand side participation in a non-discriminatory fashion.

These rules should in particular strive to ensure that demand side resources receive the real market value for their participation so that benefits are properly shared amongst all network users. Equal treatment of generation and demand is key. For instance it is clear that the non-use of electricity at certain times of the day has a value that should be rewarded appropriately. The introduction of a real market approach to demand response is therefore necessary. With increasing intermittent renewable energy sources in the future, we need to stress the responsiveness of balancing in the future for both demand side management and conventional electricity supply.

6. Simplify rules to allow participation in markets in order to adapt to the specificities of demand side providers. Enablers for active demand side participation must be implemented.

This is particularly true for residential consumers. Today, most markets are modelled for generation side participation because legislations have been written for power generators, with the idea that they would always provide more capacity. This has generated regulatory barriers and limitations to the penetration of third parties. Very few MSs have started developing the adequate framework to incentivise the end-users to participate in demand response programmes. When developed, rules are more adapted to very big industrial players who have the capacity to deal directly with the TSOs and DSOs. Aggregators could be play a fundamental role as facilitators for private consumers to enter the market.

III GETTING ON TRACK

Part III considers the overarching measures which bring all the pieces together and lead beyond 2020. It includes recommendations on how to use financing strategies and national building renovation strategies.

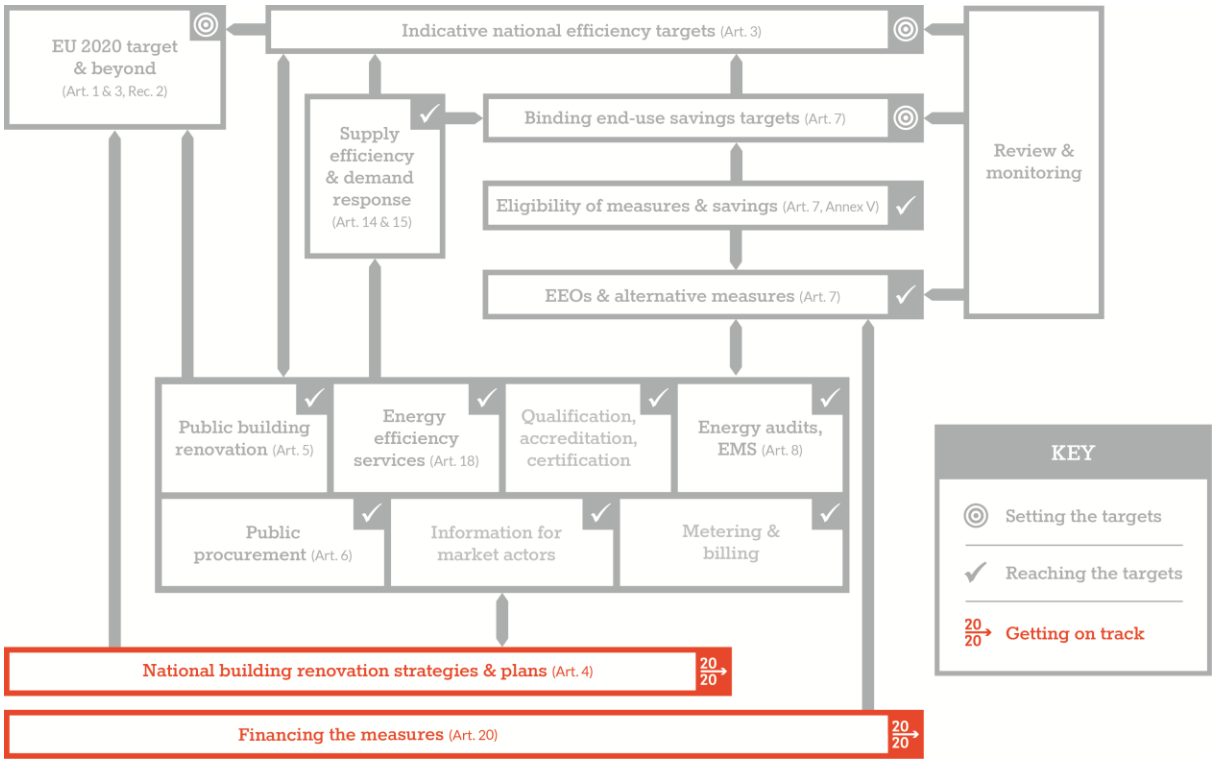

Figure 24 – Guidebook Overview Map: Getting on track

III.1 National building renovation strategies and plans (Article 4)

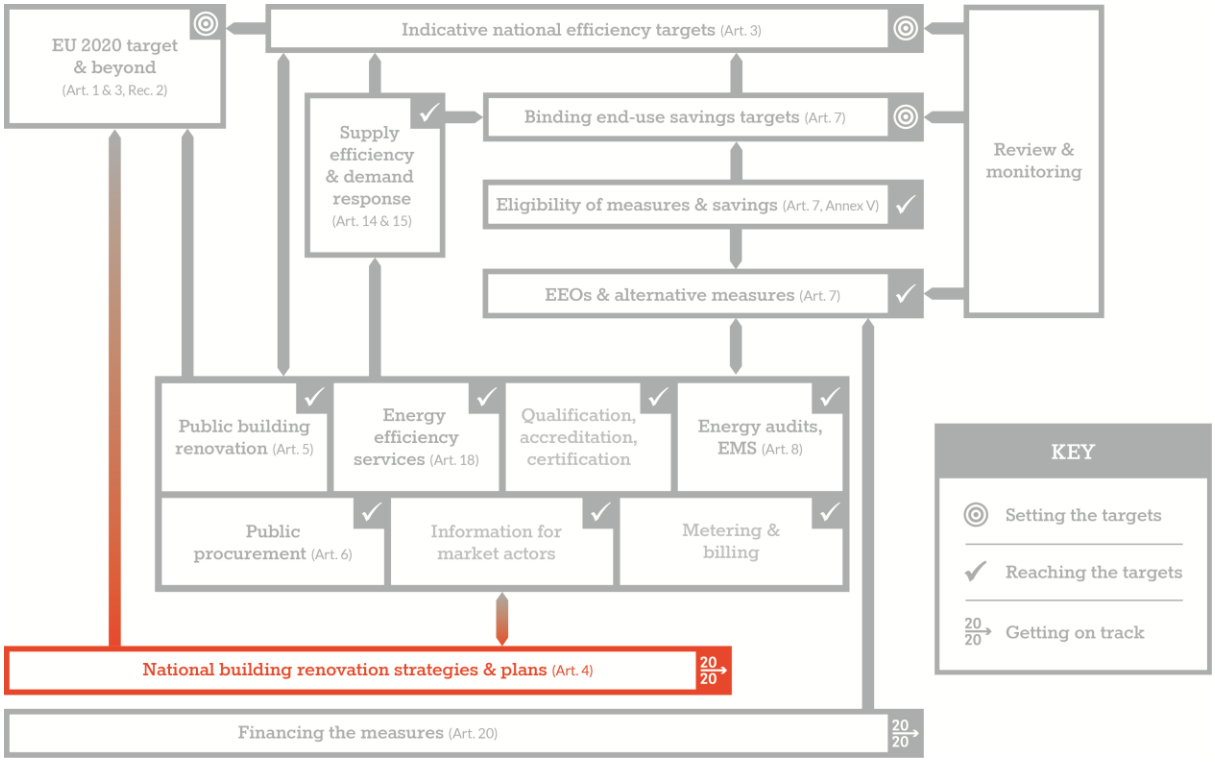

Figure 25 – Guidebook Overview Map: National building renovation

III.1.1 Summary

Article 4 of the EED requires MSs to define long-term strategies for stimulating renovations in their building sector. This provides them the opportunity to realise the full savings potential of their entire building stock (not just the public buildings emphasised in Article 5). The Coalition believes that the aim of the comprehensive national renovation roadmaps should be to provide a well-planned, realistic yet ambitious approach, to increase with immediate effect the historically low renovation rates, and ultimately reduce significantly the energy consumption of the building stock by 2050.

The national renovation strategies must be robust and designed to put all actors on the right track towards reaching an 80% reduction of the energy demand of the EU's buildings by 2050, as recommended by the European Parliament, the Renovate Europe Campaign and other authorities. This will be done by:

- Developing an overview, which should be understood as an inventory, of the entire national building stock. This should be formulated in coordination with the inventory of public buildings required in Article 5;
- Assessing the impact of renovation approaches (techniques) and proposed policies and measures, including those to stimulate deep and staged deep renovations;
- Assessing empirically the expected energy savings for all building types, including wider benefits, to enable better planning and monitoring of the likely impact of enacted policies;
- Designing new long-term financing mechanisms, plans and perspectives as a way to ensure a stable investment climate for market actors; and

- Engaging all relevant stakeholders (multi-party political groups, relevant government departments, building professionals, ESCOs, financial institutions, civil society, etc.) in the development of the roadmaps.

The development of the long-term renovation roadmaps set out in Article 4 is to be viewed in coordination with the public buildings renovation requirements established in Article 5, which should be aimed at kick-starting the market and providing best practice cases through the public sector. The long-term perspective provides the predictability to all stakeholders needed to unlock investments and support institution and capacity building and training. It is important to note that the renovation roadmaps are dynamic tools that will need to be adapted to future developments.

Two recent reports, *A guide to developing strategies for building renovation* prepared by Building Performance Institute Europe (BPIE)[47] and *Renovation Roadmaps for Buildings*[48] prepared for the European Insulation Manufacturers Association (Eurima) by The Policy Partners, elaborate in detail actions to be considered when designing renovation strategies.

MSs must draft their national renovation strategies by 30 April 2014 and update them every three years as part of their National Energy Efficiency Action Plans (NEEAPs).

III.1.2 Background

While the EED is meant to help the EU reach its 20% energy saving target by 2020, Article 1 acknowledges that the EED should "pave the way for further energy efficiency improvements beyond that date". Article 4 on building renovation is perfectly in line with this longer term perspective, as it provides guidance for future energy efficiency and savings policies in the building sector. Article 4 requires that MSs draft national renovation strategies by 30 April 2014 with a perspective far beyond 2020.

Article 5 on its own is insufficient to grasp the full energy saving potential of the built environment. Article 4 therefore seeks to bridge that void and stimulate stronger and more comprehensive action.

With a focus on the entire building stock (public and private), Article 4 mandates and indeed encourages MSs to develop a coherent long-term national strategy for mobilising investment streams to renovate existing buildings. This strategy should provide tailor-made guidance adapted to specific categories of buildings (residential, commercial and public buildings). It should also include policies, programmes and measures that ensure the integration and proper functioning of markets and value chains in the built environment. Overall, it should provide a well-planned, realistic yet ambitious approach, to increase with immediate effect the historically low renovation rates and ultimately reduce significantly the energy demand of the existing building stock up to 2050.

Recital 16 recalls the huge potential of buildings in contributing to growth and employment opportunities, climate goals, energy security and energy savings and efficiency objectives. In other words, the renovation strategies are a key tool to drive economic recovery and at the same time help the EU achieve its decarbonisation objectives.

III.1.3 Requirements

Article 4 specifically says that:

> *"Member States shall establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private. This strategy shall encompass:*

[47] *A guide to developing strategies for building renovation,* Building Performance Institute Europe, 02.2013.
[48] Klinckenberg, F., McAndrew, L. and Pirie, M. F., *Renovation Roadmaps for Buildings*, The Policy Partners, London, 01.2013.

(a) an overview of the national building stock based, as appropriate, on statistical sampling;

(b) identification of cost-effective approaches to renovations relevant to the building type and climatic zone;

(c) policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations;

(d) a forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions;

(e) an evidence-based estimate of expected energy savings and wider benefits."

The strategy will be updated every three years. This three-year reporting cycle provides a valuable tool for review of progress and for refinement of intermediary milestones included in the roadmaps, as experience with their implementation is acquired.

III.1.4 Good practice recommendations

1. **Advocate for an 80% energy consumption reduction target for the building stock to be achieved through improvement of the energy performance of buildings by 2050. This will also provide investor confidence.**

At EU level, the European Commission's *Roadmap for moving to a competitive low carbon economy in 2050* has set an overall long-term target for the building sector of 88-91% reduction of CO_2 emissions by 2050. The timeframe for the renovation strategies set out in Article 4 should be linked to this EU policy initiative and others, such as the Energy Roadmap 2050[49] and the Roadmap to a Resource Efficient Europe to 2050[50]. Examples of long-term national strategies with the same timeframe are already available at national level (e.g. in Germany[51], Ireland[52], and Denmark[53]), some of which also focus on the built sector.

Once the far-reaching target of 2050 is set, a back-casting exercise should allow the fixing of intermediate quantitative targets (for 2030, 2040 and beyond) and covering different building types (residential, commercial, public and private); these intermediate targets will be instrumental to the achievement of the longer-term goal and will help evaluate whether a recalibration of the strategy is needed at a certain point.

There are numerous empirical examples and modelling results showing the economic rationale for approaching the 80% range of energy performance improvement[54]. Germany, for instance, has already committed to an 80% reduction in the primary energy demand in the building sector by 2050[55].

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[49] European Commission Communication 2011/0885 *Energy Roadmap 2050*, 15.12.2011.
[50] European Commission Communication 2011/0571 Roadmap to a Resource Efficient Europe, 20.09.2011.
[51] 'The Energy Concept and its accelerated implementation', *German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety*, 10.2011.
[52] *Residential energy roadmap 2050*, Sustainable Energy Authority of Ireland (SEAI), 2010.
[53] *Energy Policy of Denmark*, Danish Energy Agency, 12.2012.
[54] Ecofys, *Renovation Tracks for Europe up to 2050 - Building renovation in Europe - what are the choices?*, 10.2012.
Building Performance Institute Euruope, Europe's Buildings Under the Microscope – A country-by-country review of the energy performance of buildings, 11.2011.
Center for Climate Change and Sustainable Energy Policy, *Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Hungary*, Central European University, Budapest, 08.06.2010.
Center for Climate Change and Sustainable Energy Policy, *Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Poland*, Central European University, Budapest, 01.2012.
Hermelink, A. and Müller, A., *Economics of deep renovation: Implications of a set of case studies*, Ecofys, 12.2010.
Hermelink, A., How deep to go: Remarks on how to find the cost-optimal levels for building renovation, Ecofys, 13.08.2009.
[55] Federal Ministry of Economics and Technology, Second National Energy Efficiency Action Plan (NEEAP) of the Federal Republic of Germany, 10.2011.

This level of reduction target could generate a real change in long-term investor confidence by creating a stable and lower-risk investment climate over the long term.

2. **The public buildings inventory should be expanded to an inventory of the whole building stock.**

To be able to set long-term energy reduction objectives and develop the renovation strategies, MSs need to have a clear picture of the current energy performance of their entire building stock (and not just the public buildings required in Article 5). Therefore, carrying out the "overview of the national building stock" should be understood as setting up an inventory, which leads to a mapping of the current energy performance of existing buildings, showing useful floor space and actual consumption (e.g. in kWh/m^2 per annum).

The inventory is also a prerequisite to implement the available and future policies and measures tailored to the specific national circumstances of the building stock. The outcome of the requirement should again be publicly available (including both the results and methodology).

3. **Strategies should include clearly defined renovation approaches and expected energy savings for all building types, in order to capture the benefits of long-term investments and improve policy monitoring.**

MSs should do reliable, stratified, sectoral savings potential assessments based on calculations that take account of long-term costs and multiple benefits. These should be cost effective, as explained in chapter II.3. Only then will it be possible to fully capture the returns and benefits of long-term investments involved in building renovations. MSs should bear in mind the lock-in effect that could result from undertaking sub-optimal renovations. This has been demonstrated by numerous studies[56].

At the same time, the policies and measures to realise these cost-effective savings potentials and the tools to implement them should be well defined. The expected savings for the different policies and measures should be assessed and benchmarked against the long-term savings potential of the entire national building stock. This should also be done in correlation with the suggested targets established by the European Commission's *Roadmap for moving to a competitive low carbon economy in 2050* for buildings.

Moreover, the impacts of new policies, measures and approaches in terms of increasing productivity and lowering costs during the course of the strategy should be carefully analysed and quantified. For example, cost-effective renovation approaches that are linked to economies of scale can, *inter alia*, impact the dimensioning of technical system requirements, such as heating and cooling supply and thus reduce energy demand significantly. Therefore, it is important to have up-scaled renovation programmes and co-ordinated efforts rather than several "isolated" small programmes. "Bottom-up" schemes, e.g. different initiatives, renovation plans and goals being developed at local level, should also be supported and coordinated within the national renovation roadmaps in order to help create a coherent framework.

Methods to track progress and measure and verify results should also be incorporated. Further guidance is required on measurement and verification of savings. This can be provided by the several existing studies on this subject financed by the Commission, like EMEEES[57], as well as the JRC ISPRA's methodology for measuring energy savings in buildings, which is actually already being used by many MSs[58].

The outcomes planned to be delivered through the renovation strategies should be clearly communicated to all actors.

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[56] Among others: Global Buildings Performance Network and the Centre for Climate Change and Sustainable Energy Policy – Central European University, *Best Practice Policies for Low Carbon & Energy Buildings, Based on Scenario Analysis,* 05.2012
Hermelink, A. and Müller, A., *Economics of deep renovation – Implications of a set of case studies*, Ecofys, 12.2010.

[57] EMEEES project, Evaluate Energy Savngs EU.

[58] Institute for Energy and Transport, Joint Research Centre, 02.04.2013.

4. **Encourage MSs to develop a policy landscape that stimulates cost-effective deep renovations of the building stock.**

Because the EED stipulates that national renovation strategies include policies and measures to stimulate cost-effective deep renovations of buildings, MSs must go beyond individual measures for "mobilising investment" and implement a broad policy mix supported by a broad political spectrum. Policies and measures included in the EED should also be taken into account. For instance, the National Energy Efficiency Funds foreseen in Article 20 should be designed to promote mainly deep and staged deep renovations.

When developing the policies and measures within their long-term renovation strategies, MSs should also take into account their obligation to develop policies and measures to stimulate the transformation of buildings into nearly zero-energy buildings under Article 9 of the EPBD (2010/31/EU).

Deep & staged deep renovation (see Annex C)

Recital 16 of the EED states that deep renovations "lead to a refurbishment that reduces both the delivered and the final energy consumption of a building by a significant percentage compared with the pre-renovation levels leading to a very high energy performance" and that "such deep renovations could also be carried out in stages."

In poorly performing buildings, deep renovation has been shown to improve the energy performance by on average a factor of four and within a range of between 65% and 95% compared with pre-renovation levels, primarily by reducing final energy consumption. This should bring the energy performance level of the renovated building as close as possible to requirements for new built or nearly zero energy-buildings.

The successful implementation of a staged renovation requires the definition of a holistic renovation plan to avoid that any stage of the renovation increases significantly the overall costs or precludes subsequent stages in the course of the standard renovation cycle. This renovation plan will look at the building as a whole (including envelope, control systems, technical systems and equipment), and define the sequence of the renovation stages with a view to reach the final goal (the significant reduction of energy consumption).

Policies and measures fostering deep renovation include, *inter alia*:

- Incentives to look at the building as a whole (including envelope, control systems, technical systems and equipment) and to carry out more than one renovation measure at a time;
- Encouragement to carry out deeper renovation work whenever there is a change of owner in the building, e.g. through differentiation in taxation;
- Requirements to improve first the worst energy performing properties in a market segment[59];
- Minimum improvement level conditions (in % of energy gains) when granting public subsidies, soft loans or default guarantees;
- Incentives for longer-term contracts such as Energy Performance Contracting (EPCs), enabling deeper renovations;
- Improved governance laws in multi-family housing;
- Incentive schemes which address split incentives while avoiding regressive social impact;
- Independent technical and financial advice for building owners and occupants;
- Improvement and further harmonisation of standards and certification systems for buildings and building elements;
- Measures to increase collaboration between all parts of the building chain; and

[59] For instance, the UK's 2011 Energy Act outlaws the letting of F and G rated residential and commercial properties after April 2018.

- Encouragement to deploy best-available technologies, including those designed for monitoring and verification of the building's energy performance.

5. The multiple benefits arising from building stock renovation should be clearly quantified and communicated.

In order to build and nurture the buy-in of all actors concerned, including the various administrative levels (national, regional, local), MSs need to be able to identify, quantify and communicate not only the energy savings but also the wider benefits (co-benefits) of buildings renovated to high energy performance standards to the broader economy. This should include quantification of societal benefits whenever possible. The Commission should assist in gathering knowledge on which MSs are already beginning to use long-term calculation models and why. For a truly sustainable building sector, linkages with other relevant aspects like resource efficiency should be considered as well.

Examples of multiple benefits of buildings renovations

The benefits and co-benefits of building renovations whereby greater ambition leads to greater benefits for individual owners and for society have been substantiated in various studies:

- An analysis of the KfW building refurbishment programme, elaborated by Jüllich Research Centre, demonstrated that, by creating or safeguarding some 340,000 jobs only in 2010, building renovation brought immediate benefits to public authorities (4 to 5 Euro for each Euro invested) in terms of increased tax revenues and avoided unemployment subsidies.
- Recent research from Ecofys analysed three possible tracks for the renovation of the EU building stock for the horizon 2050 and demonstrated that the deep renovation of the EU building stock delivers the highest record in environmental benefits and energy savings (more CO_2 savings and far less energy consumption than the other tracks), and provides higher job creation at costs similar to the other options.
- The Irish Residential Energy Roadmap 2050 states that the deepest decarbonisation of Ireland's residential sector (about 90% of current levels by 2050) could be achieved with very high levels of energy efficiency retrofits, among other measures.
- Research on the employment impacts of a large-scale deep renovation programme in Poland showed that "deep renovation will create by 2020 around 250,000 net additional jobs per year, as opposed to the approximately 40,000 forecasted in the suboptimal scenario."
- A recent study by Copenhagen Economics on the ancillary benefits of building renovation demonstrated that renovating Europe's buildings could boost GDP by €291 billion by 2017.

6. Ask for stable funding for renovations.

A strong long-term policy framework is a prerequisite to stimulate building renovations and financing is a key pillar of this framework. Therefore, providing comprehensive solutions to enable financing for building retrofits should be included in the renovation roadmaps under Article 4.

Innovative financial mechanisms will be required in order to overcome the traditional barriers to the availability of upfront capital for renovation. A number of actors have to be involved, from state-owned banks and other finance providers to the final customer asking for a mortgage to renovate his or her house. Innovative financial mechanisms need to be supported by enabling frameworks, such as state guarantees (these are discussed in the following chapter of this guide).

MSs should engage all relevant interested parties in this process and consider the creation of long-term agreements with different stakeholders in order to provide long-term policy signals and contribute towards a sustainable renovation strategy. A common understanding and commitments involving the various stakeholders (building professionals, industry, financial institutions, etc.) and the political groups represented

nationally will be key elements in order for the strategies to survive changes in government.

7. Ensure coordination with other Articles in the Directive.

By putting buildings – the sector with the biggest energy saving potential – under the spotlight for energy efficiency and savings policies beyond 2020, Article 4 offers the opportunity to coordinate other measures, including:

- Article 5: Article 4 was conceived to complement this article (covering the whole building stock, not just public buildings). Therefore, from this perspective, the public building renovation obligation under Article 5 should be perceived as a "kick start" for long-term strategies;
- Article 7: Energy Efficiency Obligations can be used to support and finance renovation strategies;
- Article 8: Energy audits can provide valuable information about the current level of consumption of different types of buildings, as well as possible measures to take; and
- Article 20: Financing mechanisms and national EE Funds must help to develop the required investments.

III.2 Financing the measures (Article 20)

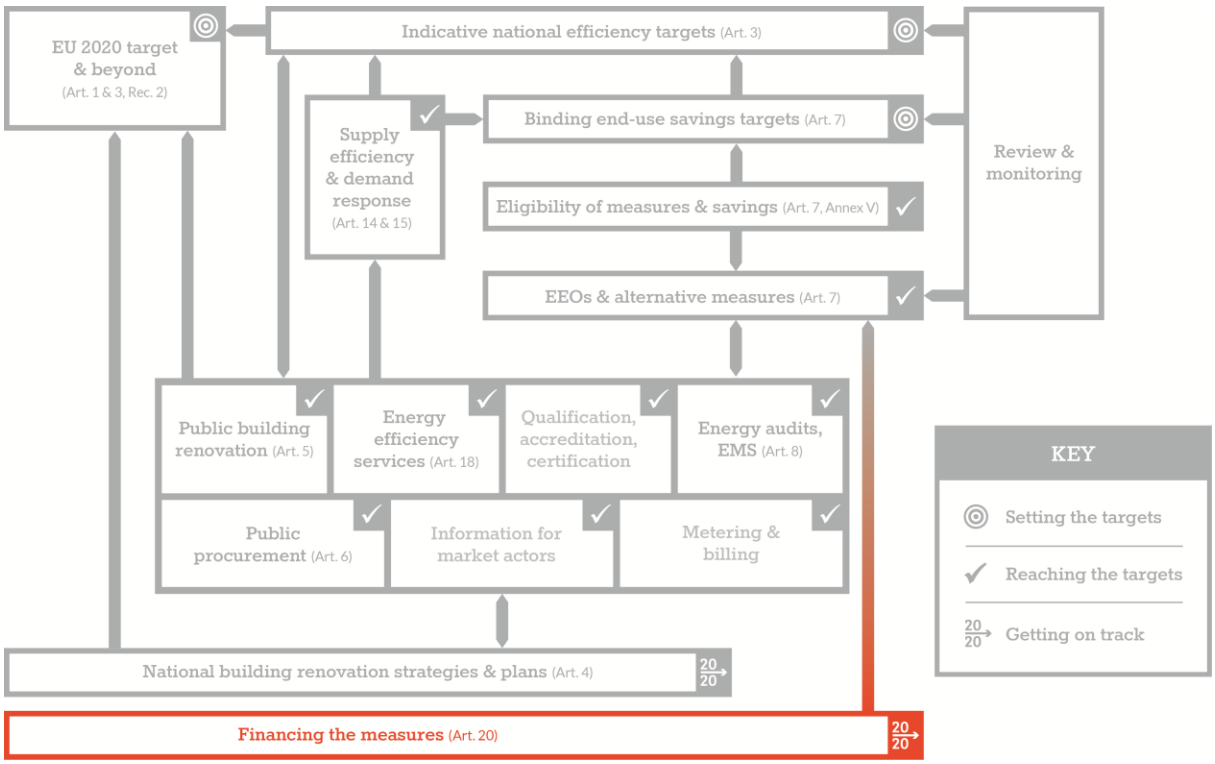

Figure 26 – Guidebook Overview Map: Financing the measures

III.2.1 Summary

In order to implement ambitious energy efficiency programmes in line with high standards for project viability and sustainability, MSs will need to ensure that adequate financing is available to those programmes. Initially this could come from public sources of finance, such as National Energy Efficiency Funds (NEEFs), but the aim should be to shift toward greater levels of private sector finance provision, as the energy efficiency market becomes better established.

The EU's Multiannual Financial Framework (MFF) for the 2014-2020 period is expected to increase the budgets available for climate action and within this, energy efficiency improvement programmes. This means that the need for structures to manage those budgets will increase and make a strong case for setting up NEEFs.

Article 20 invites MSs to establish dedicated financing facilities (NEEFs) to support energy efficiency investment or use existing facilities. There are significant advantages to governments ensuring affordable upfront finance is made available given that affordable private finance is scarce.

Funds do not have to be sourced from central budgets. Other options include public bank-sourced low cost capital, energy user charges (including EEOs), Structural Fund money and ring-fencing of EU Emissions Trading Scheme (EU-ETS) auction revenues. Funds should be designed to act as a catalyst or attractor for private sector financing in the medium-term.

MSs will need to decide which NEEP structure best suits their national conditions. Options include:

- fully public funds that are managed and administered by public financing institutions that disburse funds directly to end users;

- fully public funds that are managed and administered by public financing institutions but are disbursed via private sector banks;
- fully public funds that are managed and administered by a specific government department or departments; and
- public-private fund structures that disburse funds directly to end users.

Where available, it is highly recommended that MSs utilise the expertise held in their national public banks to set up and design EE funds. Finally, the interest of private sector investors is critical to achieving scale in the medium- to long-term. Investors will need to have confidence that scaled investment opportunities will be forthcoming. MSs should therefore develop a long-term plan to drive demand across all sectors of their economies that offers sufficient scale of opportunity to meet targets and confidence that the plan will match or exceed the expected period required for private capital invested to be repaid.

III.2.2 Background

Article 20 of the EED invites MSs to work to either establish dedicated financing facilities to support energy efficiency investment or use existing facilities to provide these financing services. This Article aims to ensure a source of scaled financing is made available to back enhanced national efforts to improve the energy efficiency of MS economies, and to create opportunities for various streams of publicly sourced money to be blended into a single "pot". The Article also includes requirements for the European Commission to provide assistance for MSs in setting up these facilities and exchanging best practices amongst each other.

Fulfilment of this Article will help address two of the key issues that have held back energy efficiency financing in many MSs: a lack of sources of public finance that are 1) scaled and 2) streamlined.

In addition to Article 20, other measures within the EED focus on identifying opportunities and driving scaled demand for energy efficiency measures that will assist governments in creating enhanced investment opportunities. While NEEFs and Financing Facilities could be a source of affordable finance to underpin investments, the sheer scale of the financing challenge will be beyond the reach of the public purse alone. The focus of such facilities should be, wherever possible, to catalyse co-investment by the private sector, thus kick-starting scaled markets that will eventually be backed by mainly private sector financing.

III.2.3 Requirements

Article 20 is non-binding and simply invites governments to set up NEEFs that aggregate sources of funding to support investments for reducing energy consumption. It also suggests three sources for the Fund: contributions from governments to fulfil their obligations to refurbish public buildings under Article 5 that equal the amount of investment needed to fulfil those obligations; annual contributions from energy distributors and retail energy sales companies that equal the investment needed to fulfil their Article 7 energy efficiency obligations; and revenues from EU emission allowance auctioning. It will be up to each country to decide whether to set up such Funds or not and how finance will be sourced.

A number of other funding sources could be considered, for example:

- The European Energy Efficiency Fund, set up by the European Investment Bank (EIB) and other national banks;
- Public bank-sourced low-cost capital (the approach used in Germany, which in part underpins its Energy Efficient House Programme with KfW financing);

- General National Budgets (the approach used under the USA's Recovery Act, which had a focus on making homes and businesses more energy efficient with funds sourced from central budgets);
- A specific charge on all energy users that is ring-fenced into an energy efficiency fund (this type of approach was used to support the UK's Energy Efficiency Commitment scheme); and
- Structural Funds and Cohesion Fund money, which the EED encourages as a way to trigger investments in energy efficiency improvement measures (see Annex E for three case studies on how such funds have been drawn down and utilised).

Setting up dedicated NEEFs, as set out by Article 20, creates an opportunity to blend different streams of finance from any or all of these sources and to potentially combine them with private sector and multilateral development bank funding (for example, finance from the European Investment Bank).

III.2.4 Recommendations

Good practice recommendations

1. **Ask governments to set up dedicated Energy Efficiency Funds capable of blending various streams of financing and dedicated to backing high standard national energy efficiency investment programmes.**

While setting up EEFs is not obligatory, it is highly recommended that governments intent on delivering ambitious energy efficiency programmes do so. Not only does this send a strong signal of intent to the private sector, it also creates opportunities to efficiently blend and coordinate the various sources of financing to back such investment programmes. Furthermore, if the fund provides investment to "able to pay" end users on a loan basis, then the "revolving" nature ultimately can permit greater activity than traditional upfront subsidy mechanisms.

A scaled source of affordable and long-term upfront finance to back energy efficiency investments is critical to ensuring government ambitions for energy efficiency can be delivered. This is especially true at a time when private sector finance providers are increasingly risk-adverse due to the ongoing effects of the financial and economic crisis.

The assessment criteria used to make an investment decision must be clear and precise in how the energy efficiency aspects are considered in order to ensure that projects are designed with the aim of delivering maximum energy savings and reduced energy bills. This should be done through needs assessment and proper monitoring, measuring and verification procedures in the operational programmes.

EEFs can take a variety of forms (see Figure 27 below) but they are ostensibly sources of finance ring-fenced from national budgets and deploying a range of types of financing instruments including commercial or soft loans and grants. They can be structured as:

- fully public funds that are managed and administered by public financing institutions that disburse funds directly to end users;
- fully public funds that are managed and administered by public financing institutions but are disbursed via private sector banks;
- fully public funds that are managed and administered by a specific government department or departments; and
- public-private fund structures that disburse funds directly to end users.

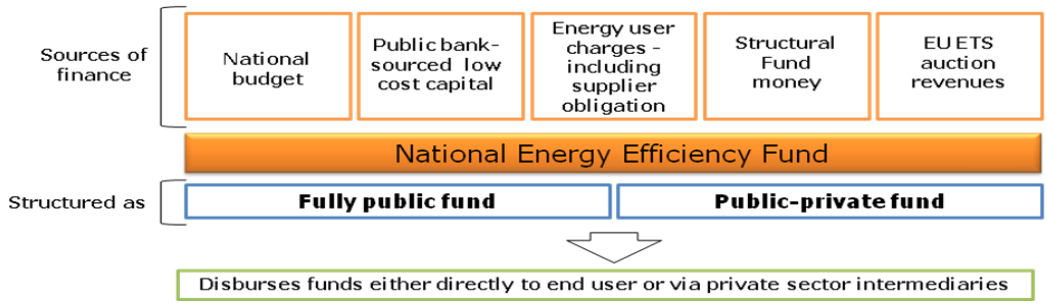

Figure 27 – Design consideration of NEEFs

In the European Union, many funds exist that are partly or fully dedicated to financing energy efficiency in MSs. Up to 4% of national allocations of the 2007-2013 programming of the European Regional Development Fund (ERDF), for instance, may be used to improve energy efficiency or to use renewable energy in existing residential buildings. Estonia made use of this provision and set up a revolving fund in 2009 for energetic refurbishment of houses. Its revolving fund provides long-term (up to 20 years), low-interest loans, and combines money from the ERDF (€17 million), the national fund KredEx (€49 million) and the Council of Europe Development Bank (€29 million). In the first year, 122 multi-apartment buildings in Estonia were refurbished through the programme, leading to average energy savings of 33% (with 20% as minimum required savings).

Other examples include the Slovak Energy Efficiency and Renewable Energy Finance Facility (SLOVSEFF II), launched by the European Bank for Reconstruction and Development (EBRD) in cooperation with the Ministry of Economy to support energy efficiency projects in the industrial and residential sector, and the Bulgarian Energetics and Energy Savings Fund (FEEI), the country's first private fund supporting energy-saving measures in publicly owned buildings with support from the EBRD.

2. Use public financing institutions to drive energy efficiency investment.

The expertise of public banks should be utilised in setting up and designing Funds, as they can play a critical role in driving the energy efficiency agenda forward. This could be in the form of a "primary financing role": setting up and running national EEFs, providing a source of low-cost, long-term finance to EEFs, or simply backing programmes run by other public or private entities. A secondary financing role might entail serving as a broker that warehouses energy efficiency loans and/or securitises them as bond market offerings. This latter function is important as a way of managing costs to consumers, since the cheapest source of private sector finance has traditionally been the debt capital markets. However, individual investments must be aggregated into a bundle to reach a size suitable for bond issuance (likely between €150 million and €250 million). Small-scale energy efficiency investments are often financed on a project-by-project basis, making it difficult to bundle different contracts with different risk characteristics into one attractive security.

3. Design effective policy instruments to ensure take-up of funds.

Making upfront finance available for energy efficiency measures is only part of the solution. As energy efficiency markets are currently at an early stage, careful thought should be given to the most effective complementary measures, whether economic instrument or regulation, to drive demand for loans among different economic sectors.

Instrument					
Fiscal	Tax relief on more energy efficient goods and services	Tax increase on less energy efficient goods and services			
Financial	Loans	Partial guarantees (including for 3rd party financing)	Grants – as a form of equity or to subsidise loans	Grants – as scrappage payments	Grants – to fund energy audits
Market-based	EE Feed-in-tariff	White Certificates, EEOs	EU-ETS permits (EUAs)		
Direct investment	Public procurement	Public infrastructure investment	RD&D		
Regulation	Minimum standards of energy performance for equipment	Requirement to undertake energy audits	Requirement to report on energy performance	Tightening of building regulations for new and existing buildings	

Table 3 – Examples of instruments that can be used to drive uptake of energy efficiency measures, and by extension energy efficiency loans

Good practices in practice

Using complementary economic instruments to stimulate uptake of energy efficiency loans for buildings

Germany: under the KfW Efficiency House Scheme homeowners can apply for loans with an annual interest rate of just 1% or "cashback" grants. Refer to page 73 for information on how Germany provides financial support to combined heat and power (CHP).

France: the government extended the availability of tax credits (the CIDD scheme) from 2012 to 2015, and introduced a new preferential rate loan of up to €30,000 (Eco zero-interest loan - Eco-PTZ) for energy efficiency improvements in social housing. The two instruments are part of a larger policy package that aims to promote environmental goals in the building sector. Demand side management measures include, in addition to the tax incentives and loan scheme, feed-in tariffs for renewable energy and obligation schemes for energy providers.

Poland: established in 1998, the Thermo-Modernisation and Repair Fund can cover up to 20% of a bank loan for investment in thermal renovation, but cannot exceed 16% of the total costs of investment. The support can be awarded to investment projects that reduce annual energy consumption by at least 10% if the heating system is modernised or by at least 25% in other cases (thermal insulation). The grant and soft loan elements of these schemes are financed by national budgets.

4. Consider how to structure offerings to leverage the maximum amount of private sector investment possible.

At the micro-scale (offerings) this means using cashbacks and grants to incentivise asset owners to invest their own capital. At the macro-scale (financing vehicles) this means

using public money as junior debt to bring in senior private sector debt and thus achieve scale in EEF structures.

5. **Develop a long-term plan for driving demand across all sectors of the economy that offers sufficient scale of opportunity to meet targets and confidence that the plan will match or exceed the expected period required for private capital invested to be repaid (traditionally 15 years or more).**

Within this plan governments consider the role of economic instruments versus regulation and other measures (including information campaigns) in driving that demand and creating opportunities of scale.

Green Deal in the UK: An innovative trial to address split incentives and stimulate uptake of energy efficiency loans for buildings

The Green Deal scheme, which started in 2013, links the energy efficiency loan to the building rather than the owner (thus addressing split incentives). In addition, those initially undertaking investments will receive a cashback backed by £125 million (€154 million) in government funds, with different cashbacks linking to different technologies installed.

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Supply side efficiency and demand response

European commission webpage on CHP with direct access to national report on CHP potential: http://ec.europa.eu/energy/efficiency/cogeneration/cogeneration_en.htm

Intelligent Energy Europe projects in the field of CHP:

CODE and CODE2 http://www.code-project.eu

CHP Goes Green (bio-CHP) http://www.chp-goes-green.info/

ene.field (micro-CHP fuel cell) www.enefield.eu/

International Energy Agency, *Cogeneration and District Energy: Sustainable energy technologies for today…and tomorrow*, 04.2009.

International Energy Agency, *Cogeneration and Renewables: Solutions for a low-carbon energy future*, 05.2011.

International Energy Agency, *Combined Heat and Power: Evaluating the benefits of greater global investment*, 03.2008.

ANNEXES

A. Timeline of the Energy Efficiency Directive obligations

Deadline	Article	Obligation
31 December 2012	Article 24 – Review and monitoring of implementation	Commission provides template as guidance for NEEAPs
30 April 2013	Article 3 – Energy Efficiency Targets	MSs shall set indicative national energy efficiency target
5 December 2013	Article 7 – Energy Efficiency Obligations	MSs opting for alternative approach shall notify Commission of policy measures.
5 December 2013	Annex V	MSs shall notify the Commission of proposed detailed methodology for Energy Efficiency Obligation Schemes and for purposes of Articles 7.9 and Article 20.9
31 December 2013	Article 5 – Exemplary Role of Public Bodies' Buildings	Inventory of eligible heated and/or cooled central government buildings
31 December 2013	Article 5 – Exemplary Role of Public Bodies' Buildings	For MSs opting for alternative approach instead of renovations, notification of alternative measures
31 December 2013	Article 14 – Promotion of efficiency in heating and cooling	Notification of exemptions under paragraph 6
1 January 2014	Article 5 – Exemplary Role of Public Bodies' Buildings	3% of total floor area of heated/cooled buildings owned and occupied by central government is renovated each year
30 April of each year from 2013	Article 24 – Review and monitoring of implementation	MSs report progress on achieving national energy efficiency targets
Before 30 April every year	Article 24 – Review and monitoring of implementation	Submit statistics on national electricity and heat production from high and low efficiency cogeneration.
30 April 2014 and updated every 3 years thereafter	Article 4 – Building Renovations	Building Renovation Strategy - first version of strategy published by MSs and submitted as part of the NEEAPs
30 April 2014	Article 19	MSs shall evaluate barriers and take measures to remove barriers to energy efficiency, and notify the Commission in the first NEEAP
30 April 2014 and every three years thereafter	Article 24 – Review and monitoring of implementation	Submit NEEAPs
5 June 2014	Article 7 – Energy Efficiency Obligations	MSs making use of paragraph 2 shall notify Commission
5 June 2014	Article 13 – Penalties	MSs to lay down rules on penalties for non-compliance for Articles 7 to 11
5 June 2014	Article 14 – Promotion of efficiency in heating and cooling	Cost-benefit analysis (paragraph 5)
5 June 2014	Article 27 – Amendment and	Various repeals and amendments

	repeals	
5 June 2014	Article 28 – Transposition	MSs bring into force necessary laws, regulations and administrative provisions
30 June 2014	Article 24 – Review and monitoring of implementation	Commission submits assessment referred to in Article 3.2 to EP and Council (national targets)
31 December 2014	Article 10 – Billing Information	For final customers without smart meters, MSs shall ensure billing information is accurate and based on actual consumption
31 December 2014	Article 14 – Promotion of efficiency in heating and cooling	Commission empowered to review the harmonised efficiency reference values
31 December 2014	Article 16 – Availability of qualification, accreditation and certification schemes	MSs shall ensure certification and accreditation schemes or equivalent if existing ones are considered insufficient
30 April of each year	Article 24 – Review and monitoring of implementation	MSs report progress on achieving national energy efficiency targets
30 June 2015	Article 15 – Energy transformation, transmission and distribution	MSs undertake assessment on energy efficiency potential of their gas and electricity infrastructure (paragraph 2)
9 July 2015	Article 5 – Exemplary Role of Public Bodies' Buildings	Threshold for buildings to be included in public sector renovations reduced to 250 m^2 from 500 m^2
5 December 2015, and at least every four years from the date of the previous energy audit	Article 8 – Energy Audits	National legislation by MSs to ensure that enterprises (non-SMEs) are subject to energy audit, implemented and supervised by public authorities
5 December 2015	Article 24 – Review and monitoring of implementation	Commission shall review the effectiveness of implementation of Article 6 (Purchasing by public bodies)
31 December 2015, and upon request of Comm. every five years thereafter	Article 14 – Promotion of efficiency in heating and cooling	Comprehensive assessment by MSs of potential of high-efficiency cogeneration and efficient district heating and cooling
30 June 2016	Article 24 – Review and monitoring of implementation	Commission report to EP and Council on implementation of Article 7 (Energy Efficiency Obligation Schemes)
31 December 2016	Article 9 – Metering	In multi-apartment and multi-purpose buildings with central heating or from DH system, individual meters to be installed
30 June 2018	Article 24 – Review and monitoring of implementation	Commission assessment of progress in removing regulatory and non-regulatory barriers referred to in Article 19(1)

B. Eligibility of measures and savings to count towards the energy end-use savings target

NEW AND ADDITIONAL ENERGY SAVINGS FOR THE EED

This note explores the issues around how energy savings will be counted towards the target outlined in Article 7.1 "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". The energy savings can be determined through Energy Efficiency Obligations on energy providers or through the option in Article 6.9 of setting up equivalent policy measures – both will follow the same methodology of determining new and additional energy savings.

Annex V in the EED clearly explains the various options that may be used to determine energy efficiency savings: deemed savings, metered savings, scaled savings and surveyed savings. In what follows, the issues discussed relate primarily to deemed and scaled engineering estimates of determining energy savings. Historically these are the most commonly used methodologies in EU Energy Efficiency Obligations.

MSs will need to decide the eligible energy efficiency measures for which there are either independently proven or well-established energy saving norms; all others will need their energy savings to be metered or surveyed to determine their exact values. For all deemed and scaled engineering estimates, it is recommended that MSs publish such information to ensure that all stakeholders have access to a common database.

However, as discussed below, there are various factors which need to be addressed in order to determine whether the anticipated energy savings are fully realised and to what extent there is an additionality or materiality associated with the involvement of the obligated, participating or entrusted parties. In a few cases, there will be a difference between the best practice of determining new and additional energy savings for Energy Efficiency Obligations (or equivalent options) and for MSs meeting the 1.5% target.

Inevitably there are overlaps between the issues that need to be addressed, but these have been gathered under the following headings: gross energy saving adjustments, baseline considerations and attribution of energy savings.

1. Gross energy saving adjustments

There are a series of adjustments that need to be made and these depend on the nature of the energy efficiency measure installed and any subsequent impact it may have on other energy usage in the property or industrial site. They are particularly important for deemed energy savings or scaled engineering estimates. Additionally, energy efficiency measures which save heat or produce heat efficiently will produce energy savings which clearly depend on the climatic zone of such installations. For example, in France, they have divided the country into three climate zones with different energy saving values. The French accommodate this flexibility by setting the target with a mix of measures across all three climatic zones and building those into the energy saving target.

The following are typical energy saving adjustments that will need to be addressed by MSs:

- Technical corrections and rebound effects

The energy efficiency measures will only save their full potential if they are both quality and installed correctly. The EED refers to the importance of monitoring measures on a sampling basis. However, even high-quality installations may not result in full energy savings because of unforeseen technical factors. For example, it may not be possible to insulate the entire loft, roof or external walls because of accessibility problems.

From experience monitoring the actual energy savings achieved, a technical correction can be derived to apply to the energy savings which are often set from either modelling calculations or paired test houses which have the benefit of no human involvement[60].

The rebound effect is often factored in along with the technical corrections. The rebound effect, also known as the comfort factor or increased amenity, can be best explained by giving the example of an insulation measure that will make it easier and cheaper to heat a property. It is likely that, particularly in low-income households, a portion of the benefit may be taken as increased comfort if that property was not heated to desired temperatures beforehand because of cost considerations.

Disentangling the two effects is difficult. Attempts to do this in UK and the USA have produced similar reduction factors. For the UK, because of the historically much lower indoor temperatures than in mainland Europe, a combined reduction factor of 50% gave the energy saving values used in their CERT obligation. In the USA, compared to the results from the computer simulation models, the reduction was 35% of the expected energy savings.

- Heat replacement effect

At times when space heating is required, internal gains from inefficient lights, appliances or pumps make a useful contribution to meeting the heating load. Conversely, at times when space cooling is required, such internal gains result in the cooling system working harder than necessary. A shift to more energy efficient equipment will therefore reduce internal gains and reduce the net savings from the energy efficient measure during the heating season.

To allow for this, the savings from the more efficient product should be amended, accounting for the duration of the useful heat provision from the inefficient products and/or if cooling is required, the reduction of the load on the air conditioning plant and hence increased energy savings.

2. Baseline considerations

Because energy savings under the EED can only be counted if they are new and additional, it is important to set the baseline from which the energy savings are accredited. Of the factors governing the use of baselines, the ones explored here are regulatory requirements, the average energy efficiency in the market place for certain products, early replacement of products or equipment and historic energy efficiency activity.

- Regulatory requirements

Perhaps the easiest examples to understand are whether there are clear regulatory requirements on either buildings or products. For example, if national or regional building regulations require that all new buildings meet a certain level of energy efficiency and they also meet cost-optimality requirements that are calculated as set out in Commission Delegated Regulation (EU) No 244/2012, then only improvements above that level of efficiency can be taken into consideration in claiming additional and new energy savings.

Minimum energy performance improvements are also required by the Energy Performance of Buildings Directive. These are to be set by the MSs for new buildings and for major renovations in all property sizes, as well as for building elements. All building energy performance requirements shall be benchmarked in accordance with the cost-optimal calculation methodology[61].

When applied in the context of Article 7 of the EED, this will mean that only energy performance requirements in building codes more stringent than requirements set in accordance with the cost-optimal methodology may be credited as energy savings.

[60] The range of energy savings achieved by individual households is known to be amazingly wide even for identical properties with the same energy efficiency measures installed. Many factors contribute to this, such as indoor temperature preferences, the number of people in the household, whether they are in the property all day or not, elderly relatives moving in or out or childbirth. For this reason, energy saving studies require significant sample sizes to correct the theoretical energy saving values.

[61] OJ L 81, 21.03.2012, p. 18-36.

However, policy measures that increase the rate of new build or renovation, including financial and fiscal instruments, may be eligible to be counted as delivering energy savings even if they are based on building code energy performance requirements that simply meet the cost-optimal level, in so far as they would trigger activities above the baseline.

In the field of energy efficient appliances and products, the Ecodesign Directive sets minimum energy performance standards in a variety of applications. In all cases, only energy efficiency improvements encouraged beyond these minimum requirements may be counted for additional and new energy savings unless higher standards exist already in the marketplace.

- Using the average energy efficiency of new equipment in the marketplace

For many products, the minimum energy performance required by the Ecodesign regulations is considered lower than the actual products available in the marketplace. For example, the Ecodesign in refrigeration products permits refrigeration products of energy efficiency class B to be sold, though the market average for such products encompasses better performing A, A+, A++ classes of product. The baseline in such situations should be the average efficiency of the product sold in the market place. For household appliances and lighting, such data is available from sources such as GfK and frequently used by governments, among others, to track the performance of energy efficiency as part of their market transformation programmes.

- Early replacement of products and equipment

For example, for boilers (which last approximately fifteen years), the net present value of replacing a twelve-year-old boiler three years early is very positive because of the tremendous improvement in energy efficiency over those three years. However, it would not be correct to claim energy savings in such a situation for more than three years, because the boiler is likely to fail and the owner might replace it with a market average efficiency or minimum energy performance requirement energy efficiency boiler. For the remainder of its lifetime, in addition to the three year advancement of significant energy savings, there should an added value reflecting savings from the rest of the new boiler's twelve year lifetime compared to the market average or minimum energy performance requirement as appropriate.

- Increases on previous energy efficiency activity

One way to view the effectiveness of any Energy Efficiency Obligation is to determine whether it has brought about a dramatic upturn in the rate of activity for that particular energy efficiency measure. The secondary consideration of dealing with free riders (those end users that would have invested in the measure anyway) is discussed below.

Trade bodies in MSs will usually have a good idea of the market activity relating, for example, to new insulation measures in their country. One way of determining the baseline for such activities would be to extrapolate historical activity from the underlying trend prior to the introduction of the Energy Efficiency Obligation or equivalent new policy.

3. Attribution of energy savings

This section covers the topics that are necessary to ensure that energy savings claimed towards EED targets are additional and that the activities of the obligated or entrusted parties have made a material difference to the end-use consumer's decision to invest in the energy efficiency measure. Clearly all the net energy savings that are additional to the prevailing or business as usual conditions may be counted.

- Free riders or deadweight

It is necessary to account for those end users that benefit from energy efficiency funds though they would have undertaken the investment anyway, known as free riders or deadweight. This depends on whether the energy efficiency measure being installed was a natural change in a purchase decision (e.g. new appliances, light bulbs, boilers, etc.) or the creation of a purchasing decision such as insulation or early replacement of products or equipment.

When starting Energy Efficiency Obligations on a small scale, it is possible to design the system to minimise free riders. For example, solid wall insulation is not a common occurrence in the existing housing stock (less than 1% per annum) and by targeting a defined geographical region, a successful programme which stimulates significant activity will have few free riders.

However, as such obligations become larger in scope, it is inevitable that they will pick up free riders. For example, Danish energy distributors are expected to reach a target 15% higher than the normal expected savings to account for a proportion of the savings that will not be additional. In other words, obligated distributors must achieve 115% of the nominal target. A different approach has been adopted in the United Kingdom where the government has built an estimate of likely free riders into the target that energy retailers must meet. When reporting the energy savings, the government removes the deadweight estimates but the energy retailers are credited for the full energy savings for the measures delivered.

In both cases, an estimate was made of the extent of free riders based on the best data available (ex ante or ex post) and deducted from the achieved savings to deduce the real additional energy savings above those that would have happened anyway.

- Co-funding of installation measures

Determining to what extent the obligated or entrusted parties should be accredited with energy savings in the case of co-promotion with other funding sources is an issue which has been addressed through a variety of approaches. In France and Italy, the availability of tax breaks for installing energy efficient boilers has been widely utilised by the obligated parties without any reduction of the energy saving values. In contrast, in the United Kingdom, if the obligated party is funding measures in conjunction with another national government programme, then the energy savings are delivered in proportion to the funding provided. However, any local government, other third party or end user financial support is not taken into account and the full energy savings are awarded to the obligated party.

Nevertheless, for the purposes of meeting the EED's 1.5% energy savings target, it is not necessary to reduce the energy saving value for other national or local governments' involvement, though MSs may wish to do so for their own particular obligation activities to ensure as much energy saving as possible is achieved through such schemes.

Although not yet applied in European Energy Efficiency Obligations, the concepts of free drivers and multiplier effects have been determined in the United States, when publicity for a scheme created by marketing or raised awareness creates purchases by those who invest in the energy efficiency measure but do not directly take advantage of any subsidy offered. Naturally, the case for applying free drivers needs to be examined carefully if the obligated party has not made a direct financial contribution to equipment sales. There is European evidence that this free driver effect occurs. In the Dutch EMAP programme, which subsidised condensing boiler sales, only 50% of the subsequent condensing boiler sales were subsidised by the government driven programme. Similarly in the mid 1990s, the UK's Energy Saving Trust condensing boiler cashback schemes only funded 50% of condensing boiler sales.

- Materiality of obligated or entrusted party to the energy efficiency measure

It is important to ensure that any subsidy or involvement of the obligated or entrusted party has a clear material effect on the end user's decision to undertake the energy efficiency investment. For example, an obligated party contributing €1 and/or no promotional activity to the purchase of an energy efficient appliance costing €400 has not made a "material contribution" to the purchasing decision. In other words, simply buying electronic point of sale data on energy efficient appliances from appliance retail outlets should not be allowed to count towards the target.

If the other contributions are coming from national government, then this causes no concern in terms of meeting the target. The key determinant is the extent to which the subsidy or the involvement of the obligated or entrusted party had an impact on the end user's decision to invest in energy efficiency.

4. Further reading

Greater detail on specific energy efficiency measures in residential, commercial, public and industrial buildings can be found in the eceee and RAP Report "Determining Energy Savings for Energy Efficiency Obligation Schemes"[62]. The report has examined best practices in determining energy savings in EU Energy Efficiency Obligations and their alignment with common practices in North America. Chapter 8 contains recommendations on how to determine energy savings measure by measure.

[62] Lees, E. and Staniaszek, D., *Determining Energy Savings for Energy Efficiency Obligation Schemes*, European Council for an Energy Efficiency Economy and the Regulatory Assistance Project, 04.2012.

MONITORING AND VERIFICATION

(QUALITY STANDARDS, COMPLIANCE, SAMPLING PRECISION)

It will be important for MSs to ensure that the claimed energy savings from Energy Efficiency Obligations or equivalent policies meet the EED requirement to deliver new and additional energy savings. This section outlines the monitoring and verification (M&V) requirements to ensure that the claimed energy efficiency measures have actually been implemented and that the measures are delivering the expected energy savings. There are well established international protocols[63] to govern this process.

In this section, the M&V process has been split into three steps: quality standards for installations of energy efficiency, compliance methodologies to ensure savings claimed are eligible and valid and an indication of the sampling techniques which are used to deliver a reasonable degree of confidence in the validity of the achieved energy savings.

1. Quality standards

MSs need to be satisfied that the energy efficiency measures that have been installed conform to the relevant quality standards. This involves ensuring that the energy efficiency measure meets the energy performance requirements and that (if appropriate) it has been installed to the prevailing best practice guidelines. These monitoring aspects serve to ensure that energy efficiency is delivered properly and that end users see it as a positive experience.

The quality standards can be achieved in a variety of ways, for example:

- Technically monitoring a sample of recipients of energy efficiency measures (common for insulation installations);
- Customer satisfaction monitoring, often required of energy providers for heating and insulation installations in properties;
- Customer utilisation monitoring, which ensures that the measures are being used and that energy savings are actually being realised. This is historically required for certain measures such as free compact fluorescent lamps (CFLs), low flow shower heads or consumer electronics;
- Using an approved list for specific energy efficiency measures, for example, the European lighting standard for minimum energy performance requirements in terms of energy saving and lifetime for CFLs;
- Appliances and products carrying an energy label. Most Energy Efficiency Obligation schemes in Europe have placed restrictions on the energy label that may be promoted by obligated and entrusted parties; as the appliance retailers are subject to the European Union energy labelling scheme, it is not usually necessary to undertake any technical monitoring of such products;
- Products with specifications for performance. Using the example of insulation, it could be required that products have U-value or lambda performance which are compliant with the national or European standards; and
- Where applicable, ensuring that installers use national best practice guides regarding the installation of energy efficiency measures like insulation and heating.

In all cases, international best practice recommends using a sampling procedure to physically monitor the quality of installations after completion.

2. Compliance

To ensure that savings are new and additional and that the energy efficiency measures claimed have actually been installed and are not being double counted, common practice in Europe and elsewhere is to carry out a random sample of the end users that have received energy saving measures. This can be in conjunction with the quality standard

[63] Efficiency Valuation Organization, *The International Performance Measurement and Verification Protocol*, 2007.

sampling discussed above. Effectively this is the equivalent of a financial "dip check" familiar for accountancy audits. Best practice is a trade-off between the level of precision required and the costs of attaining that precision. Typically, the audit would be on a standard sampling basis.

Audits can be carried out by a scheme administrator or by a recognised, independent third party. For example, in Denmark an annual audit of documentation and guidelines is required from the obligated parties and from an independent third party every second year.

Double counting can be addressed by maintaining a central register or database of all efficiency improvements by physical location. Such databases are also helpful in identifying localities which seem to be missing out on energy efficiency activities.

The costs of monitoring and verification and the associated auditing process are not large especially if the deemed savings approach is the dominant methodology for recording the energy savings. In the United Kingdom, the cost to the Office of the Gas and Electricity Markets (Ofgem) for administering (including monitoring, verification and auditing) the Carbon Emissions Reduction Target (CERT) programme totals €1.5 million per year, equivalent to around 0.1% of what the annual energy retailer spends on energy efficiency measures.

3. Sampling precision

Whether in connection with quality standard monitoring or compliance monitoring, the size of the sample is inevitably a compromise between high precision and cost. Additionally, certain energy efficiency measures may need to be monitored for quality standards to a greater extent than others. The box below illustrates a typical good practice sampling requirement by the energy regulator Ofgem for technical monitoring.

CERT Monitoring Requirements (Source: Ofgem Supplier Guidance Manual)

1% customer utilisation monitoring for electrical items, do-it-yourself (DIY) loft insulation and DIY radiator panels provided to householders for free

5% technical monitoring for professionally installed insulation and heating measures

1% customer satisfaction monitoring for professionally installed insulation, heating measures and micro-generation measures

5% or a statistically significant sample (whichever is smaller) utilisation and evaluation monitoring of behavioural measures (CFLs, advice and smart metering)

Some obligations require that a certain fraction of the energy saving target be met by energy efficiency measures in low-income households. Because promotions of appliances, CFLs and information or communication technologies often appear in retail outlet or internet sales, it is difficult to reliably establish whether the customer is part of a low-income household. Subsequent determination of the percentage of low-income households who purchased the energy efficient product is determined via a sampling approach. Standard statistical calculations can be used to derive an appropriate sampling base to give a confidence level of 95%. Typically this would require sampling 5% or less of the customers.

ANALYSING PRICE ELASTICITIES IN VARIOUS SECTORS

Transport

The best known review (Goodwin, Dargay et al. 2004) concludes that the short run price elasticity of demand is -0.25 (+/- 0.15). A more recent review (Brons, Nijkamp et al. 2008) reports a number of studies with a very similar central estimate (Espey 1998; Graham and Glaister 2002). There is therefore a strong case to use -0.25 as the price elasticity of energy in the transport sector.

Residential

Analysis of the residential sector is a little more complicated, as there is a broader range of fuels, including electricity. Analyses of the long run price elasticity of a single fuel may be misleading, as the cross-price elasticities with other fuels need to be considered to address fuel switching. However, for the short run elasticity, measures of the fuel's own price elasticity are probably sufficient.

There is more significant literature on electricity than other household fuels. A recent review of electricity price elasticities (Fan and Hyndman 2011) found a range from -0.2 to -0.4, but also found a significant variation by income and time of year, presumably reflecting different elasticities for different energy services (which would be expected). Another review (Alberini and Filippini 2011), limited to the United States, has similar results for electricity price elasticities of demand of -0.2 to -0.35.

Of the other household fuels, gas is the only one studied. A recent analysis in California (Lavín, Dale et al. 2011) tends to confirm the findings for electricity reporting a value of -0.28, but finds a significantly lower value of -0.11 for gas and reports other findings well below -0.2.

In the UK, DECC's economists in 2012 used for households an electricity demand elasticity with respect to price of -0.196 and with respect to disposable income per head +0.196. (Danskin, private communication).

In conclusion, it seems likely that electricity has significantly higher price elasticity of demand than direct use of fossil fuels in this sector, with the former larger than -0.2 and the latter smaller. On average, if a single value is required, an assumption of -0.2 is supported by the available literature. Ideally there should be some differentiation by fuel or energy service.

References

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Lavin, F., L. Dale, et al. (2011). "The impact of price on residential demand for electricity and natural gas". Climatic Change 109(1): 171-189.

C. Building renovation concepts

Comprehensive renovation: The concept of "comprehensive renovation" should be understood as a renovation undertaken with the objective to bring a building to a very high energy performance level, incorporating best available technologies. Comprehensive renovation should also be linked to the economic, environmental and social co-benefits of deep renovations, while calculating the net present value of the investments.

Deep renovations or staged deep renovation: Deep renovations or staged deep renovations are not specifically defined in the EED; however Recital 16, which addresses the long-term strategies referred to in Article 4, states that deep renovations "lead to a refurbishment that reduces both the delivered and the final energy consumption of a building by a significant percentage compared with the pre-renovation levels leading to a very high energy performance".

Recital 16 also states that "such deep renovations could also be carried out in stages". "Staged deep renovation" should be understood as a "deep renovation" that reduces the final energy consumption of a building or group of buildings in stages to achieve a very high energy performance or nearly zero-energy level. The successful implementation of a staged renovation requires the definition of a holistic renovation plan which defines the sequence of the renovation stages with a view to reach the final goal of significantly reducing energy consumption. This renovation plan will look at the building as a whole (including envelope, control systems and technical systems and equipment). Establishing this plan will avoid increasing significantly the costs of individual stages or precluding subsequent stages in the course of the standard renovation cycle.

In poorly performing buildings, deep renovation has been shown to improve the energy performance by an average factor of four or within a range between 65%-95% compared with pre-renovation levels, primarily by reducing final energy consumption. This should bring the energy performance level of the renovated building as close as possible to requirements for new built or nearly-zero energy buildings. A study from the German Energy Agency (Dena) evaluates 350 deep retrofit projects of different types of buildings with cost effectiveness criteria. The energy consumption in every retrofitted building analysed was reduced on average by 85%[64].

Normally, deep renovation is undertaken in conjunction with a major renovation of the building or buildings and/or as part of the standard 30-40-year renovation cycle, using a cost-optimal approach. Deep renovation can be applied to an individual building or to a group of buildings.

Given the current poor performance of buildings in all MSs, it is estimated that a large proportion of buildings will require a deep or staged deep renovation in order to be brought to a very high energy performance or "nearly zero-energy" level. This will depend on the overall national target for reduction of energy consumption for the building stock by 2050, the overview of the national building stock and the results of the individual audits for buildings.

Energy savings: in Article 2.5, energy savings is defined as "an amount of saved energy determined by measuring and/or estimating consumption before and after implementation of energy efficiency improvement measures, whilst ensuring normalisation for external conditions that affect energy consumption".

[64] dena, 'Part 1: Economic viability of upgrading the energy efficiency of the rental housing stock', *dena Renovation Study*, 01.2013.

D. Good practices in practice: boosting the energy services market

One example of national schemes that enhance a development of energy services is "Grenelle de l'environnement" which is the French action plan invented through a dialogue between business, communities, unions and associations. The action plan encompasses policy objectives, information campaigns and financial instruments. Policy objectives for residential sector include the reduction of existing buildings' energy consumption by 38% by 2020 in comparison to 2008 and buildings' refurbishment. Regional offices of the National Energy Agency (ADEME) make funding available under public-private partnerships for state-owned buildings which create a market for energy services, especially in the public sector.

In Spain, there are two different "models" recommended by the Spanish Ministry of Energy (jointly elaborated by the public sector and the professionals) for contracting energy efficiency services with public administration:

- A "Services and Supply Contract" with a recommended contract: "CONTRATO DE SUMINISTRO DE ENERGÍA Y GESTIÓN ENERGÉTICA EN EDIFICIOS PÚBLICOS CON GARANTIA TOTAL DE LAS INSTALACIONES TÉRMICAS Y DE ILUMINACIÓN INTERIOR LOS EDIFICIOS DE LAS ADMINISTRACIONES PÚBLICAS"
- A Public-Private Partnership (CCPP) with a recommended contract: "CONTRATO DE COLABORACIÓN ENTRE EL SECTOR PÚBLICO Y EL SECTOR PRIVADO PARA LA PRESTACIÓN DE SERVICIOS ENERGÉTICOS".

In Finland, in the framework of the National Energy and Climate strategy, companies and communities apply energy efficiency solutions that can be subsidised by the state.

In Austria, energy agencies create demand for energy services, initiate pilot projects and act as independent advisors. Municipalities and federal state organise EPC tenders for their building stock and street lighting.

Cooperation between public institutions and the private sector has also been established in Denmark, where promotion of the ESCOs concept is mainly achieved through projects by research institutes, industry associations, the Danish Energy Agency (DEA) and the Danish Enterprise and Construction Authority.

In countries juggling rising energy prices, high energy efficiency potential and limited financial resources and experience, a strong legal framework is necessary to bolster the growth of ESCOs. For example, in Bulgaria the Energy Efficiency Law has created a better environment with increased security for the development of ESCO projects, particularly in the municipal sector[65].

[65] Bertoldi, P., Boza-Kiss, B., Marino, A. and Rezessy, S., *Energy Service Companies Market in Europe - Status Report 2010*, Joint Research Centre, European Commission, 2010.

E. Case studies: innovative use of Structural Funds for EE financing

The JESSICA Holding Fund in Lithuania: In June 2009 a tripartite agreement between the Ministry of Finance and the Ministry of Environment of the Republic of Lithuania and the EIB was signed, establishing the JESSICA Holding Fund for the modernisation of residential apartment houses. The EIB-managed JESSICA Holding Fund will invest in energy efficiency projects for multi-apartment housing via the Lithuanian banking sector. Funds have been contributed from the European Regional Development Fund (ERDF) alongside national match funding. Intermediary banks will act as energy efficiency-focused JESSICA Urban Development Funds (UDFs) in providing long-term preferential loans with a fixed interest rate not exceeding 3%. The loans will be offered to homeowners in multi-apartment buildings with tenant associations acting as representatives and managing the implementation process of chosen energy efficiency projects. The contribution invested in the Holding Fund is €227 million, which consists of ERDF funds (€127 million) and national funding (€100 million). The expectations are that commercial banks step in with an additional €20-40 million.

Revolving fund for energy refurbishment in housing in Estonia: This revolving loan fund combines ERDF grant funding with loans from European banks like the CEB or the EIB. It also combines funds from the Credit and Export Guarantee Fund KredEx (national guarantee fund) to provide long-term (up to 20 years) low-interest loans (currently 4.5% compared to the 7% market minimum) through local commercial banks to multiple-unit residential buildings built before 1993. Homeowners contribute 15%. This lending scheme, which was set up by KredEx with the help of technical assistance provided by KfW Bankengruppe, targets energy efficiency investments that have been defined as priority measures in an energy audit. The objective is to reach minimum 20-30% savings in the building's energy consumption.

Grants for energy efficiency in housing in France: The French government has chosen to use the ERDF in a grant scheme as an additional resource to reach its objectives of retrofitting 800,000 very energy inefficient dwellings. In many cases, like in the Nord-Pas de Calais region, the ERDF will release the extra investment needed to improve the energy performance of buildings. Each French region is therefore permitted to use up to 4% of their Operational Programme funding for energy efficiency investments and greater use of renewable energy in existing housing. Operations must target a significant number of homes, mostly energy inefficient buildings or most effective energy saving refurbishment actions. Two types of housing are eligible: social housing and run-down co-ownership with social occupation, within the framework of an operation supported by ANAH (national housing agency). For the most recently constructed buildings, the eligible actions are the ones that achieve at least a gain of 8 kWh/m^2 and reach an energy consumption of less than 150 kWh/m^2.

F. Overview of main EU energy efficiency legislation

Framework legislation

Energy Efficiency Directive: Directive 2012/27/EU 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, 14.11.2012, p.1.

Sectoral and procedural requirements

Energy efficiency in buildings: Directive 2010/31/EU of the European Parliament and of the Council of 17 May 2010 on the energy performance of buildings, OJ L 153, 18.6.2010, p. 13 (recast of the Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002). Directive 2010/31/EU entered into force in July 2010; Directive 2002/91/EC was repealed beginning 1 February 2012.

Delegated Regulation on cost-optimal energy performance requirements for buildings: Commission Delegated Regulation (EU) No 244/2012 of 16 January 2012 supplementing Directive 2010/31/EU on the energy performance of buildings by establishing a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements, OJ L 81, 21.3.2012, p. 18.

Energy Services Directive: Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC, OJ L 114, 27.4.2006, p. 64, as amended. Directive 2006/32/EC will be repealed from 5 June 2014 except Articles 4.1-4.4 and Annexes I, III and IV, which will be repealed from 1 January 2017.

Cogeneration - Combined Heat and Power (CHP): Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC,, OJ L 52, 21.2.2004, p. 50, as amended. Directive 2004/8/EC will be repealed from 5 June 2014.

EU product legislation

Labelling of energy-related products: Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products, OJ L 153, 18.6.2010, p. 1 (recast of Council Directive 92/75/EEC of 22 September 1992).

Ecodesign of energy-related products: Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products, OJ L 285, 31.10.2009, p. 10 (recast of Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005).

Consumer information on fuel economy and CO2 emissions of new passenger cars: Directive 1999/94/EC of the European Parliament and of the Council of 13 December 1999 relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars, OJ L 12, 18.1.2000, p. 16, as amended.

Emissions from motor vehicles: Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO 2 emissions from light-duty vehicles, OJ L 140, 5.6.2009, p. 1.