



Co-funded by the Intelligent Energy Europe  
Programme of the European Union

**ENSPOL**  
Energy Saving Policies

Contract N°: IEE/13/824/SI2.675067

# Energy Saving Policies and Energy Efficiency Obligation Scheme

## D3.1: Report on Alternative schemes to Energy Efficiency Obligations under Article 7 implementation

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March 2015

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# 1 Executive Summary

## Scope - Method

The European Union has set itself the goal of reducing EU primary energy consumption by 20 % by 2020, compared to current projections. The Energy Efficiency Directive (EED) (2012/27/EU), which entered into force on 5 December 2012, is the key instrument to help attain this goal.

All Member States (MS) must achieve a 1.5% annual energy saving target. Article 7 of the Energy Efficiency Directive- provides that an energy efficiency obligation scheme or/ and an alternative system will be introduced in every MS in order to reach the target. Many countries have decided to introduce alternative measures in combination with an energy efficiency obligation scheme (EEOs). In practice much information is already known about energy efficiency policy measures especially for MS which have a great deal of existing policy experience to build upon.

The aim of this report (Task 3.1) is to analyze alternative measures by examining their key implementation and design features. Emphasis is placed on the different interpretations of regulatory requirements by MS regarding additionality and double counting. This allows identification of related risks and feasibility barriers faced by some alternative measures towards meeting with their estimated savings.

Alternative measures proposed by MS countries are described and analyzed systematically, in terms of the following main themes:

- Classification of alternative measures
- Design and implementation features
  - Activity coverage
  - Target setting
  - Implementation specifics
  - Adaptation of policy measures
- Estimated results of alternative measures
- Observed or potential implementation risks/barriers

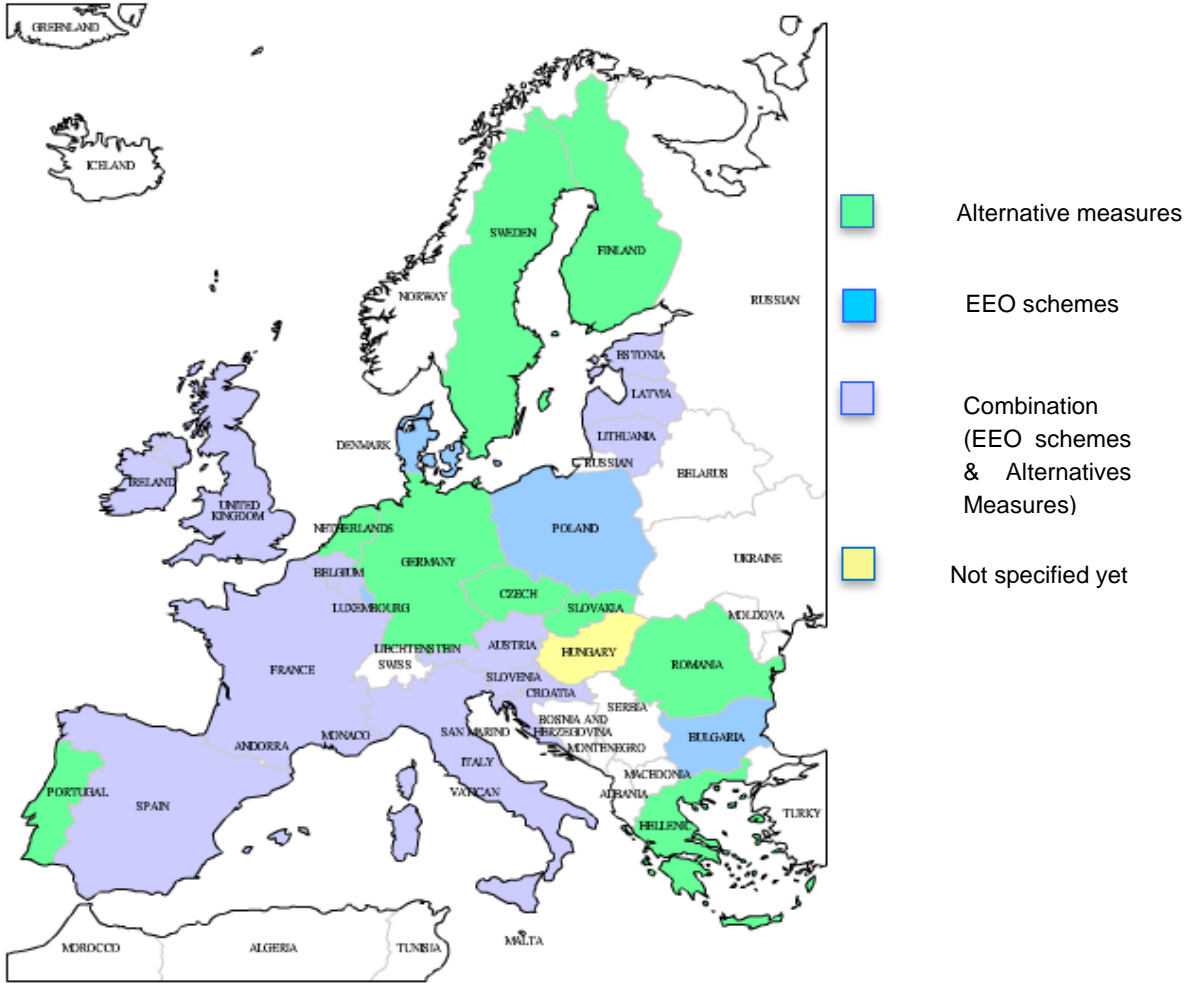
The analysis was conducted based on MS' updated submission due the 20th of November 2014 to the Commission under Article 7 and the relevant National Energy Efficiency Action Plans (NEEAPs). These governmental documents on future policy plans were corroborated with reference to existing policy databases (e.g. IEA and MURE databases). Finally interviews with relevant officials or experts supplemented where necessary and validated the final results from the study. Broader feasibility and implementation issues were explored using the wider published literature.

The amount of information available on alternative measures varies by country. This report provides more detailed analysis for eight MS where good quality information is available – Austria, France, Germany, Greece, Italy, the Netherlands, Sweden and the UK. These countries are at different stages of energy efficiency policy development and in different regions of Europe. They also vary in terms of market characteristics, infrastructure, industry development and institutional capacity.

**Overview of MS options to comply with Article 7 requirements: Almost all countries opt for alternative measures**

Almost all countries have opted for alternative measures: 24 out of 28 MS have relied exclusively on alternative measures, or a combination of alternative with EEOs. The reason for that is the high degree of flexibility of a variety of alternative measures to opt for as well as increased familiarity, since all MS countries have already implemented similar schemes.

The map (figure 1.1) presents the current status of implementation of EEOs across the EU. For some MS the development of the details of the planned EEOs are still in progress.

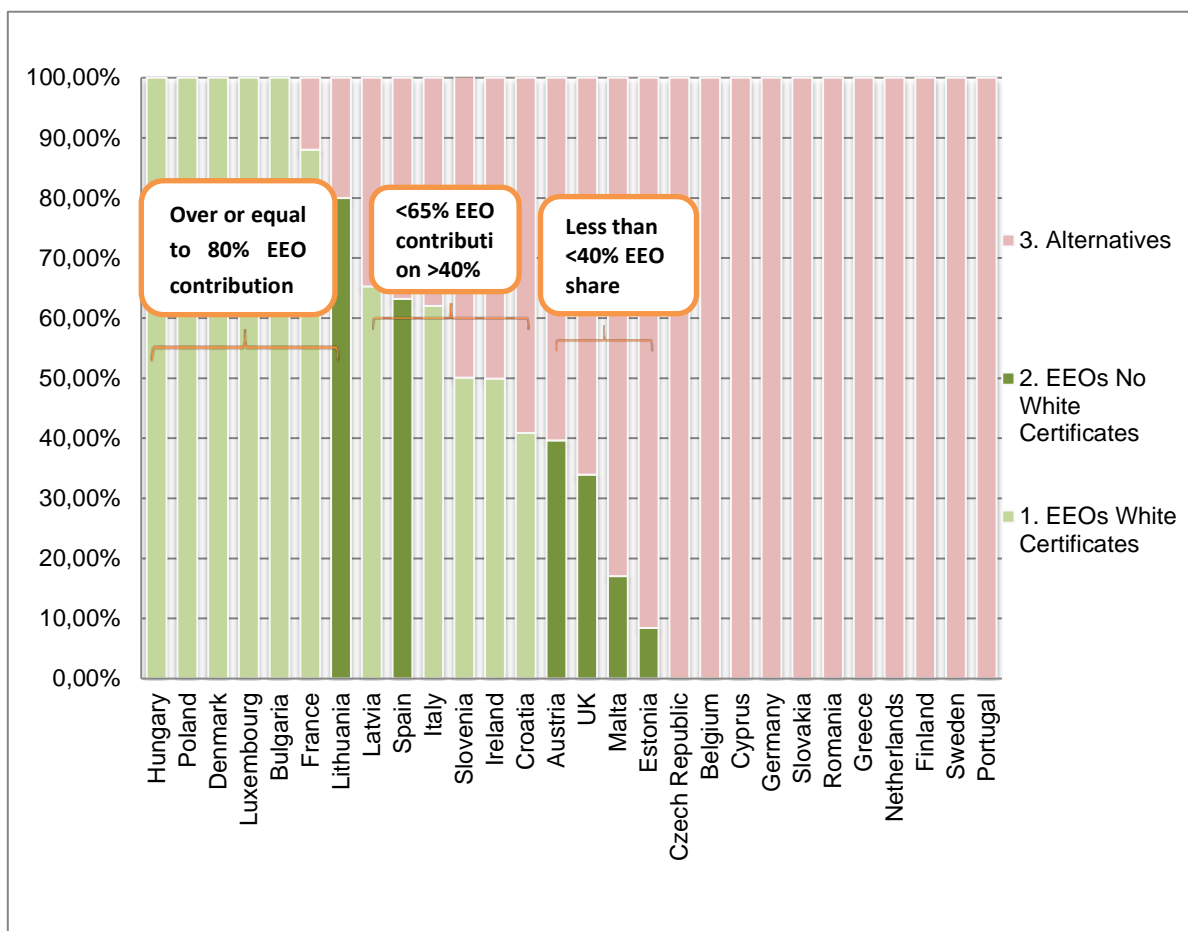


**Figure 1.1: Overall assessment of MS options to achieve savings**

The main updates regarding the choices of countries to comply with their Article 7

requirements, as notified by the revised notification reports (submitted November 2014) can be summarized as follows:

- Ireland has eventually adopted an EEO scheme in combination with alternative measures,
- Slovakia chose to comply only through the implementation of alternative policy measures.
- For countries like Lithuania, Estonia updates in their notification report clarify that both countries have opted for a combination of EEO with auxiliary measures.
- Finally Luxembourg has eventually opted to comply solely based on an EEO scheme.



**Figure 1.2: Contribution of alternatives & EEOs to the total energy saving target**

As aforementioned, alternative measures seems like a popular way for many countries to achieve their goal. In fact 24 MS countries have opted for those measures by using over 350 different types of measures in total, in favor of the logic of building on what exists rather than introducing a major new type of policy. Despite, the significant amount of alternative measures, the contribution of the latter in the total saving target is approximately 60%, while EEOs contribute to the remaining 40% of target savings.

Figure 1.2 shows the relative share of EEOs in the overall targeted savings for 2020 along with the contribution of alternative measures. On the left-end are countries opting wholly

for EEO while on the right end are countries opting for alternatives and placed in the middle are countries opting for a combination of the two. Note that a number of countries, which are proposing to deliver significant savings from EEOs, are introducing this policy for the first time. Those countries, which have an existing, well-established EEO are Denmark, France, Italy and the UK. Poland has had also an existing EEO scheme in operation, although this is currently undergoing extensive revision.

For those countries that opt for an EEO scheme supplemented by auxiliary measures, we may observe that:

- Only 2 countries, namely France (with an existing EEO) and Lithuania, are heavily dependent on EEOs to bring about savings over 80% out of the total savings
- Half of them (i.e. 6 out of 13 countries) allocate a moderate energy savings share to Obligations between 65% and 40% of the total savings to be achieved.
- 4 countries, Austria and UK (with an existing EEO), and also Malta and Estonia rely mainly on the savings resulting from alternatives, allocating a lower share to savings resulting from Obligations.

One country with an existing scheme is allocated in each of the three groups; France is categorized in the high share group, Italy in the moderate share and the UK in the lower share of EEOs in the overall target for savings.

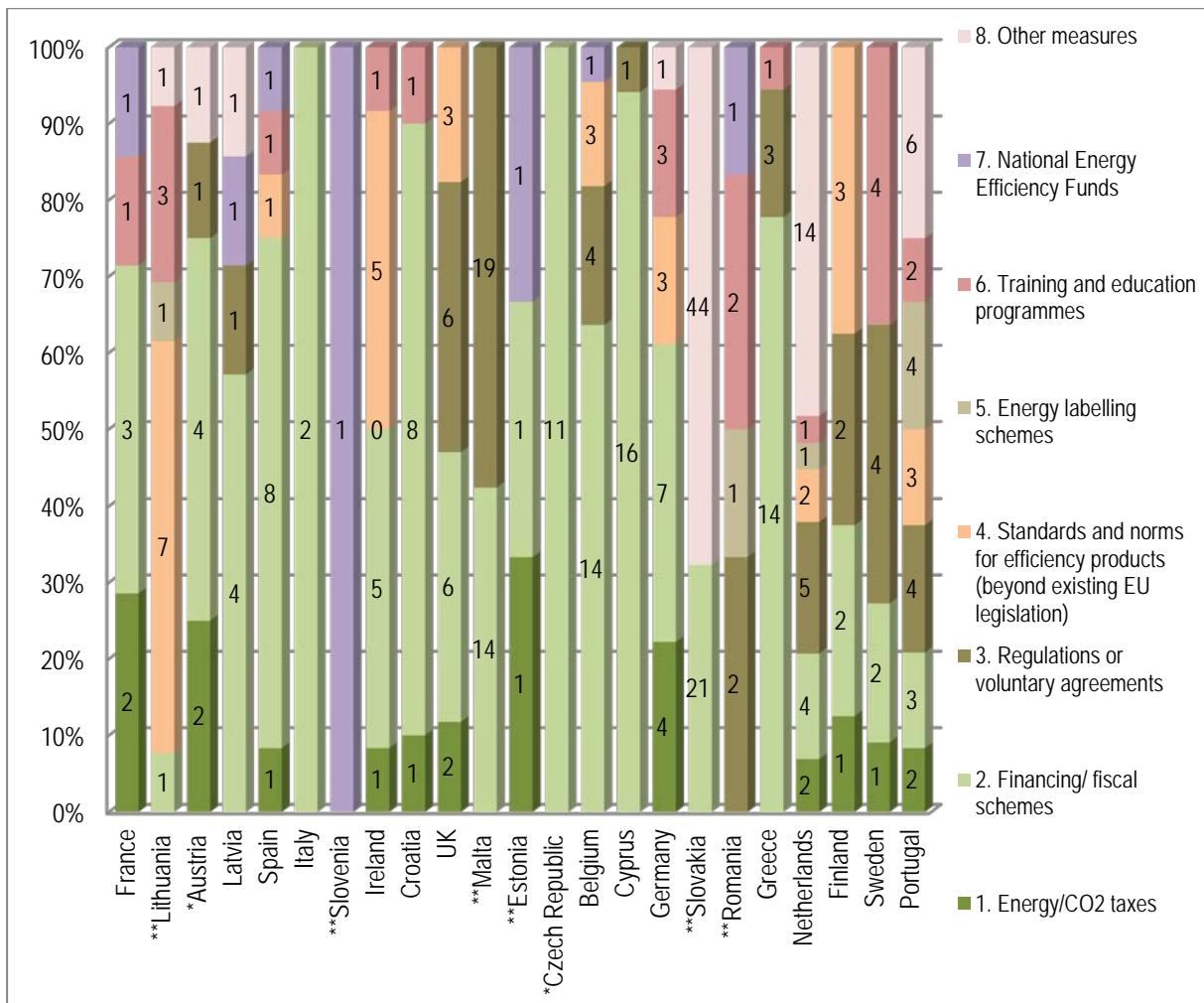
### **Classification of alternative policy measures to meet with Article 7 requirements**

The Energy Efficiency Directive (EED) permits the delivery of part or the entire target by alternative measures that have the effect of reducing end-use consumption (Article 7.9). These are categorized in i) Energy or carbon taxes, ii) Financing instruments or fiscal incentives, iii) Regulations or voluntary agreements, iv) Standards and norms, v) Labeling schemes, compliant with the EU labeling framework 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 and last but not least vi) Training and education reducing end-use energy consumption.

The numbers in the figure below (figure 1.3) indicate the number of notified types of policy measures for each country.

#### **Key observations: Traditional financial schemes dominate**

Unsurprisingly, most measures proposed by MS are of financial nature, in the form of grant schemes and low-interest loans, and they outnumber other options in each country. Characteristic cases are countries such as Croatia proposing mostly financial schemes except for two measures, while Cyprus, Greece and Belgium have the largest number of financial schemes proposed.



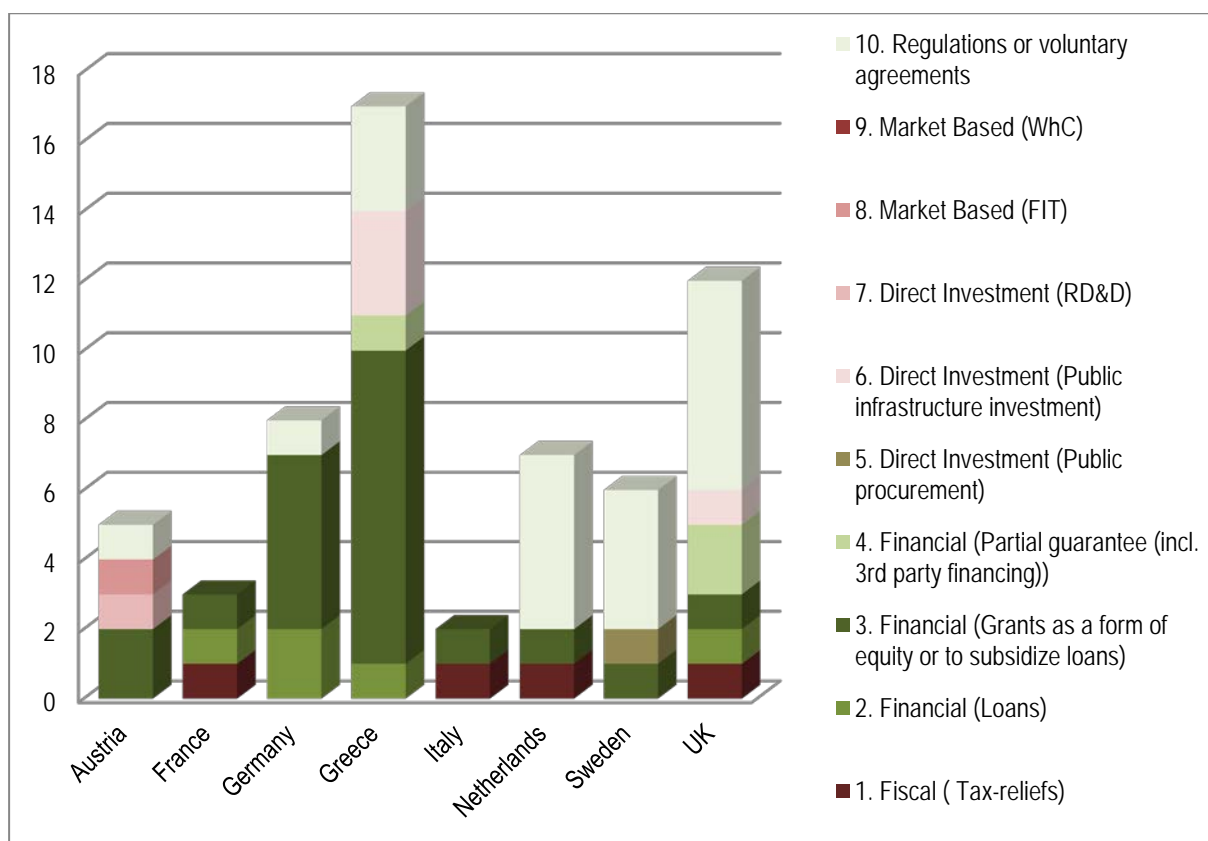
\*Lack of information about certain measures

\*\* Lack of information about the majority of the measures for those countries

**Figure 1.3: Classification of the different types of policy measures across MS countries**

Financial/Fiscal schemes have thus a leading position among the sum of measures proposed making up more than 40% of the total number of measures. All MS have adopted at least one financial scheme (see figure 1.3).

A more detailed classification of measures promoting access to finance, as proposed by the 8 countries under evaluation, to meet with their 2020 energy saving targets is presented underneath (Figure 1.4). The introduction of those measures is comparatively easier than regulations, in terms of policy (re-) design, although most of them require ongoing funding to operate. The numbers in the figure indicate the number of notified policy measures promoting access to finance for each country.



**Figure 1.4: Classification of financial and regulations measures promoting access to finance.**

Measures promoting access to finance are usually proposed as grants in the form of equity or to subsidize loans, and fiscal measures (including Tax-reliefs). Less utilized measures are direct investments in the form of public procurements, 3rd party financing and direct investments for Research, Development and Demonstration. For the latter case only Austria directly supports research and development projects through the Climate and Energy Fund that encourages research projects in the fields of local and regional public passenger transport, the environmentally friendly carriage of goods and mobility management.

Regulatory measures also seem like a favorable option for MS countries, with UK, Sweden, the Netherlands, Greece, Austria and Germany including them in the mix of measures to comply with Article 7. These are usually adopted in the form of tightening of building regulations for new and existing buildings (e.g. Greece, the Netherlands and especially UK with four measures proposed), minimum standards of energy performance equipment (e.g. Greece, the Netherlands, UK) and requirements to undertake energy audits (e.g. UK and Sweden).

Apart from more traditional measures promoting access to finance, Article 20(6) also prescribes that: ‘MS may provide that obligated parties can fulfil their obligations set out in Article 7(1) by contributing annually to the Energy Efficiency National Fund an amount equal to the investments required to achieve those obligations.’ Quite a few MS have adopted National Energy Efficiency Funds, yet interpreting the term in various ways, hence increasing the risk of overlaps and double-counting of savings with other co-existing financial schemes.



As stated also by the DG Energy study evaluating the national policy measures and methodologies to implement Article 7 of the Energy Efficiency Directive (Ricardo AEA, 2015), Spain is the only country that has adopted a National Fund to supplement the operation of the EEO as described with Article 20(6). This may indicate a greater risk of policy overlaps for other type of funds implemented in combination with other measures. The Spanish Energy Efficiency Fund will be financed directly through the financial equivalent paid by obligated parties to comply with their energy efficiency obligations. In fact limiting the EEO compliance options to the payment of a financial equivalent reassures the viability of the Fund. France has set-up a fund for energy renovations to guarantee green loans for banks and ensure low-cost financing for households. The Guarantee fund is set up in parallel with the 3rd period of the EEO (2015-2017). EEO's obligated parties will be able to fulfil part of their obligation by contributing to this fund.

Support for the human agency including information, education, advice, energy management and best practice dissemination programmes are present in most country plans opting for alternatives. Sweden is a typical case that introduces four measures of this type. These are all training and educational measures aiming to increase skills particularly in the public sector. More specifically they aim to assist Municipalities in understanding how to measure energy efficiency in the first place, and also to recruit suitably qualified staff.

#### **Best practice information scheme: The French Energy Renovation passport**

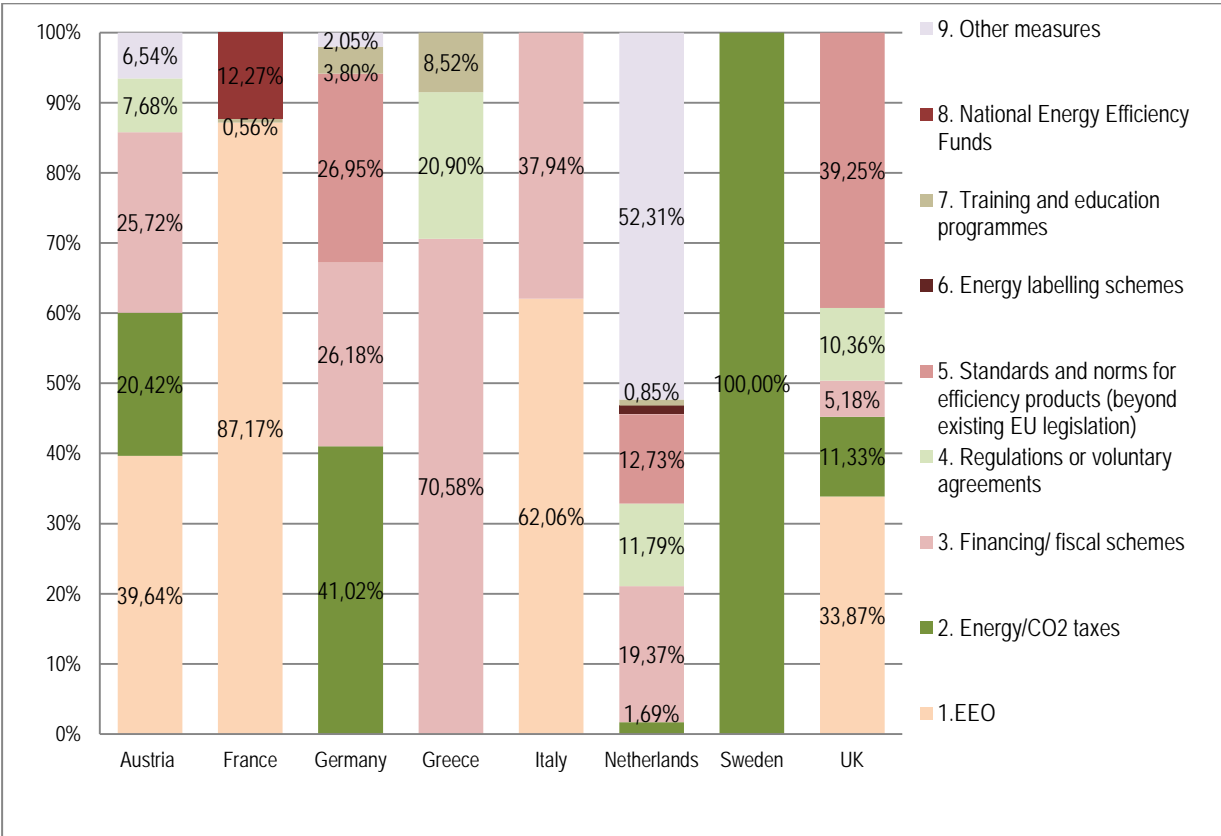
The energy renovation passport is a French scheme aiming to improve housing energy performance mainly by focusing on a detailed analysis of quantitative and qualitative consumption data. Its goal is to determine step-by-step programs of energy saving actions by capitalizing on an overview of the housing, an energy report, an improvement program and a financial analysis. At least one of the proposed programs must lead to a "low consumption" performance. The passport will allow households to make an informed choice regarding the program of actions required to improve their housing energy performance.

Finally existing mechanisms affecting energy prices (i.e. energy taxes/CO2 taxes) have also been proposed by many MS countries. Savings from energy taxes dominate the share of total estimated savings (see Figure 1.5). The most extreme example is the case of Sweden, where energy taxation is expected to deliver 100% of savings. The following table (table 1.1) lists the 8 countries under evaluation describing their options for energy or CO2 taxes according to their NEEAPS and updated notification reports, by giving a % share only for those countries that enough details were available.

**Table 1.1: MS countries adopting energy and CO2 taxes in compliance with Article 7 requirements.**

Countries	Proposed Tax schemes (% share in total savings)
<b>Austria</b>	Energy taxes (18,67%), Federal highway toll: Taxes like road tax (1,75%)
<b>Estonia</b>	Excise duties and VAT on fossil fuels and electricity (under review)
<b>France</b>	Eco-taxes for heavy vehicles (under review), Increase in domestic consumption duty based on CO2 content (under review)
<b>Germany</b>	Energy taxes (34,82%), air traffic taxes (1,98%) and truck taxes (1,43%)
<b>Greece</b>	The fuel tax (i.e. excise duty on heating oil) initially proposed has been suspended.
<b>Netherlands</b>	Increase in duty on diesel (1,59%), Increase in duty on LPG (0,13%)
<b>UK</b>	Climate Change Levy (6,18%), Carbon reduction commitment Energy Efficiency scheme (5,18%)
<b>Sweden</b>	Energy tax and Carbon dioxide taxes (100%)

Figure 1.5 presents a different classification of measures based on estimated savings attributed per different type of measure.



**Figure 1.5: Classification of alternative measures based on estimated savings.**

In comparison to figure 1.2 above we may observe that for countries like Austria, France, Germany, the Netherlands and UK a large number of financial measures are proposed to

bring about a relatively small amount of estimated savings. In Sweden although a number of measures are notified only savings resulting from Energy CO<sub>2</sub> taxes are accounted for to meet with the 2020 target savings. The Swedish example might be quite straightforward however there is no guarantee that the fiscal regime will bring about its estimated energy savings (Xylia and Sylveira, 2014).

As such assigned savings to alternative measures serve more as an indicative target for most policy measures and are subject to change, since energy savings resulting from measures are often highly dependent on the scale of each measure and the replication potential of these measures. In addition most reported national energy savings data is not uniformly corrected for additionality while some MS might overstate their savings creating thus an altered image on the share of different types of measures in total savings. In fact this figure shows that the rationale of MS behind their notified reports on alternative measures, was to show that proposed measures are sufficient to meet the Article 7 target; yet MS will make their own decisions on what contribution each measure makes to the total target.

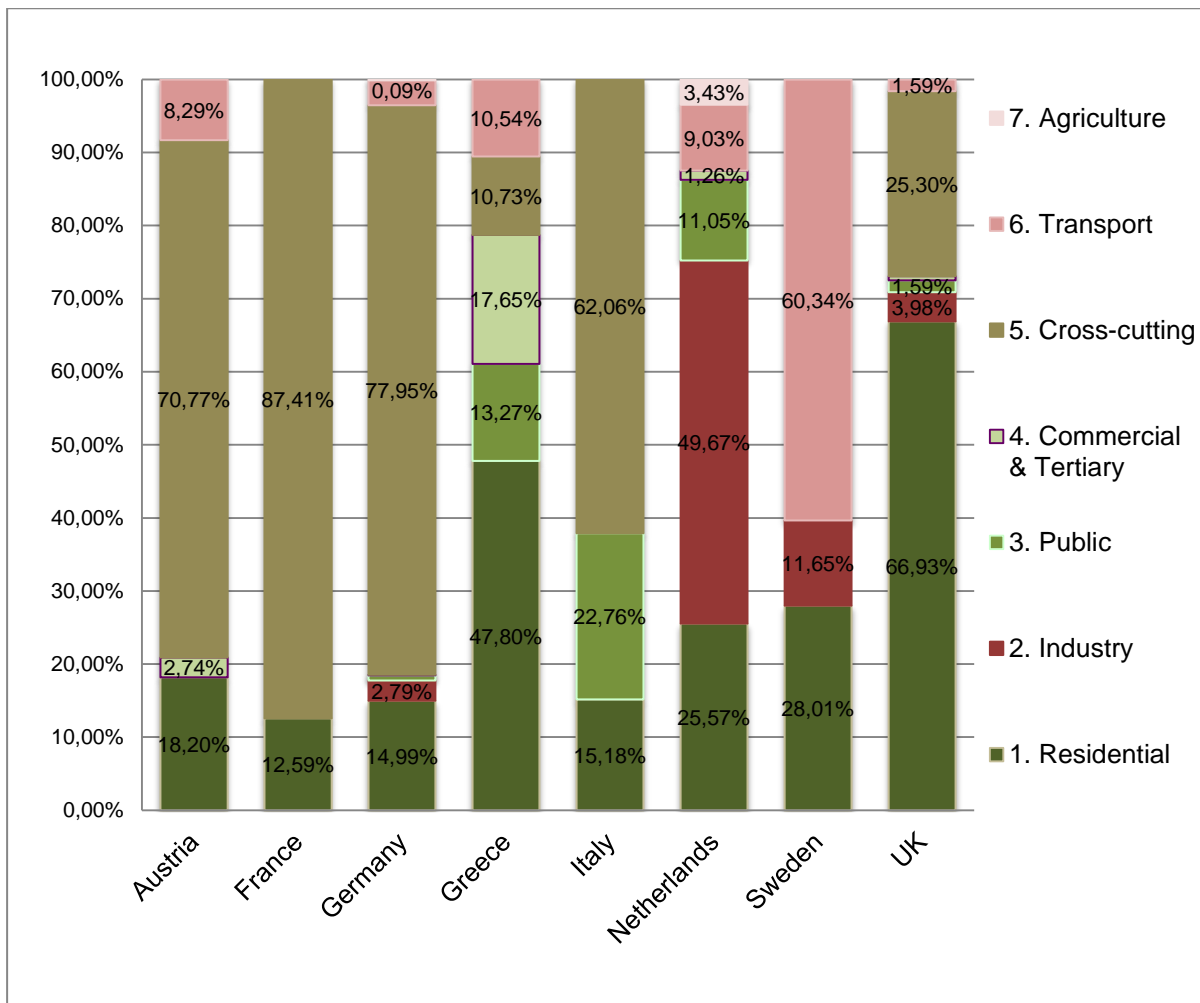
### Analysis of design & implementation features

#### **Sector of application: Residential & tertiary sectors contribute the most to the total energy savings target**

Alternative measures can be characterized by a significant variety regarding the targeted end use sectors. An analysis of the sectoral split, based on their targeted energy savings, has been conducted for each country.

Figure 1.6 shows the sectoral split of proposed measures, based on their sectoral scope as described for each measure (e.g. residential, transport, public, industrial, residential, commercial & tertiary, agriculture). The majority of those have a cross-sectoral scope implemented in different sectors simultaneously. Typical crosscutting measures are proposed in the form of financial schemes applying to domestic and tertiary sectors, energy taxes, and fiscal measures as well as building regulations. More than 50% of the target savings of each country is achieved through crosscutting measures (e.g. France, Austria, Italy and Germany).

Sweden, Greece and The Netherlands propose measures with a more specific sectoral scope in order to achieve their target. Sweden in fact is the only country to calculate energy savings resulting from the transport sector, which contributes by 70% over the sum of target savings. The Netherlands emphasized notably more than other countries, on the industrial sector, while Greece and UK expect most savings from the residential sector (by 48% and 62% respectively).



**Figure 1.6: Sectors' contribution (%) to total energy savings' target**

### Technology focus: New builds, innovative products less promoted

Aiming to explore whether there is a more natural fit of certain sorts of technology / intervention supported by different sorts of measures, we analyzed eligible technologies and measures as described by each alternative option. Table 1.2 attempts to classify alternative measures regarding their technology focus and the sector on which they are implemented indicating which types of measures are usually opted for by MS countries to support certain technology interventions. Please note that the table does not include all measures proposed by countries. Instead only measures adequately described in the notification reports are included in the table. Therefore the table is not meant to be exhaustive but to indicate which technologies interventions are crowding out other options.

In the building sector, energy renovation of the thermal envelope of existing buildings (e.g. insulation, facades and windows) seems a common option promoted in every sector (in the residential sector for Austria, France, Germany, Greece, Italy, UK and the Netherlands, and in the Public, Commercial and Tertiary sector for the UK).

Higher cost measures (e.g. whole house renovation, solid wall insulation) seem to be the main focus of alternative measures proposed in the residential sector, usually in the form of

soft loans and grants.

In the public sector, street lighting and build envelope measures are the usual interventions targeted mainly through grant schemes, regulations as well as behavioral measures.

The most common intervention in the heating domain chosen by Austria, Germany, Greece, France, Italy, UK, and the Netherlands is the upgrade of heating systems in existing buildings in the residential sector by using condensing boilers, heat pumps and solar thermal, or by using oil to natural gas boilers in the public sector for Austria and Greece, UK.

Automation and smart management systems, Renewables (RES) and Combined Heat and Power (CHP) units dominate crosscutting technologies promoted also through direct infrastructure investments. The same type of measures usually supports the improvement of equipment and process technologies in the industrial sector.

Finally in the transport sector, urban sustainable mobility and low emission vehicles (case of Austria, Germany and Greece) are promoted the most through tolls, regulation and direct infrastructure investments.

Less targeted by alternative measures, are new products such as domestic refrigeration, appliances and co-generation units as well as energy savings interventions in new builds. District heating & cooling, and waste heat utilization systems are also less common.

**Table 1.2: Classification of alternative policy measures based on their eligible technologies and interventions**

Common technologies	Fiscal (R: tax reliefs, I: increases)	Financial (L: loans, G: Grants, P: partial guarantee-3rd party financing)	Direct investment (P: Public procurement, I: Public infrastructure investment, RD&D)	Regulations	Support for Human Agency (information, training, education)
<b>Residential/Buildings sector</b>					
Energy renovation of the thermal envelopes of existing buildings (e.g insulation, facades, windows)	Italy (R), Greece (R), France (R), UK (I), Netherlands (R)	Italy (G), Austria (G, G), Germany (G, L, G), Greece (L, G, G, P), France (L, G, L), UK (P)		Germany, Netherlands, UK	Netherlands
Upgrade of heating systems (e.g. condensing boilers, heat pumps, solar thermal) in existing buildings	France (R), Netherlands (R)	Italy (G), Austria (G, G), Germany (G, L, G, G), Greece (L, G, G, P), France (L, G, L), UK (G)		Netherlands, Germany, UK	Netherlands
Construction of new buildings (e.g. climate friendly construction material)		Austria (G), Germany (G)		Netherlands, UK	Netherlands, Germany
Improvement of the energy efficiency of air conditioning equipment	Netherlands (R)	Austria (G)		Netherlands	Netherlands
Improvement of the energy efficiency of the lighting installations in existing buildings.				Netherlands	Netherlands, Germany
Improvement of the energy efficiency of household appliances	Netherlands (R)	Austria (G)		Netherlands	Netherlands, Germany
Installation of RES systems in new & existing buildings	France (R), Netherlands (R)	Germany (G), France (L, G, L), UK (P), Netherlands(G)	Greece (P)	Netherlands, Germany	Netherlands, Germany
Rational energy use/smart energy planning					Netherlands, Germany
Connecting to district heating	France (R)			Netherlands	
Domestic refrigeration and appliances				UK	

Energy upgrade of the E/M installations		France (L, G, L)			
<b>Industry</b>					
Introduction of energy management schemes and energy audits	Sweden		Germany (G)	Germany, Greece, Sweden, Netherlands	Germany, Greece
Improvement of equipment and process technology (BAT)	UK (R)	Germany (L, G)	Austria (RD&D)	Netherlands	
Installation of heat recovery/waste heat utilization systems	UK (R)	Germany (G, L, G)			
Improvement of the energy efficiency of commercial and industrial heating & cooling installations	UK (R)	Germany (G, L, G)			
Installation of RES systems				Sweden, Netherlands	
<b>Public-Services Sector</b>					
Renovation of existing outdoor public lighting installations,		Austria (G), Germany (L), Greece (G, P), UK (L)	Greece (G),	UK	
Improvement of the energy efficiency of existing data centers (e.g. greening ICT)		Austria (G), Germany (G)	Austria (RD&D)	Greece, UK	Sweden
Improvement of the heating installations in existing buildings (e.g. oil to natural gas boilers)		UK (L)	Austria (RD&D), Greece (G)	UK	Netherlands
Facilities and estate management, rationalization and smart energy planning		Austria (G), UK (L)	Greece (G)	Greece, UK	Greece, Sweden
Installation of RES or CHP units		UK (L)		UK	Netherlands

Energy renovation of the thermal envelopes of existing buildings (e.g insulation, facades, windows)		UK (L, P)		UK	Netherlands
<b>Cross-cutting</b>					
Improvement of the energy efficiency through automation, smart management systems and audits	UK (I)	Greece (P), Sweden (G), France (G), UK (P)	Austria (RD&D), Greece (G),	UK	Sweden
Improvement of the energy efficiency of district heating and cooling	UK (I)	Greece (P), Austria (G)		UK	
Improvement of the energy efficiency of electrical installations in existing buildings	UK (I,R)				
Installation of RES and CHP units	Austria (I), UK (I), Netherlands (R)	Austria (G, G), Germany (G)		Germany, UK, Netherlands	Netherlands
Expansion/upgrade of heat and refrigeration systems	UK (I)	Germany (G)		UK	
Energy upgrade interventions of technical infrastructure / other facilities	UK (I)	France (G)			
Energy Efficiency Lighting	UK (I)			UK	
<b>Transport</b>					
Implementation of measures for urban sustainable mobility		Austria (G), Greece (G)	Austria (I),		
Promotion of Low emission vehicles		Austria (G), Greece (G)	Austria (I), Germany (P)		
Introduction of electric, natural gas and hydrogen vehicles (i.e. switching of fuel vehicles)	Netherlands (R)	Germany (G), Netherlands (G)	Austria (I),UK	UK	



Improvement of urban mobility and transport for businesses		Greece (G)	Austria (I)		
<b>Agriculture</b>					
Financial assistance: Energy Efficiency loans from agricultural pension bank		Germany (L)			

**The majority of measures proposed are an extension of existing measures.**

Another aspect we analyzed related to the starting date of measures proposed and whether or not their introduction was an immediate result of the transposition of the Directive by each MS country. Our findings suggest that the majority of measures proposed are an extension of existing measures, which may indicate that some MS have set the basis for energy saving many years before the introduction of the Directive, whereas the market experience with EEOs is low. New legal actions and practices would have to be developed with a new EEO, meaning that the entire learning curve would have to start all over again for many countries. Hence they opt to rely on existing elements (i.e. pre-existing to the transposition of the Directive) by adapting them properly in order to meet the requirements under Article 7 to avoid also additional administrative and monitoring needs new measures entail. Table 1.3 outlines key existing and new policy measures as identified through the individual country reports under analysis. Sweden and UK with a wide range of instruments promoting energy efficiency already in place (33 and 14 measures respectively) before the Directive came into force. On the other hand Greece, France and the UK propose policy packages with existing and new policy measures, with the introduction of those new measures still at a very early implementation stage in need of continuous monitoring.

**Table 1.3: Pre-existing or New Policy measures proposed by MS**

Existing/ New Policy			
	1. Existing	2. New	TOTAL
Greece	6	12	18
France	4	4	8
UK	14	6	20
Austria	8	1	9
Netherlands	33	1	34
Italy	2	0	2
Germany	11	0	11
Sweden	11	0	11

**Calculation method savings for proposed alternative measures**

A summary of aspects relevant to the basic energy savings calculation method (i.e. top-down / bottom-up, ex-ante/deemed savings or ex-post/measured real savings), as well as an evaluation of available information regarding baseline settings and benchmarking methods adopted for alternative measures, as reported across MS countries under evaluation, is presented below.

According to the NEEAPs and the updated notification reports, there are three different methodologies used by MS countries to calculate the savings resulting from proposed

alternative measures. These are deemed, metered and scaled savings.

**Deemed/top-down savings** are pre-determined, validated estimates of energy and peak demand savings attributable to energy efficiency measures. This method calculates total estimated savings by multiplying the number of installed measures by an estimated (or deemed) savings per measure, which is derived from historical evaluations.

**Metered savings** use before-after measurements in order to estimate energy and demand savings. The Metered Baseline Method lets the user establish a consumption baseline from which the energy savings can be calculated after the implementations of energy savings activities.

The **scaled savings method** (or project impact assessment method) estimates energy demand savings based on engineering estimates. It is usually applied in the form of measured consumption data before and after the implementation of the activity, combined with industry recognized engineering calculations. This method is commonly used where energy savings are small compared to the overall site consumption, or data for a project's site past electricity consumption is unavailable.

In the Netherlands, no official and standardized monitoring, reporting and accounting protocol is in force for most subsidy schemes, for which deemed savings are likely to be calculated based upon aggregate data. Likewise, in Greece estimated savings for financial schemes, are largely based only on processing the results from Energy Performance Certificates (EPCs) issued for participating buildings in different sectors. Whereas deemed savings for fiscal and financial schemes in France are supported by impact assessment through SCEGES modeling. Table 1.4 demonstrates the calculation methods adopted by MS countries to estimate savings ex-ante for selected alternative measures under evaluation.

For regulatory measures and standards, estimations are often based on deemed savings, where assumed percentage savings are adopted for energy uses not covered already by other policy measures (e.g. cases of UK and Greece). A "deemed savings" method is also reported for fiscal measures, since tax authorities do not usually require monitoring and reporting of energy savings.

**Table 1.4: Calculation Method Savings adopted by MS countries**

Type of measure	Calculation method	Countries
Financial (e.g. subsidy-grant, loan)	<b>Deemed savings</b> , based on experiences from past years	Austria, Germany, France, Greece (direct investment programmes), Netherlands, UK
	<b>Scaled savings</b> based on program evaluations and expected future support volumes	Austria, Italy, Germany, Greece
Fiscal (tax deduction, increase)	<b>Deemed savings</b> /modeling based on experiences from past years	Italy, France, Netherlands
Energy Taxes	<b>Scaled savings</b> /modeling using economic model with assumptions about price response and the number of behaviour and technological options adopted.	Austria, Sweden (use of long-run elasticities), UK (deemed savings modeling)
Training & Education	<b>Deemed savings</b> based on specific assumptions	France, Greece
Regulatory measures (e.g. standards)	<b>Deemed savings</b> based on specific assumptions	Greece, Netherlands, UK
Infrastructure roll-out (e.g. smart metering)	<b>Deemed savings</b> based on specific assumptions	Greece, UK (evidence are collected to test current assumptions)
Legislative	<b>Scaled savings</b> based on program evaluations	Greece
Voluntary Agreements	<b>Metered or Scaled savings</b> based on program evaluations and expected future support volumes	Netherlands

For most MS countries the estimated savings assigned on alternative measures are based partly on assumptions, estimates and forward projections of savings measured in the past. At this point in Article 7 implementation, as shown in Table 1.4, the most popular methods adopted by MS to calculate indicative savings for alternative measures, is the deemed calculation method. For the latter there is a greater risk of poor additionality when baselines do not adapt to technology development or when measures are not revised following the evaluation of the market. This approach should be usually complemented by on-site inspections and periodic monitoring.

Table 1.5 classifies MS countries under analysis according to the adequacy of information provided over their baseline settings and benchmarks used for calculating energy savings estimates. References to the basics of the measurement methods were made within the notification reports, although insufficient information specifying the chosen baseline and methodology for the benchmark adopted was usually included. Finally little or no information was included on whether ex-post monitoring and evaluation of energy savings from alternative measures will be conducted in the future.

**Table 1.5: Measurement methods for alternative measures - evaluation of adequacy of information/main issues identified.**

Colour-code	Measurement methodologies - main issues	Countries opting for alternatives with main issues identified
Green	Sufficient information is provided tailored for alternative measures proposed regarding: the measurement methods in accordance with Annex V (part 1) of the EED, the baseline settings, elasticities used and/or benchmark method.	Austria, Sweden
Yellow	MS mention their approach to calculating the savings, but do not provide sufficient information on methodologies, benchmark and baseline settings used for savings estimates.	France, Greece, Italy, Netherlands, UK
Grey	References to the basic measurement methods are made, yet no further information at all is given on methodology for estimating the savings, benchmark and baseline setting used for estimating the savings.	Germany

Overall, calculation and reporting approaches are extremely diversified and there is an essential difficulty in determining the most appropriate calculation method of savings regarding many issues (e.g. double-counting, additionality), especially due to the variety of policy measures usually with a broad technology and sectoral scope.

There is not one best method of calculating savings since the issue at stake is about defining in detail the most appropriate method, accounting for a number of factors, including transaction costs, practicality, and risk of over-estimating savings.

Please note that the methods were reported by MS to calculate the expected savings from measures ex-ante, and measuring real savings in the future would usually require monitoring on a case-by-case basis. Therefore for the calculation of delivered savings in the future, modifications in the adopted calculation methods to evaluate observed savings are likely to occur.

**Verification, monitoring, control & compliance regime for proposed alternative measures**

MS countries are required to thoroughly outline a monitoring, verification, control and compliance regime (Article 7(10) (h) and Annex V, (part 4)) in their notification reports covering all alternative policy measures proposed, verifying their operation until 2020 and beyond.

The results of the country reports show that most MS mention the pertinent authorities assigned with such responsibilities for individual alternative measures but often do not include details on specific elements of the system such as verification procedures in the form of ex-post evaluations, inspections for a representative sample size or established monitoring protocols in place to facilitate and ensure the calculation of credible savings and

penalties.

An existing national monitoring body in each MS is assigned to monitor and verify the implementation of measures. These are usually in the form of energy and environmental agencies or comprise a specific/department part of the general oversight body (i.e. Ministry) and are complemented by a network of local authorities (i.e. tax agency/authorities) and municipalities. For instance in Sweden, the Swedish Tax and Energy Agencies oversee the implementation and verification of measures based on monitoring reports, which county administrative bodies, municipalities, companies and other relevant bodies, at a sub-national level, are obliged to submit periodically (either annually or more regularly). Italy has assigned the national Energy services manager body, in charge of all the incentive schemes, including RES, for the evaluation of proposals and of on-field verification, as well as the existing agency for new technologies, energy and economic sustainable development (ENEA) for documental verifications. France relies on the various Tax authorities and participating financial institutions, while, Greece uses combination of Ministries to administer the bundle of proposed policy schemes.

Regarding the details on the verification procedures and monitoring control area, these are not well specified at this point. The results of our analysis indicate that official and standardized monitoring and reporting initiative is linked to only a few, usually existing measures. Where no official monitoring set-up exists, 'deemed savings' estimates are likely to be adopted based on either sample monitoring or top-down estimates.

Yet limited or no information at all is provided by MS reports on the statistics related to future sample monitoring work. Ex post evaluations and quality standards are also hardly mentioned in the notification reports. France characteristically states that if none of the proposed alternative schemes involve ex-post evaluation or control of the actual savings reached, they will all rely on quality works. In Italy the verification procedure of a tax-reduction measure is limited to the documentation attached to the proposal, yet a false declaration is highly unlikely due to the fiscal controls and the particular bank payment allowed accessing the tax deduction. There are no penalties, apart from the eventuality of fiscal controls resulting in non-conformity to the law. As such in the Netherlands only a few schemes have a robust monitoring and reporting framework in place. In most cases this is considered to be justified, as it would significantly add to the transaction costs (for many smaller projects). The main issues identified regarding the available information on the monitoring and control regime of MS countries are summarized in the table below.

**Table 1.6: Information on monitoring, verification and compliance regime for alternative measures – Main issues**

Issues	MS where issue has been identified
<p><b>No information at all:</b> MS countries only mention that the verification, monitoring and control method will be based on conducting inspections from the authority, responsible for planning and financing each individual measure. No further information about the foreseen verification and monitoring procedures such as audits, quality works, sampling of inspections or penalties are provided.</p>	<p>Greece, Sweden, Germany</p>
<p><b>Insufficient information:</b> MS refer to documental control (on applications) and on-site (spot check) verification, or fiscal controls for fiscal measures in their notification reports. Minimum quality requirements are mentioned. No further information are included referring to the specifics on the verification coverage or the statistics of the sampling used. Penalties and audits are also not described or mentioned</p>	<p>Italy, France, Austria, Netherlands, UK</p>

On the one hand the lack of strong evaluation and verification procedures at least for some types of alternative measures (e.g. fiscal, lending measures) is balanced by the type of admitted actions and by the unlikelihood of false declaration, due to the fiscal and particular documental controls. Yet on the other, a great deal of additional work is still required by MS to clarify and improve this area in their notifications, especially for more complex projects by setting stronger requirements in terms of qualification of the installers, quality of projects and establish penalties for non-conformity with well-defined quality standards. The monitoring and verification regime is an integral component of MS efforts to meet with Article 7 requirements, one that determines the credibility of the calculation methods adopted and the validity of estimated savings. To improve the quality of data when calculating savings, MS should keep records to validate any information they have submitted about the organization, energy supplies and use. By keeping an evidence pack that the regulators can examine during an audit, they ensure the validity of results. To support MS efforts towards specifying and establishing robust monitoring, verification and control procedures, a more detailed guidance should perhaps be provided from the EC side, on the specifics of auditing, data gathering and form of inspection procedures.

### **Additionality**

Article 7 puts in place the criteria and conditions for eligible measures and how savings can be counted towards the target for the period 2014-2020. Only new savings, that is, savings resulting from additional energy end-use efficiency measures during the period 2014-2020, that are beyond “business as usual” (i.e. above the baseline), are eligible to be counted towards meeting the energy end-use savings target. Additionality of alternative measures can be distinguished into:

- **Policy additionality**, which ensures that a single instrument has an additional effect if

and when combined with other policy instruments.

- **Technological or legal minimum** (i.e. **norm based**) **additionality** refers to energy savings considered additional only when these go above and beyond autonomous saving trends (or minimum legal standards). A simple list with eligible technologies does not really ensure additionality, since there could be stakeholders that would have invested in the technology irrespective of the incentive scheme in place.
- **Economic additionality** relates to energy savings measures that are not yet viable in the current economic climate. Any such investments made would thus generate additional energy savings, which would otherwise not have occurred.

The issue of ‘policy non-additionality’ resembles the double-counting issue, and can be largely solved by adopting a method for calculating or avoiding the effect of overlapping or double counting of the impacts that results from separate impact assessments of individual measures operating at the same time. Some countries like Sweden and the Netherlands consider deemed saving per policy package or sector instead of per individual instrument to avoid policy overlaps when estimating savings (see Table 1.4).

The issue of ‘technical non-additionality’ can be tackled by frequently updating the list of eligible (more innovative) technologies. This requires the public bodies to closely monitor market and technology transformations in multiple sectors. MS countries usually mention provisions about the periodic update of list of eligible measures and tax-reduction percentages without providing more details on established monitoring procedures.

‘Norm-based additionality’ can be ensured by setting minimum performance norms or standards (or effectiveness norms or ranges, such as EUR invested per MJ energy saved), also this requires careful monitoring of the developments regarding the latest technologies and technology options. This issue of additionality is also insufficiently described by MS and often for only some of the measures proposed by mentioning that the baseline is established to be higher than applicable national and EU regulations. For instance France states that there are no particular additionality requirements for alternative measures, beyond the fact that eligible measures only involve the most efficient equipment available (that goes beyond national and European regulations).

Finally economic additionality is hardly mentioned at all in the notification reports. Italy states that there is lack of explicit additionality evaluation, due to the character of both policies (incentives linked to the capital cost of investments). Economic additionality of financial measures has been implicitly addressed through low-income requirements for participating in subsidy schemes. ‘Economic additionality’ can be ensured by looking more closely at the financial-economic position of the (group of) stakeholder(s) who is making the investment. As such for subsidy schemes in the Netherlands, economic additionality can be partially justified for investments which might have occurred at some point in the future as part of regular maintenance and refurbishment cycles, but are made earlier than would otherwise have been done.

Most common reasons for non-additionality identified as mentioned in the reports are:



- I. Energy efficiency is not main objective and no distinction is made between the energy efficiency and the renewable energy part of the objective,
- II. Early and late savings counted towards achieving the target,
- III. Calculated savings may be below the EU standards set by Energy Performance of Buildings Directive (EPBD) and Eco-design.

Energy taxes, tax-reductions, and RES support schemes (i.e. loans and grants) are the most usual suspects for which additionality requirements are mentioned in the country-reports. RES systems are usually funded via subsidies, and the remuneration heavily relies on actual production data, which requires net metering. A good metering infrastructure is usually in place for RES production facilities and RES systems are generally more concentrated meaning that ex-post metering is possible with relatively low monitoring costs. However, it is common practice to allocate 100% of the RES production to the primary incentive scheme, while alternative policies and measures promote the development of RES production facilities as well, which raises the question if such 100% allocation can still be justified.

#### **Best-case practice: Austrian Green Electricity support Act**

Austria provides tailored additionality provisions per measure. In fact when it comes to the inclusion of RES technologies, Austria foresees that to avoid non-additional savings on the Green electricity support act, only the energy that is produced and used on-site by final customers will be taken into account.

### **Double counting issues**

Judging by the variety of alternative measures proposed, a great variety of approaches to double counting is also noted from MS countries in order to avoid overlapping policies.

Austria, which opts to meet with Article 7 requirements through an EEO scheme supplemented by six alternative schemes, to hedge double counting, introduces a different approach for every measure (see Table 1.7). A similar approach is followed by Italy with only two schemes complementing the EEO scheme. Italian regulators reduce the risk of double-counting by issuing a strict documental and spot-onsite verification for the more recent Thermal account scheme, to the detriment though of delaying and discouraging project implementation due to increased complexity. Greece on the other hand follows a unified and rather practical approach to minimize the risk of double counting, by simply implementing energy efficiency interventions in different buildings. Even in cases where two different measures will be implemented in the same building, the energy savings resulting from the following measure will be estimated according to the new energy performance of the building, resultant from the completion of the first intervention.

Different approaches to avoid policy overlaps as described in MS notifications and NEEAPs are summarized in Table 1.7. An exchange of approaches could be useful among MS countries, especially where similarities among types of policy measures are noted and when

new policies are proposed.

**Table 1.7: Policy additionality – MS approaches to avoid double counting.**

Countries	Examples of Double-counting considerations
Austria	<b>Refurbishment Subsidies:</b> applied by separate federal states at their own territory. <b>Domestic support:</b> allocated based on data provided by a centralized database. <b>Tax on oil:</b> only measure from the traffic sector. <b>Electricity Tax and N. gas Tax:</b> estimates are based on short-term elasticities <b>Federal Highway toll:</b> sole actions for freight traffic <b>Green el. support:</b> counting only the state el. support might hedge double counting.
France	<b>No double-counting considerations.</b> Verification and control doesn't account for energy savings.
Germany	<b>Formulas and methodological parameters</b> for calculating the final energy savings resulting from policy measures or combinations thereof.
Greece	<b>Implementation of EE interventions in different buildings.</b>
Italy	<b>Documental and spot-on-site verification.</b> <b>Penalty</b> of 10 years exclusion from any national support programme.
Sweden	Total target savings consider only the impact of taxes.
The Netherlands	<b>Policy packages instead of individual instruments:</b> Double counting is avoided, since the gross savings performance is not the sum of deemed savings per individual instruments. National reporting is based on a top-down protocol, which is corrected for non-additionality.
UK	<b>Policy ranking</b> to adjust pre-policy demand for lower ranked policies in the merit order to avoid double counting.

Finally issues and risks related to additionality and double counting were reported for each country individually and are summarized in the table below (Table 1.8).

**Table 1.8: Reported double counting and additionality risks regarding the implementation of alternative measures in compliance with Article 7 requirements**

Countries	Double-counting/ Additionality risks
Austria	None reported
France	<b>Sustainable Development Tax credit, Interest free eco-loan:</b> Double counting risks with all the programs targeting households <b>Energy Renovation Passports, Guarantee fund for energy renovation:</b> Double counting risks with the EEO scheme and in general with all the programs targeting households
Germany	No information available

Greece	<p><b>Development of Thessalonica Metro, Extension of the Athens Metro:</b> Rebound effects likely to occur are not accounted in the calculation of savings.</p> <p><b>Installation of electronic and intelligent metering of electricity:</b> Potential double counting with all the measures resulting in the reduction of electricity consumption. Various overlaps among measures to be hedged through the implementation of measures in different buildings or through calculations with the new energy performance of the building/transport.</p>
Italy	<p>Additionality is not explicitly accounted for in terms of savings, but non-additional solutions are not admitted to the scheme based on specific minimum efficiency requirements that apply for each measure.</p>
Sweden	<p>Risks were eliminated in the notification to the EU Commission, where all other measures were left out from the calculations since they work in concordance with the taxes.</p> <p><b>Network management in industry:</b> such types of measures are rarely measured in actual figures.</p>
The Netherlands	<p><b>Voluntary Agreements:</b> Additionality for most agreements is not structurally assessed. In most cases these agreements are used in conjunction with other support schemes, such as fiscal measures / subsidies. It becomes difficult to determine the ‘policy additionality’, which relates to what share of the (deemed) energy savings can be attributed to a specific policy instrument.</p> <p><b>Fiscal instruments</b> do not oblige stakeholders to perform some form of monitoring and reporting, and as such only deemed savings, based on aggregated data (e.g. total investment per technology category) can only be calculated.</p> <p><b>Lending facilities:</b> such facilities do not ask for reporting specifically on energy savings achieved (such monitoring would increase the transaction costs of the lending facility) – only deemed savings can be calculated.</p>
UK	<p><b>Green Deal – household:</b> Links with the Supplier Obligation-need to ensure savings, which arise from a combination of these policies, are only counted once.</p> <p><b>Building regulations, Building regulations – non-domestic:</b> The UK government suggests these are additional for the purposes of this Directive because these regulations predate EPBD. This interpretation of additionality may well be incorrect.</p>

### Estimated costs of alternative measures in compliance with Article requirements.

An effort has been made, throughout the country reports to gather information on the envisaged costs of selected alternative measures proposed by MS. Focusing on the perspective of the utility, government agency, or third party implementing the program, we have classified information on costs under three main categories, administrative costs (i.e. policy overhead costs), policy administrator incentive costs (i.e. funding costs) and investment costs (i.e. utility/market actor installation costs). For a large majority of

alternative measures, there is little information on the costs these will generate. Funding costs are usually highly dependent on the scale of each measure and the replication potential of these measures which are difficult to determine at this point, while in many cases costs for various measures are intertwined, making it almost impossible to allocate costs to only one measure. Table 1.9 summarizes available information regarding the costs related to the implementation of selected alternative measures

Information on relevant administrative costs as well as the total investment costs is largely not available. The former are in some cases approximated through qualitative ratings (i.e. low, medium, high) and can be interpreted as a percentage of total incentive costs (e.g. Italy estimates low administration costs to be equal to below 1% of the total incentive cost and high equal to higher than 5%). Even less often those are more precisely specified such as the case of the complex UK Carbon Reduction Commitment Energy Efficiency Scheme (see Table 1.9). Administrative data should not be overlooked, especially when most MS opt for adapting existing and proposing new alternative measures features, which usually entail a considerable administrative burden.

Investment costs are also rarely specified are also usually estimated as the sum of investments per year (€/year) for existing schemes already in place (e.g. the case of France) and for investment allowance schemes (e.g. cases of UK and the Netherlands). Finally incentive costs are translated as available state-funds or cohesion funds allocated for each measure. The total incentive costs of the measures often depend on the number of the participating buildings, which will lead to the achievement of the specified energy savings target.

**Table 1.9: Overview of costs of selected alternative measures adopted/adapted by MS to meet with Article 7 requirements**

Countries	Administrative costs (€)	Total investment costs (€)	Total incentive (i.e. state funding) costs (€)
<b>Austria</b>			
PI1: Refurbishment subsidy schemes	N/A	N/A	3,27 Bn €
PI2: Domestic environmental support scheme (UFI)	N/A	N/A	90 mil. €
PI3: Energy taxes	N/A	N/A	4,58 Bn €
PI4: Federal highway toll	N/A	N/A	1,1 Bn €
PI5: Green electricity support	N/A	N/A	66,8 mil €
<b>Germany</b>			
PI1: Support programmes for energy-efficient construction and renovation	N/A	N/A	1,500 mil. € per year
PI2: Investment programmes in municipalities and social facilities	N/A	N/A	200 mil. € per year expected
PI3: Investment support programmes in companies	N/A	N/A	3 bil. € per year
PI4: National Climate Protection Initiative — further programmes	N/A	N/A	120 mil. € per year
<b>Greece</b>			
PI1: "Energy saving at home" programme	High	N/A	Total available budget: 548.2 mil. €
PI2: "Exoikonomo / SAVE" programme	Low	N/A	Total foreseen cost: 100 mil. €
PI3: "Exoikonomo / SAVE II" programme	Low	N/A	Total foreseen cost: 75 mil. €
PI15: Development of the Thessalonica metro	High	N/A	Total foreseen cost: 900 mil. € approximately

PI16: Extension of the Athens Metro	Low	N/A	Total foreseen cost: 100 mil. € approximately						
<b>UK</b>									
PI1: Green Deal – household	N/A	N/A	180 mil. € have already been spend 125 mil. € will be spent on the Green Deal Home Improvement Fund						
PI5: Smart metering (non-domestic)	N/A	N/A	0.575 € (central estimate) for the period 2013-2020 out of which 50% are counted by the Bristish government towards meeting with Article 7 requirements.						
PI6: Carbon Reduction Commitment Energy Efficiency Scheme	4.125 mil. € spent on staff time and IT and other set-up costs (2.25 mil. € fees charged to participants, rest from central government), 1.5 mil. € for policy design and development costs for the period 2010-2011.	The value of allowances surrendered was: 2011/12 – 832.5 mil. €; 2012/13 – 837.5 mil. €; 2013/14 – 713.75 mil. €							
PI7: Energy Savings Opportunity Scheme	N/A	The most significant elements of the costs of the policy are the capital and hassle costs of implementing assessment recommendations 875 mil. € over the period).	N/A						
<b>Italy</b>									
PI1: Tax deduction	Not available, but below 1% of the total incentive cost.	N/A	2012:	1,585	M€	-	1.26	€/kWh	
			2011:	1,820	M€	-	1.27	€/kWh	
			2010:	2,533	M€	-	1.25	€/kWh	
			2009:	1,410	M€	-	0.95	€/kWh	
			2008:	1,925	M€	-	0.98	€/kWh	
			2007: 799 M€ - 1.01 €/kWh (kWh final consumption)						
PI2: Thermal account	Not available, but high due to the limited success of the scheme so far (estimable higher than 5%).	N/A	3.89	M€	in			2013	
<b>France</b>									

PI1: Sustainable development tax credit	Low administration costs as part of the tax authority functioning (declaration through the tax declaration, direct deduction from tax payment and control through normal tax control)	6,8	bn.€	1.36 bn. €
PI2: Interest-free eco-loan	Low as dealt with by banks	4,5	bn.	€ 75 bn. €
<b>Netherlands</b>				
Green Funds	A total of 137 mln. EUR in 2011, and 167 mln. EUR in 2010	N/A		4.5 Billion E (from green banks and green funds in 2013)
Voluntary agreements with housing corporations	N/A	60.000 €	per house	
Blok voor Blok	The national government has committed 15 mln. EUR and 2,5 mln. EUR thus far to facilitate the blok-for-blok process (support platform, some process funding, etc.).	N/A		350.000-500.000 € per project, in total 5,75 mil. €
Revolving funds	N/A	N/A		185 mil. € from government funds, 225 mil. € cofinance from banks for owner/occupiers
EUR 400 million subsidy for housing corporations	N/A	4.500 €	max. available amount per household	400 mil. € / 4.500 € max. available amount per household
Energy Investment Allowance	An estimated 3,5 mln EUR per annum to run this scheme. For the period 2006-10 this comes to an administrative costs of 0,27 EUR per GJ primary energy saved.	Total CAPEX in 2006-2010 period was 5.509 mln EUR.		111 mil € (2014) and 160 mil. € (2013)
Long term agreement on energy efficiency in ETS companies (MEE)	NL Agency (now RVO) reported costs of 19,5 mln. EUR for the 2008-12 period, while MEE companies (aggregate estimate) spend 1,5 mln EUR in 2010-12 period.	N/A		

Long term agreements MJ3	Executive costs of the scheme (operated by RVO) amounted up to 15,3 mln. EUR per annum throughout the 2008-2012 period.	N/A
<b>Sweden</b>		
PI2: Municipal energy and climate advice		15.33 mil.€/year
PI3: Support for energy efficiency in municipalities and county councils		29.56 mil. €/year, together with regional climate and energy strategies
PI4: Sustainable municipalities		Depends to a very high degree on the number of participating municipalities, which has varied.
PI5: Regional climate and energy strategies		Depends to a very high degree on the number of participating municipalities, which has varied.
PI6: Energy audit checks	98,547.4 €/year	0,77 million €/year government expenses, excluding companies' own spending
PI7: Program for energy efficiency in electricity-intensive industries (PFE)		This is difficult to measure in exact terms because the idea was that participants get a waiver from their electricity tax in exchange for carrying out energy efficiency measures.
PI9: Technology procurement		11.82 million €/year



Although MS countries are not required to notify the European Commission on the cost-effectiveness of their proposed options to comply with Article 7 requirements, there is an urgent need reported from governments to evaluate their cost-effectiveness in a homogenous manner.

Yet cost-benefit ratios are impossible to estimate at this point, since not many details are given about any type of cost, and that data which is available is very heterogeneous. For example, different metrics are used for incentive costs – including total foreseen budget available, available funds per year or per participant. Only Italy clearly describes the calculation of the cost-benefit ratio of the long-implemented tax deduction scheme using the following benefit/cost ratio indicator:  $leff = \frac{\text{(discounted economic value of tax deduction)}}{\text{CAPEX}}$  (please refer to individual country reports for further details).

Finally considering that in most of the cases a combination of instruments is used, determining the cost-effectiveness of individual instruments is strongly dependent on what share of the deemed total savings is attributed to an individual scheme. However since that allocation is usually subjective and varies across EU countries, the cost-effectiveness performance of individual instruments is hardly comparable across different MS.

### **Observed or Potential Implementation Barriers/Risks**

The main challenges in the policy decision-making and implementation process of measures under Article 7 implementation are summarized below as reported by each MS country under assessment. These are discussed further per individual measures for each country-case.

- Lack of clear purpose of the measure,
- Unexpected changes/adaptations in policy design impacting policy consistency,
- High administrative burden due to necessary policy amendments to conform with Article 7 requirements,
- Insufficient fundability for end users, candidate owners, municipalities, operator and ESCOs and difficulty in access to finance in general,
- High public cost associated with fiscal measures,
- Uncertainty of financing related to the unfavorable economic climate (e.g. In Italy, in a period of high public debt and crisis, the reduction of tax revenues will bring the Government to hinder the development of the scheme or even close it),
- Lack of a clear monitoring system (especially lack of precision according to energy savings and lack of a control-audit system) which influences the quality and certainty of achieved energy savings,
- Technical constraints or lack of technical infrastructure (e.g. IT problems) leading to delays and budget deficit,
- Past energy efficiency market activity focused on low hanging-fruit (e.g. the rapid implementation of measures with short payback periods),
- High up-front costs combined with long payback periods impacting the short-run

profitability of most measures.

- Lack of political will,
- Possibility of failure due to competition with other measures (i.e. policy interactions) or due to complexity and difficulty of the measure itself.
- Lack of integrated energy concepts focusing on overall energy efficiency, resulting in untapped energy saving potentials,
- Lack of skills (motivation, knowledge, understanding): Low technical capability of municipalities' and banks' technical staff and lack of awareness and motivation from public entities and households for participation.

In particular, lack of skills can refer to the technical staff of local public authorities or to participating entities (e.g. private companies, banks) as it has been reported by many country cases. In Sweden lack of knowledge refers to lack of qualified staff in the public sector since tasks have become especially demanding. In France building refurbishment professionals need appropriate training in order to deliver quality work leading to the expected energy savings. Finally both in France and the UK participating financial institutions have been reported to have difficulties in comprehending and assessing projects' relevance in terms of energy efficiency (e.g. In France free eco-loans are not actively promoted since banks are not equipped to properly examine eco-loans applications).

This expanded lack of skills across different sectors (i.e. public and private sector) is highly related to inefficiencies in the official verification and compliance regime, indicating an urgent prioritization over such actions from MS governments. To stimulate skills enhancement in the private market (i.e. construction and buildings sector), MS should clearly prescribe, and strengthen their quality standards established per each support measure, policy package or sector, both in terms of project design and professional qualifications. Strict project requirements in terms of eligible technologies may also address reported market failures such as low hanging fruits. As follows, building contractors, project managers and craftsmen themselves will work as a market to take several actions (i.e. training and education efforts) in order to meet with new requirements and standards. Such raising awareness-efforts, carried out by the professional organizations, must also be continued to other influential intermediaries – accountants and banks. These professions should be in regular contact with craftsmen and company directors with whom they should maintain a close cooperation. To stimulate skills enhancement in the public sector, governments should continue their exertions to inform and train local authorities' staff about changing requirements and standards with regard to anticipated results in the energy efficiency and renewable energy market. Finally regular audit procedures (e.g. inspections) and protocols should be clearly described and established to frame a credible monitoring, verification, control and compliance regime. To do so MS would benefit from a more detailed support and guidance from the EC side, on the specifics of auditing and inspection procedures (i.e. in what form should these be established and what type of information should be checked).

## Conclusions

The objective of this report is to analyze key notified national alternative measures as well as their design specifics, defined as those planned to make the largest contribution to the targets set out in Article 7. Since it is estimated that alternative measures will generate more than half of the savings (i.e. 60%) of Article 7 by 2020, this assessment is important as it provides evidence on whether or not alternative measures are likely to achieve their goal, how are these contrasted to EEOs and which are the potential implications that may impede their eminent implementation.

### **Classification of Alternative policy measures**

For some countries alternative measures are designed in order to be a good complement to the Energy Efficiency Obligation Scheme. Yet for some others introducing or strengthening alternative policies such as standards, taxation and support for infrastructure and human systems, outside the remit of utilities are preferred and are deemed necessary to meet the energy saving target. Different mixes of measures are opted in order to achieve the total target. Some MS countries opt for a very large number of measures (most of them existing), such as the case of Netherlands proposing a list of 34 measures, while other countries follow a more minimal approach notifying a small number of measures to complement energy saving efforts to non-target sectors under the EEO. For example, Italy proposed a combination of a subsidy and fiscal scheme to support energy efficiency in the residential and public sector, complementing the savings resulting from the EEO applied primarily in the industrial sector.

### **Allocation of savings across sectors**

The sectoral allocation of estimated savings from alternative measures to EEOs is unclear, since the sectoral split of the expected savings is not available for every country-case. In addition, MS are not required to submit a sectoral allocation of the expected savings in their notifications and only Austria, the Netherlands and Sweden do so. In fact the last two countries argue that estimating the energy saving potential of the policies and measures at the level of sectors instead of attributing specific measures per individual measure minimizes the risk of double-counting. Estimating savings at a sectoral level might avoid policy overlaps however does not tackle all, equally important, aspects of non-additionality, such as technological and economic additionality. Out of the 8 countries under study Sweden is the only country to calculate energy savings resulting from the transport sector, which contributes by 70% over the sum of target savings, while the Netherlands emphasized the industrial sector, much more than other countries. Overall most countries opt to deliver the largest part of their savings through crosscutting measures with a horizontal impact (such as taxes, fiscal and regulatory measures), while for the rest of the savings, the residential sector leads the sources of savings. This indicates that MS assign different weight in their sectoral focus and energy saving efforts possibly to meet with untapped energy saving potential and available technologies across sectors.

## **Eligible technologies promoted by alternative measures**

The sectoral scope of policies by large determines the mix of eligible technologies proposed in the national action plans. A first analysis of targeted eligible technologies has been carried out that provides an indication of which technologies are “naturally” promoted by various types of alternative measures and which ones are less prioritized. It should be noted that since MS do not provide a technology split of estimated savings except for Austria, technologies had to be inferred by checking each of the policy measures proposed under the 8 countries under review. EEOs are a proven and effective route to delivering incentives for proven, low cost, mass-market measures. On the other hand, higher cost measures (e.g. whole house renovation, solid wall insulation) seem to be the main focus of alternative measures proposed in the residential sector, usually in the form of soft loans and grants. In the building sector, energy renovation of the thermal envelope of existing buildings (e.g. insulation, facades and windows) seems like a common option promoted across sectors.

The great variety of choices of measures adopted by each MS signifies that probably there is no universal optimal way of meeting with Article 7 requirements and that each country has chosen a package of policy measures, which best fits, its national circumstances (e.g. national priorities, historical policy developments and different policy making styles).

## **Implementation Issues**

The majority of proposed measures are an extension of existing ones. Newly proposed measures are (by definition) at very early implementation stage meaning that some risk attaches to certainty of savings. There is not one best method of calculating savings since the issue at stake is about defining in detail the most appropriate method, accounting for a number of factors, including transaction costs, practicality, and risk of over-estimating savings.

## **Monitoring, verification, control and compliance**

In addition, most MS do not present a clear view of their monitoring system, and that might mean a lack of ratification of the results. Usually in every MS the administrative system responsible for monitoring is a national or regional authority, however a common system for the verification of the results should be described and established per measure, site or sector. More details should be mentioned in order to monitor the implementation of the measures, especially for new schemes, since in most cases several measures have not been fully developed yet. In essence it is the quality and availability of data in a country that will finally determine which calculation methods are more suitable to apply for evaluating the energy savings for Article 7 from a sector, an energy end-use or an alternative measure. To reduce faults when calculating savings, MS should keep records, to validate any information they have submitted about the organization, energy supplies and use. By keeping an evidence pack that the regulators can examine during an audit, they ensure the validity of results.

## **Additionality and double-counting issues**

Our analysis identified different approaches to both additionality and double counting of policy measures, revealing that for most country-cases there is lack of completeness of information on methodological aspects and general insufficient account for additionality. Some of this information may be present in national policy documents, but it has not been included in notification reports or NEEAPs. Austria demonstrates a best-case practice providing tailored information on additionality and double counting for each individual measure proposed. Finally the variety of MS approaches to address the multilayered issue of additionality may also indicate the need for more detailed guidance on a uniform approach (method) to correct for the different aspects of non-additionality of national savings by MS.

## **Broader feasibility risks**

The most frequently cited risks that may impede the potential of alternative measures to achieve their estimated savings are:

- Insufficient fundability from end users, ESCOs and end-users' difficulty in access to finance;
- Past energy efficiency market activity focused on low hanging-fruit (i.e. the rapid implementation of measures with short payback periods);
- High public cost associated with fiscal measures;
- Low technical capability of municipalities' and banks' technical staff;
- Lack of awareness and motivation from public entities and households for participation.

Aforementioned persistent challenges impeding the implementation of alternative measures under Article 7 requirements are well recognized in the literature of energy efficiency barriers. Inefficiencies regarding verification, monitoring and control relating also to additionality inadequacy for alternative measures implies additional policy actions, in terms of support and further guidance provided at an EU level, as well as in terms of strengthening quality standards, auditing and inspection procedures at a MS level. Within the frame of implementation to meet with 2020 energy savings target the following suggestions can facilitate the implementation of alternative schemes:

- ✓ Improved architecture and design of promotional offers (e.g. introduction of grants) to uplift financing challenges,
- ✓ Promotion of Public Private Partnership models to address limited access to finance in the public sector,
- ✓ Support of integrated energy concepts focusing on overall energy efficiency to fully exploit energy savings potential,
- ✓ Continuously monitoring and verification especially for newly proposed schemes,
- ✓ Introduce a common centralized database in order to collect and monitor all energy savings data,
- ✓ Work with energy efficiency stakeholders to mobilize capacities,

- ✓ Identify and better understand best practices, and learn from other MS,
- ✓ Setting the target by including qualitative and detailed information
- ✓ Specifying a more long-term view of savings, after 2020.

Alternative policy measures can and should help some MS in reaching the 2020 energy saving target. Yet MS still have a long way to implement existing energy efficiency legislation. In the meantime, it is crucial to realize what governments aim to achieve when opting solely for a particular type of measure, or for a combination of those, in order to provide a convincing case for every MS that they will reach the target. And the European Commission should support and facilitate the correctness of this option by offering more guidance on the details of a monitoring and verification system ensuring the quality of the notified policy measures and national energy savings.

## REFERENCES

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## 2 Austria – AEA

For the context analysis specific indicators have been chosen that will provide us with a contextual overview on environmental, economic and socio-political state of Austria in view.

The European Union has set itself the goal of reducing EU primary energy consumption by 20 % by 2020, compared to current projections. A key instrument to help attain this goal is the EU Energy Efficiency Directive (2012/27/EU), or EED, which entered into force on 5 December 2012. The Directive included further cross-sectoral provisions to increase energy efficiency at European level, to be transposed into national law by 5 June 2014, or in some cases earlier.

Article 7 of Directive 2012/27/EU (Energy Efficiency Directive-EED) provides that an energy efficiency obligation scheme and/or an alternative system to an energy efficiency obligation scheme by taking alternative policy measures may be taken in order to achieve the 1.5 % annual energy savings target. In order to reach this target Austria decided to introduce alternative measures in combination with an energy efficiency obligation scheme. Concerning the alternative measures, successful measures, which were implemented in the past will be extended and new measures proposed. According to the notification submitted by 5 December 2013 to the European Commission, this will be necessary to meet the overall target under Article 7 EED.

According to the Austrian energy strategy Austria needs to stabilize final energy consumption at the level of consumption in 2005 in order to be able to meet the targets for 2020 established by the EU. Hence, final energy consumption in the year 2020 is not to exceed 1100 PJ (NEEAP 2014). The savings target was calculated on the basis of the final energy balance for Austria in 2010 and 2011 and the preliminary energy balance for 2012 from the Austrian Office of Statistics (Statistik Austria). A detailed explanation of how the target was calculated will be included in the first national energy efficiency action plan.

The implementing measures proposed are divided into the following categories: industrial buildings, production and services, as well as trade and small-scale consumption, mobility, energy provision, security of energy supply and general measures.

### 2.1 Classification of alternative policy measures

Austria's policy measures with the greatest contribution to achieve the set targets will be examined in more detail and described in the following sections. The table below allows a first quick overview on the five measures chosen for further evaluation.



All the measures are analyzed within the framework of the current study. Three of the five measures foresee the provision of financial support and incentives and the other two measures are tax related. All measures target the reduction of final energy consumption.

**Table 2.1: Alternative measures.**

Policy measure	Type of measure	Principal objective	Course of implementation
<b>PI1: Subsidy schemes for residential buildings</b>	Financing and incentives	Reducing final energy to be saved between 2014 – 2020.	1982 - open (certainly beyond 2020)
<b>PI2: Domestic environmental support scheme (UFI)</b>	Financing and incentives	Reducing final energy to be saved between 2014 - 2020	1986 - open (certainly beyond 2020)
<b>PI3: Energy Taxes</b>	Taxes	2 main objectives: (1) generating income for the state (2) reduction of energy consumption	open (certainly beyond 2020)
<b>PI4: Federal highway toll</b>	Taxes	Shift from road to other modes, reduction of CO <sub>2</sub> emissions	2002 - ongoing (effective until 2020 )
<b>PI5: Green electricity support</b>	Financing and incentives	Increase share of green power	2002 – ongoing (amended 2006, 2007, 2008)

## 2.2 Analysis of design and implementation features of alternative policy measures

### PI1: Refurbishment subsidy schemes

Savings in the building sector determined by means of bottom-up methods result mainly from measures to improve the thermal quality of the building shell, efficiency of heating systems, including promoting the use of alternative energy systems and tightening the requirements set by building regulations.

### PI2: Domestic environmental support scheme (UFI)

The domestic environmental support scheme provides economic incentives for companies to

implement measures in the field of energy efficiency, climate and environment protection. Subsidies are provided for energy efficiency measures and use of renewable energy sources in industry. In general, the subsidy covers 30 % of the environment- related investment costs. Higher or lower subsidy rates are foreseen in certain circumstances. The basis of this subsidy is regulated in the federal law called „Umweltfoerdergesetz". The annual budget for these grants is more than 30 million € provided by the Austrian Ministry of Environment, with the "Oesterreichische Kommunalkredit" transacting the programme. Beside this national initiative, there are several regional programmes.

### **PI3: Energy Taxes**

Taxes on electric energy, natural gas, mineral oil products are regulated under the following laws in Austria: Energy Tax Act (BGBl. No 201/1996); Natural Gas Tax (BGBl. No 201/1996); Mineral Oil Tax (BGBl. No 630/1994)

All three acts lay down higher tax rates than the EU Energy Taxation Directive (Directive 2003/96/EC).

### **PI4: Federal highway toll (Federal Road Toll Act (BGBl. No 109/2002))**

Use of stretches of toll road by multi-track motor vehicles with a maximum permissible total weight not exceeding 3.5 tonnes is subject to a distance-related toll. Vehicles which fulfil these conditions are therefore required to pay a fee for the journey affected on the toll road. The toll amount is set by the Federal Minister for Transport, Innovation and Technology, in consultation with the Federal Minister for Finance. The Autobahn- und Schnellstraßen-Finanzierungs-Aktiengesellschaft (ASFiNAG) draws up the Toll Ordinance. The toll amount is determined by the distance covered, emissions class, axle-number and partly by the journey duration.

### **PI5: Green electricity support**

The Green Electricity Act (implementing the EU Directive on Electricity Production from Renewable Energy Sources 2001/77/EC) governs the aid for green energy and combined heat and power generation throughout the country. The Green Electricity Act contains provisions on support and also on the funding of support. The Green Electricity Act, which entered into force on the 1st of January 2003, made way for a uniform country wide regulation of the support schemes for Green Power. Large parts of the Green Electricity Act (GEA) are designed to support the production of green electricity via a feed-in tariff, which is financed by the Austrian electricity consumers through a clearance mechanism.

## **2.2.1 Activity coverage**

The selected measures can be characterized by significant variety regarding the targeted end

use sectors. One measure will be implemented in the residential sector, another one in the commercial and tertiary sector and the third one in the transport area. Two measures have a horizontal impact across sectors.

**Table 2.2: Sectoral coverage, technologies and obligated parties, UK**

<b>Policy measure</b>	<b>Sectoral Coverage</b>	<b>Eligible technologies</b>	<b>Obligate parties/Target groups</b>
<b>PI1: Refurbishment subsidy schemes</b>	1. Residential sector	support refurbishment of existing buildings as well as the construction of new buildings (low energy buildings and passive houses); upgrading heating systems, using climate friendly construction material, insulation	residential buildings, private households, space heating and air conditioning
<b>PI2: Domestic environmental support scheme (UFI)</b>	2. Commercial & Tertiary Sector	Improving the energy efficiency of buildings, connection to district heating, installation of heat pumps or (large-scale) solar thermal systems, operational co-generation plants, energy-efficient lighting systems, alternative fuel vehicles and various mobility management measures.	Businesses, industries and municipalities may claim UFI
<b>PI3: Energy taxes</b>	8. Cross-cutting measure	Others	8. Cross-cutting measure
<b>PI4: Federal highway toll</b>	6. Transport	Others	multi-track motor vehicles with a maximum permissible total weight exceeding 3.5 tons
<b>PI5: Green electricity support</b>	8. Cross-cutting measure	8. Installation of Renewable Energy / 9. Improving the energy efficiency of energy-intensive facilities and infrastructure	8. Cross-cutting measure

## 2.2.2 Target setting

The assumed/indicated savings are based partly on assumptions, estimates and forward projections of savings measured in the past, without taking into account the possibility of future changes in conditions.

Note that the estimated savings mentioned in the table below have been calculated in order to avoid double counting. For example there are no overlaps between PI1 and PI2 as regards target groups. In principle overlaps between PI3 (energy taxes) and the other policy measures cannot be ruled out completely. However when calculating the expected energy savings from energy taxes Austria used short-term elasticities only in order to avoid double counting with subsidy schemes. It is assumed that the short-term elasticities reflect short term behavioral changes of end customers only and not decisions about mid- to long-term investments (which are caused by subsidy schemes).

**Table 2.3: Target setting, participation principles, calculation method and flexibility**

Policy measure	Target setting	Participation principles	Calculation method savings	Flexibility
<b>PI1:Refurbishment subsidy schemes</b>	2,600 TJ / year; 73,000 TJ 2014 - 2020	Voluntary	Deemed Savings based on experiences from past years on funded installations, m2 and technologies	Point system i.e. the higher the energy efficiency of the measure the higher the subsidy
<b>PI2: Domestic environmental support scheme (UFI)</b>	395 TJ / year; 11,000 TJ 2014 - 2020	Voluntary	Scaled Savings based on evaluations of the subsidy program	no flexibility
<b>PI3: Energy taxes</b>	Initial estimates indicate potential annual savings of 10,700 TJ and 74,900 TJ for the whole period 2014 – 2020	Mandatory	Scaled Savings/modeling based on statistical data on km, vehicles, energy consumption and elasticity used in other studies	no flexibility
<b>PI4: Federal highway toll</b>	Initial estimates indicate potential annual savings of 1,000 TJ and 7,000 TJ for the whole period	Mandatory	Scaled Savings/modeling based on statistical data on km, vehicles, energy consumption and elasticity used in other studies	no flexibility

	2014 – 2020			
<b>PI5: Green electricity support</b>	Initial estimates indicate potential annual savings of 350 TJ and 10,000 TJ for the period 2014 – 2020	Voluntary	Deemed Savings based on experiences from past years on funded installations, m <sup>2</sup> and technologies	Regularly new regulations on the height of the feed-in tariffs for the different energy sources.

### 2.2.3 Implementation specifics

The Federal Ministries and the governments of the federal states are responsible for the planning and implementation of the proposed measures. A national monitoring body will be set up to monitor and verify the measures.

**Table 2.4: Roles of administration, verification and motorization and control and compliance of each alternative measure**

<b>Policy Measure</b>	<b>Administrator – Institutional set-up</b>	<b>Verification and monitoring</b>	<b>Control and compliance</b>	<b>Additionality requirements</b>
<b>PI1: Refurbishment subsidy schemes</b>	national (financing), administrator: governments of federal states	National monitoring body	Implementation of the measures has to be proved with documents. Details differ between the 9 different schemes (there is one scheme in every federal state).	Measures are eligible only if higher standards are achieved than applicable national and EU regulations
<b>PI2: Domestic environmental support scheme (UFI)</b>	national (KPC), regional (regional programme, co-förderung)	National monitoring body	Implementation of the measures has to be proved with documents.	Measures are eligible only if higher standards are achieved than applicable national and EU regulations
<b>PI3: Energy taxes</b>	National	National monitoring body	Fulfillment of the law is enforced	Only the difference between the national tax rate and the EU directives are to be considered

<b>PI4: Federal highway toll</b>	National	National monitoring body	Inspections on highways	Only the difference between national tax rate and the EU directive will be considered.
<b>PI5: Green electricity support</b>	National	National monitoring body	Implementation of the measure has to be proved with documents. Production of green electricity has to be proved in order to receive feed-in tariff	Only the energy that is produced and used on-site by final customers will be taken into account.

## 2.2.4 Adaptation of policy measures

The existing measures have undergone significant redesign since their implementation in order to improve the overall effectiveness of the implemented measure.

**Table 2.5: Policies, vintage and re-design**

Policy measure	Vintage of policy measures	Frequency of re-design	Drivers for re-design
<b>PI1: Refurbishment subsidy schemes</b>	Since 1982, continuous upgrading and tightening of the measure	Continually	Original drivers have been social aspects, during the past 20 years energy efficiency has become an important policy driver
<b>PI2: Domestic environmental support scheme (UFI)</b>	Since 1986, last modifications 2009	Continually	Reduction of energy use and CO2 industry and services
<b>PI3: Energy taxes</b>	Tax on oil: beginning of 20th century, then fuel oil; 1995 natural gas and electricity; 2004 solid fuels for heating; regular amendments	Continually	To regulate energy consumption
<b>PI4: Federal highway toll</b>	Since 2002, regular amendments	Continually	Reduce empty runs, raise efficiency, trucks

			pollute the environment and high truck traffic leads to a faster wear out of the streets, additional resources to preserve streets
<b>PI5: Green electricity support</b>	2002 (amended 2006, 2007, 2008)	continually	uniformed, countrywide regulation on the support schemes for green power

## 2.3 Estimated results of alternative measures

Information on the total administrative costs as well as the total investment costs for the existing measures is not available.

For the estimation of the total energy savings the method of deemed or scaled savings was selected. As indicated in section 2.2 they are based on assumptions, estimates and forward projections of savings measured in the past.

Specific information about the estimated results of the measures, in terms of total incentive costs and total savings, is provided in the following table.

**Table 2.6: Estimated results of policy instruments**

Policy measure	Total administrative costs	Total investment costs	Total incentive costs	Total savings
<b>PI1: Refurbishment subsidy schemes</b>	No information available	No information available	2012: 2,560 Mio Euro, 710 mio for refurbishment	2,600 TJ / year; 73,000 TJ 2014 - 2020
<b>PI2: Domestic environmental support scheme (UFI)</b>	No information available	No information available	90 Mio/year	395 TJ / year; 11,000 TJ 2014 - 2020
<b>PI3: Energy taxes</b>	no information available	No information available	4,580 Mio 2012	Initial estimates indicate potential annual savings of

				10 700 TJ and 74,900 TJ for the whole period 2014 - 2020
<b>PI4: Federal highway toll</b>	No information available	No information available	2012: 1,102 Mio euros revenues	Initial estimates indicate potential annual savings of 1,000 TJ and 7,000 TJ for the whole period 2014 - 2020
<b>PI5: Green electricity support</b>	No information available	No information available	36.8 mio euro pv, 30 mio kwk 2012	Initial estimates indicate potential annual savings of 350 TJ and 10,000 TJ for the whole period 2014 - 2020

## 2.4 Observed or Potential Implementation Barriers/Risks

Concerning their contribution to reaching the set targets two main risks have been identified, a financing and a political risk. PI1, PI2 and PI5 bear a financing risk. On the one hand it is not secured that state funds will be available every year from now on. On the other hand the fundability from the end user is crucial as well and it is not clear at this stage whether the offered fund from the state will be sufficient to have end user's investing into measures as for example refurbishment.

The other two measures, PI3 and PI4 (to some extend) are politically sensitive. It is a very delicate topic for politicians to address taxes and implement changes.

Potential risks from double counting and materiality are excluded at this stage.

Specific information about the potential risks of the measures is provided in the following table.

**Table 2.7: Risks and barriers**

Policy measure	Broader feasibility risks and implementation barriers	Double-counting, materiality and/or eligibility risks
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<b>PI1:Refurbishment subsidy schemes</b>	Financing	double counting excluded since each federal state can only support on its own territory
<b>PI2: Domestic environmental support scheme (UFI)</b>	Financing	double counting excluded since data will be provided by one centralized database
<b>PI3: Energy taxes</b>	Political considerations	Tax on oil: No overlapping since any further measures from the traffic sector will be considered under article 7. Electricity Tax and Natural gas Tax: double counting excluded since estimates for the end-energy-savings are based on short term elasticity which only reflect the behavioral effects of the taxes. Therefore there is no double counting with investment measures
<b>PI4: Federal highway toll</b>		no double counting possible since no further actions for freight traffic will be taken into account under article 7
<b>PI5: Green electricity support</b>	Financing	There are overlappings with the residential support schemes, which are run by the provinces. Avoid double counting by counting only the green electricity support by the federal government

## 2.5 Conclusions

Five policy measures with the greatest contribution to achieve Austria's targets to meet Article 7 requirements of the EED have been analyzed. All measures have been in place for a couple of years already undergoing continuous redesign.

The selected measures can be characterized by significant variety regarding the targeted end use sectors. One measure will be implemented in the residential sector, another one in the commercial and tertiary sector and the third one in the transport area. Two measures have a horizontal impact across sectors.

The assumed/indicated savings are based partly on assumptions, estimates and forward projections of savings measured in the past, without taking into account the possibility of future changes in conditions.

Concerning their contribution to reaching the set targets two main risks have been identified, a financing and a political risk. Three of the five measures bear a financing risk. On the one hand it is not secured that state funds will be available every year from now on in

order to reach the targeted savings. On the other hand the fundability from the end user is crucial as well and it is not clear at this stage whether the offered fund from the state will be sufficient to have end user's investing into measures as for example refurbishment. Other measures are politically sensitive. It is very delicate for politicians to address taxes and implement changes.

Furthermore potential risks from double counting and materiality are excluded at this stage.

## REFERENCES

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[http://ec.europa.eu/energy/efficiency/eed/doc/article7/2013/article7\\_de\\_austria.pdf](http://ec.europa.eu/energy/efficiency/eed/doc/article7/2013/article7_de_austria.pdf)

(more detailed, in German)

## 3 France – ADEME

MEDDE, Report from France on the transposition of Article 7 of Directive 2012/27/EU on energy efficiency (2013)

MEDDE, National Energy Efficiency Action Plan for France (2014)

MEDDE, MINEFI, MBCFPF, Synthèse de l'évaluation du Crédit d'Impôt Développement Durable (2011)

### 3.1 Classification of alternative policy measures

Within the framework of Article 7(1) and (9), France will use a series of measures, the weighting of which may change, in particular in the light of their effectiveness, to reach the annual target of 1.092Mtoe of energy savings.

In addition to France's ESC scheme, which should cover 314 out of the 355TWh to be saved over the 2014-2020 period (88.5% of the obligation), the following measures will be implemented:

- Budgetary and fiscal measures (existing):
  - continuation of the sustainable development tax credit and of the interest-free eco-loans,
  - increase in the domestic consumption duty based on CO<sub>2</sub> content;
- Financing measures (new): setting up of a guarantee fund for energy renovation;
- New measure aiming at encouraging energy renovation projects: launching of energy renovation "passports" (implementation planned from 2015 – see description below).

Only four of these measures will be further analyzed since these should bring the largest contribution to France's target. Plus, so far, we have little visibility on the impact of the increase in domestic consumption duty based on CO<sub>2</sub> content on energy efficiency. Further studies will be carried out in the near future to determine the impact of this scheme.

**Table 3.1: Alternative measures.**

Policy measure	Type of measure	Principal objective	Course of implementation
<b>PI1: Sustainable development tax credit</b>	2. Financing and incentives (FISCAL)	Encourage energy refurbishment in housing through both individual measures and bunch of work to contribute to the 38% reduction target in the building energy consumption	Launched in 2005, renewed in 2009 and again in 2012 until the end of 2015
<b>PI2: Interest-free eco-loan</b>	2. Financing and incentives	Encourage major energy refurbishment in housing to contribute to the 38% reduction target in the building energy consumption	Launched in 2009; extended in 2014
<b>PI3: Guarantee fund for energy renovation</b>	2. Financing and incentives	Encourage comprehensive refurbishment in housing by guaranteeing green loans for banks and ensuring low cost financing for households	To be launched in 2015
<b>PI4: Energy renovation passport</b>	Other	Trigger more energy renovations thanks to a better understanding of buildings consumption and energy saving potentials	To be launched in 2015

## 3.2 Analysis of design and implementation features of alternative policy measures

### 3.2.1 Activity coverage

The four alternative measures presented above all target the residential sector. In 2013, the building sector represents around 45% of France’s final energy consumption, the residential sector accounting for 2/3 of this, with large energy saving potentials. It is then the main target of most energy saving policies in France.

These measures all promote the most efficient actions and technologies available (through a list of actions and performance requirements), though with different approaches.

Historically, the Sustainable Development Tax Credit and the Interest-free eco loan scheme were created to be complimentary, the tax credit promoting individual actions such as the replacement of a boiler or the insulation of roofs and attics and the eco-loan supporting comprehensive refurbishments that require important upfront investments.

In 2014, the government decided to give a new focus on more comprehensive refurbishments, by making both measures favorable to “bunch of works”, through an increased tax credit rate for bunch of measures implemented at once (or at least within 2 years): 25% instead of 15%.

Since September 2014, the tax credit is again in favor of individual actions with an increased and unique tax credit rate set at 30%.

The guarantee fund for energy refurbishment will also promote such comprehensive refurbishments, by providing guarantee to large and expensive renovation projects, requiring important loans.

Finally, the energy renovation passports scheme will target deep energy renovations through a step by step approach allowing prioritizing energy saving works over a building lifetime.

Specific information about the activity coverage of the measures is provided in the following table.

**Table 3.2: Sectoral coverage, technologies and obligated parties, UK**

Policy measure	Sectoral Coverage	Eligible technologies	Obligated parties	Other stakeholders
<b>PI1: Sustainable development tax credit</b>	1. Residential sector  Households (main residence)	Only most efficient technologies eligible for: 1. Energy upgrading of the building envelope, 6. Upgrade heating system and hot water system 8. Installation of Renewable Energy 15. Connecting to district heating, realization of an energy diagnosis	NA	Refurbishment work professionals
<b>PI2: Interest-free eco-loan</b>	1. Residential sector Households (occupiers & tenants) Syndicate of owners in co-ownership buildings	Only most efficient technologies eligible for: 1. Energy upgrading of the building envelope, 2. Energy upgrade of the E / M installations 6. Upgrade heating system and hot water system 8. Installation of Renewable Energy 15. Other please specify: Renewal of a 'non-public sanitation' system	NA	Banks and refurbishment work professionals

		using a non-energy-consuming mechanism.		
		<b>Priority for bunch of work.</b>		
<b>PI3: Guarantee fund for energy renovation</b>	1. Residential sector Households	Priority for comprehensive refurbishments, including: 1. Energy upgrading of the building envelope, 2. Energy upgrade of the E / M installations 6. Upgrade heating system and hot water system 8. Installation of Renewable Energy	Obligated parties from the ESC scheme might contribute to the fund	Banks
<b>PI4: Energy renovation passport</b>	1. Residential sector	Rationalization of step by step refurbishments, including: 1. Energy upgrading of the building envelope, 2. Energy upgrade of the E / M installations 6. Upgrade heating system and hot water system 8. Installation of Renewable Energy	Obligated parties from the ESC scheme might contribute to the passport "program"	Building owners, social landlords, auditors...

The list of eligible actions and performance requirements are quite similar for these measures and available in French on ADEME's website (<http://www.ademe.fr/particuliers-eco-citoyens/financer-projet/renovation/credit-dimpot-developpement-durable-0101-31082014>).

Eligible actions include:

- Wall insulation
- Roof and attics insulation
- Low floors insulation
- Window insulation
- Installation of insulating doors leading outside
- Installation of insulating shutters

- Insulation of distribution systems for heating and hot water
- Initial installation or replacement of heating or hot water equipment functioning on wood or other biomass
- Installation of heating regulation equipment
- Installation of energy producing equipment using renewable energies
- Connection to a district heating fed by renewable energies or a cogeneration system

The energy renovation passport scheme, currently discussed by the main energy efficiency stakeholders, relies on a detailed analysis of a dwelling quantitative and qualitative consumption data, resulting on well-argued and budgeted step by step programs of energy saving actions. At least one of the proposed programs must lead to a “low consumption” performance (consumption of 50kWh of primary energy for the 5 uses considered in the thermal regulation: heating, hot water production, lighting, cooling and auxiliaries).

The passport will allow households to make an informed choice regarding the programs of actions required to improve their housing energy performance.

It will include an overview of the housing, an energy report, an improvement program and a financial analysis.

Regarding all these measures, we can emphasize the tremendous role of some stakeholders, such as:

- Banks, who distribute the interest free eco-loans, and more generally, provide loans for financing energy savings actions; banks have regularly complained that they are not equipped to properly examine eco-loan applications, which explain why they do not actively promote these loans.
- Building refurbishment professionals, who are at the core of energy refurbishment and need appropriate trainings in order to deliver quality work leading to the expected energy savings.

### **3.2.2 Target setting**

All four measures are meant to deliver the objectives of France’s Housing Renovation Plan: 500,000 dwellings to be refurbished per year from 2017 onward, among which 120,000 social dwellings, with the objective of cutting the building sector energy consumption by 38% by 2020 compared to 2008 (from an average consumption of 240kWh of primary energy per year and m<sup>2</sup> on the 5 regulatory uses to 150 kWhEP).

They are all quite flexible, including a large range of eligible technologies and easily adaptable to take into account market evolutions. The tax credit is redesigned regularly to channel public budget towards the most efficient technologies, reduce windfall effects and



adjust to budgetary constraints.

For both the tax credit and the eco-loan, expected savings are deemed savings, calculated using the SCEGES software (modelling).

The Guarantee fund and the energy renovation passport scheme are set up in parallel with the 3rd period of the Energy Saving Certificate (ESC) scheme (2015-2017). Obligated parties from this scheme will be able to fulfil part of their obligation by contributing to the fund or to the realization of passports. The impact of these measures was then calculated by considering only the additional effect of these measures regarding the ESC scheme (no double counting of savings obtained through one or the other measure and already accounted for within the ESC scheme).

Specific information about the target setting of these measures is provided in the following table.

**Table 3.3: Target setting, participation principles, calculation method and flexibility**

Policy measure	Target setting	Participation principles	Calculation method	Flexibility
<b>PI1: tax credit</b>	Expected savings for 2020: 1.08 Mtep	Voluntary	Deemed savings Impact assessment through SCEGES (modelling)	Large range of eligible technologies Easily adaptable (as redesigned regularly in the case of the French scheme) to take into account market evolution and budgetary constraints
<b>PI2: Interest-free eco-loan</b>	Expected savings for 2020: 0.19 Mtep	Voluntary	Deemed savings Impact assessment through SCEGES (modelling)	Large range of eligible actions Option to either implement at least 2 actions or to target a minimum energy performance Easily adaptable to take into account market evolution
<b>PI3: Guarantee fund</b>	Expected savings: 29 TWh cumac / year between 2015 and 2020	Voluntary, within the frame of the ESC scheme	Deemed savings: ▪ Average savings: 10MWh or 140 MWh cumac (=1 energy class)	Adaptable in its form, content, objectives, governance...

	Corresponding to: 310 000 loans guaranteed /year Average value: 13 500€		▪ 66% of loans without ESC	
<b>PI4: Passport</b>	Expected savings: 0.8 TWh cumac /year between 2015 and 2020  Corresponding to: 116 667 passports/year between 2015 and 2020	Voluntary, within the frame of the ESC scheme	<ul style="list-style-type: none"> <li>▪ Average savings: 2MWh (28 MWh cumac)</li> <li>▪ 50% of passport lead to actions;</li> <li>▪ 50% of actions without ESC</li> </ul>	Adaptable in its form, content, objectives...

### 3.2.3 Implementation specifics

These four measures have different implementation specifics.

They are for instance operated by various institutions:

- The tax credit is granted and controlled by the tax authority through the usual tax income system;
- The eco-loans are granted by commercial banks under contract with the State, and paid against receipts for the refurbishment work implemented;
- Both the guarantee fund and the passport will be part of the ESC scheme, under the control of the Ministry for the Environment, through the ESC National Unit.

If none of these schemes involve ex-post evaluation or control of the actual savings reached, they all rely on quality works. From the beginning, all of them were only granted for refurbishment works implemented by professionals.

Since September 2014 for the eco-loan scheme and from January 2015 for the tax credit, these financial aids will only be granted for actions implemented by professionals that receive the RGE label, a quality label that distinguish the best qualifications for refurbishment professionals, based on competences, references, a training and several audits of the work carried out.

There are no particular additionality requirements for those measures, beyond the fact that eligible measures only involve the most efficient equipment available (that goes beyond national and European regulations).

Specific information about the implementation specifics of the measures is provided in the following table.

**Table 3.4: Roles of administration, verification and motorization and control and compliance of each alternative measure**

Policy measure	Administrator – Institutional set-up	Verification and monitoring	Control and compliance	Additionality requirements
<b>PI1: Sustainable development tax credit</b>	Tax authorities	Carried by tax authorities during tax inspections No ex-post evaluation	Carried by tax authorities during tax inspections	Only cumulated with the eco loan for low income households Measures are eligible only if higher standards are achieved than applicable national and EU regulations
<b>PI2: Interest-free eco-loan</b>	Ministry for the environment Banks under contract with the State	<ul style="list-style-type: none"> <li>▪ Carried out by the bank at the loan application stage</li> <li>▪ No ex-post evaluation</li> </ul>	Carried out by the bank at the loan application stage	Only cumulated with the tax credit for low income households Measures are eligible only if higher standards are achieved than applicable national and EU regulations
<b>PI3: Guarantee fund for energy renovation</b>	Same national set-up as the ESC scheme	<ul style="list-style-type: none"> <li>▪ Same verification and monitoring as the ESC scheme</li> <li>▪ No ex-post evaluation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Same control and compliance as the ESC scheme</li> </ul>	<ul style="list-style-type: none"> <li>▪ Same additionality requirements as the ESC scheme</li> <li>▪ Additionality with the ESC scheme</li> </ul>
<b>PI4: Energy renovation passport</b>	Same national set-up as the ESC scheme	<ul style="list-style-type: none"> <li>▪ Same verification and monitoring as the ESC scheme</li> <li>▪ No ex-post evaluation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Same control and compliance as the ESC scheme</li> </ul>	<ul style="list-style-type: none"> <li>▪ Same additionality requirements as the ESC scheme</li> <li>▪ Additionality with the ESC scheme</li> </ul>

### 3.2.4 Adaptation of policy measures

Regarding the design and amendments of these four measures, we can differentiate on one hand the sustainable development tax credit and the interest-free eco-loan, and on the other hand the guarantee fund and the passports.

As explained earlier, the first two measures are quite adaptable. They have been redesigned

regularly since their launching to take into account various drivers such as market evolution, new focus on specific target such as multi-apartment buildings, budgetary constraints or increasing needs for quality control. These two measures evolve in coherence, for instance regarding eligible technologies. This is sensible since a household can benefit from both measures under certain income conditions.

The last two measures will be part of the ESC scheme and will then evolve with it, at least at each end of period (3 years) redesign. These measures will introduce further flexibility in the ESC scheme and will allow channeling a part of obligated parties' efforts towards comprehensive refurbishments, the ESC scheme mainly incentivizing individual actions in the residential sector so far (with the exception of actions implemented within the frame of the "Comprehensive refurbishment operation", a standard operation that value bunch of works and was the 9th most used standard operation in 2014).

Specific information about the four measures' adaptation and redesign is provided in the following table.

**Table 3.5: Policies, vintage and re-design**

Policy measure	Vintage of policy measures	Frequency of re-design	Drivers for re-design
<b>PI1: Sustainable development tax credit</b>	Main amendments concern the list of eligible equipment, the energy performance requirements, the tax credit rate per technology, the fact that the tax credit can be cumulated with the eco-loan, the fact that installers must have the RGE qualification	Potentially every year with the project of Finance Bill	<ul style="list-style-type: none"> <li>▪ Maturity of the market for certain technologies</li> <li>▪ New efficient technologies available</li> <li>▪ Cost of the scheme and budget constraints</li> <li>▪ Additionality with other scheme</li> <li>▪ Quality of the measures implemented</li> </ul>
<b>PI2: Interest-free eco-loan</b>	Main amendments concern the amount available, the fact the loan can be cumulated with the tax credit, the fact the loan can be attributed to a syndicate of co-owners, the fact that installer must have the RGE qualification	No fixed frequency; in coherence with the tax credit redesign	<ul style="list-style-type: none"> <li>▪ Cost of the scheme and budget constraints</li> <li>▪ Specific set up needed for multi-apartment buildings</li> <li>▪ Additionality with other scheme</li> <li>▪ Quality of the measures</li> </ul>

			implemented
<b>PI3: Guarantee fund for energy renovation</b>	To be launched in 2015 within the frame of the ESC scheme	Every 3 years with the ESC scheme redesign	To channel obligated parties effort towards specific financial and organizational instruments
<b>PI4: Energy renovation passport</b>			

### 3.3 Estimated results of alternative measures

All four measures present rather low administrative costs for the public budget, either because they are mainly dealt with by private entities (banks for the eco-loans, obligated parties for the passports) or because they are part of a broader organization (tax collection and control in the case of the tax credit, the ESC scheme for the guarantee fund).

Since the guarantee fund and the passport are still to be launched, we have little information on the investments and incentive costs they will generate. However, the Ministry expects savings from these measures of respectively 29 and 0.8 TWh cumac<sup>1</sup> per year between 2015 and 2020.

Regarding the tax credit and the eco-loan schemes, they have proven quite effective in terms of investment triggered.

The tax credit is a rather popular measure: over 8 million housing units have been refurbished between 2005 and 2012 thanks to this measure, representing over one fourth of France's housing stock. It then represents an important financial effort from the State budget.

The eco-loan scheme, on another hand, was not as successful as expected at first. After a good start in 2009, the number of loans delivered dropped, especially after 2011 when the loan could not be cumulated with the tax credit anymore. It still triggers important investments, as it encourages comprehensive refurbishments. It is also a "cheaper" measure to support for the State budget.

Both the tax credit and the eco-loan schemes have also contributed, along with the ESC scheme, to drive the market towards more and more efficient equipment and to professionalized and increase the quality of refurbishments (thanks to the eco-conditionality).

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<sup>1</sup> Cumulated and actualized over the lifetime of the measure

Specific information about the impacts of the four alternative measures is provided in the following table.

**Table 3.6: Estimated results of policy instruments**

Policy measure	Total administrative costs	Total investment costs	Total incentive costs	Total savings
<b>PI1: Sustainable development tax credit</b>	Low administration costs as part of the tax authority functioning (declaration through the tax declaration, direct deduction from tax payment and control through normal tax control)	6.8 billion euros in 2012; 53 billion euros between 2005 and 2012.	1.36 billion euros in 2012; 14.4 billion euros between 2005 and 2012.	0.78 Mtep saved in 2013 thanks to the implementation of the tax credit between 2009 and 2012.
<b>PI2: Interest-free eco-loan</b>	Low as dealt with by banks	4.5 billion euros between 2009 and September 2013	€75 million for 2009-2011	0.18 Mtoe in 2013 235 000 loans granted between 2009 and September 2013
<b>PI3: Guarantee fund for energy renovation</b>	Part of the ESC scheme administrative costs which are quite low	no information available	no information available	29 TWh cumac / year between 2015 and 2020
<b>PI4: Energy renovation passport</b>		no information available	A passport should cost around €1,000	0.8 TWh cumac /year between 2015 and 2020

### 3.4 Observed or Potential Implementation Barriers/Risks

Specific information about the implementation barriers and risks of the four alternative measures is provided in the following table.

**Table 3.7: Risks and barriers**

Policy measure	Broader feasibility risks and implementation barriers	Double-counting, materiality and/or eligibility risks
<b>PI1: Sustainable development tax credit</b>	High public cost Windfall effects for professionals who tend to increase their prices	Double counting risks with all the programs targeting households

	(equipment and work) in proportion to the tax credit Households a little confused with the numerous change in the scheme	Windfall effects for households
<b>PI2: Interest-free eco-loan</b>	Lack of skills on the banks side to assess the project relevance in terms of energy efficiency, resulting in little willingness from them to promote the loan scheme	Double counting risks with all the programs targeting households
<b>PI3: Guarantee fund for energy renovation</b>	Households borrowing capacity and interest in the matter	Double counting risks with the ESC scheme and more globally with all the programs targeting households
<b>PI4: Energy renovation passport</b>	Households interest and competencies on the matter	Double counting risks with the ESC scheme and more globally with all the programs targeting households

The double counting risk between the tax credit and the interest-free eco-loan is now more limited since only households with low income can benefit from both schemes. However, households can still benefit from one of these, plus the ESC scheme and other local financial support such as the one provided by ANAH (National Housing Agency).

One of the risks faced by all four measures as they are implemented so far is the absence of certainty regarding the energy savings actually achieved through these schemes. Indeed, the verification, monitoring and control procedure focus exclusively on the actual implementation of measures in accordance with all technologies and quality requirements (by the bank or the tax authority) but without regard to actual energy savings.

### 3.5 Conclusions

6 measures have been notified to the European Commission as the alternative measures France will implement in parallel with its Energy efficiency obligation scheme in order to achieve 1.5% new energy savings each year between 2014 and 2020. The eco-tax for heavy vehicle was finally abandoned in September 2014 due to social protests, leaving five alternative measures to fulfil 12% of this obligation. Four measures are presented in this report, the increase in domestic consumption duty based on CO2 content being voluntary left aside as its impact on energy efficiency is still quite unknown. This measure will impact all fossil energy consumer sectors.

The four measures described target the residential sector, 3 of them through financial supports and incentives, and one by providing a better knowledge of buildings and a prioritization of refurbishment steps, the combination of information and financial supports providing the conditions for reaching the most energy savings. The tax credit and eco-loan scheme have been in place for several years and have proven efficient though regularly

redesigned, while the two others should to be launched in 2015.

The respective contribution of each measure is hard to estimate since most of them can interfere with each other. However, the tax credit and the guarantee fund should have the biggest impact in terms of investment and direct savings.

To comply with article 7, those measures have to save some 3.7Mtoe of final energy over the 2014-2020 period, a target that seems reachable in view of the current estimated savings from the tax credit for instance.

There are still some concerns about the French alternative measures, mainly regarding additionality requirements, windfall effects and risks of double counting. For all measures, verification, monitoring and control procedures will remain based on checking the implementation of measures in accordance with all technology and quality requirements (by the bank or the tax authority) but without regard to energy savings.

If the tax credit has proven to be a popular and efficient measure to trigger energy saving actions among households and with probable positive impacts in terms of activity and employment in the building sector, it still represents an important effort from the State budget in difficult budgetary times.

Finally, the main barriers to the full implementation of these measures remain households' lack of interest and/or capacities on the matter (especially with schemes such as the tax credit which has been changing almost every year) and their limited borrowing capacity. The tax credit is for instance known to benefit mainly to high income households who can afford the upfront costs investments.

At the same time, the relays of such measures are fundamental to their success: counterexample of the eco-loan scheme, into which banks did not actively promote the loans because of their low technical capability to examine the energy saving part of the loan application.



## 4 Germany – AEA

The European Union has set itself the goal of reducing EU primary energy consumption by 20 % by 2020, compared to current projections. A key instrument to help attain this goal is the EU Energy Efficiency Directive (2012/27/EU), or EED, which entered into force on 5 December 2012. The Directive included further cross-sectoral provisions to increase energy efficiency at European level, to be transposed into national law by 5 June 2014, or in some cases earlier.

Even before the Directive was adopted, Germany had a wide range of instruments for increasing energy efficiency. The German Federal Government has chosen to build on these existing elements and develop them further in order to meet the requirements under Article 7 of the Energy Efficiency Directive (EED). Hence to achieve the saving targets of 2,046.5 PJ (Article 7 notification), Germany proposed several policy measures. Four of these policy measures have been selected and elaborated further in the following sections.

### 4.1 Classification of alternative policy measures

As mentioned above four policy measures will be examined in more detail and described in the following sections. The table below allows a first quick overview on the measures chosen for further evaluation.

**Table 4.1: Alternative measures.**

Policy measure	Type of measure	Principal objective	Course of implementation
<b>PI1: Support programmes for energy-efficient construction and renovation</b>	Economic Instruments, Fiscal/financial incentives	Provide financing by way of soft loans and grants for energy efficient construction and refurbishment activities for the German residential sector. The program targets the reduction of CO2 emission levels in the German housing sector.	2009 – end not specified
<b>PI2: Investment programmes in municipalities and social facilities</b>	Economic Instruments, Fiscal/financial incentives	The program targets the reduction of CO2 emission levels as well as the ensuring the security of supply.	2007, 2009, 2012 – no specified end
<b>PI3: Investment support programmes in</b>	Economic Instruments, Fiscal/financial	The program targets the reduction of CO2 emission	2009/2012 – no specified end

companies	incentives		
<b>PI4: National Climate Protection Initiative &amp; further programmes</b>	Policy Support, Strategic planning/ financial incentives	The initiative supports projects on greenhouse gas reduction, forest and biodiversity conservation and adaptation to climate change.	2009 – end not specified

The reason for choosing only some of the measures proposed under the National notification reports to be analyzed out of the complete list of measures proposed by Germany is that these measures are expected to make the largest contribution to the targets set out in Article 7.

## 4.2 Analysis of design and implementation features of alternative policy measures

### **PI1: Support programs for energy-efficient construction and renovation:**

The objective of the program is to provide financing by way of soft loans and grants for energy efficient construction and refurbishment activities for the German residential sector. The program targets the reduction of CO2 emission levels in the German housing sector. New buildings that exceed the applicable building standard can be financially supported. The basis for measuring the level of energy efficiency is the so-called “KfW-Efficiency House Standard”.

There are three levels of promotional incentives for energy efficient construction activities expressed as Efficiency House Standards 40, 55 and 70. Hence, the primary energy consumption of the housing unit in question corresponds to 40%, 55% or 70% of what the reference building is allowed to consume according the Energy Efficiency Ordinance. The maximum amount of funding provided for a housing unit is EUR 50,000 (see article 7 notification). This corresponds to a maximum of 100% of the eligible costs. The funding is provided through long-term soft loans.

Besides new buildings the programme provides funding for energy efficient renovation as well. In this case the renovated buildings have to surpass the applicable building standard. For energy efficiency refurbishment activities, there are in total six promotional levels: starting with Efficiency House 55 as the most ambitious level, followed by Efficiency House 70, 85, 100 and 115 as well as a separate level for monument buildings (Article 7 notification).

Support is provided in the form of a soft loan or alternatively in the form of an investment

grant. Loan rates are adjusted according to energy efficiency achieved ranked by efficiency scale. The maximum grant may be EUR 18,750 per housing unit. For individual measures, the grant may be a maximum of EUR 5,000 per housing unit. The measure continues the KfW 'CO2 Building Renovation Programme'. In December 2012, the Federal Government approved the further replenishment of KfW's building renovation programmes in the order of an additional EUR 300 million per annum for grants (Article 7 notification).

**PI2: Investment programmes in municipalities and social facilities:**

As part of the various support possibilities for municipalities in the area of energy efficiency, through the CO2 Building Renovation Programme KfW offers direct loans and sub-loans for the renovation of schools, school sports halls, day nurseries and buildings used for work with children or young people to create energy savings (Article 7 notification).

Funding within this program is provided for renovation work at the level of new builds referring to the KfW Efficient House Standard 100 and 85, 70 and 55, and for energy - efficient individual measures through the 'IKK—Energy-Related Urban Renewal— Energy - Efficient Renovation' and 'IKU—Energy -Related Urban Renewal—Energy Efficient Renovation' programmes under the CO2 Building Renovation Program. This renovation work may include heat insulation, the replacement of heating or windows or the energy efficiency of public urban lighting. Investment measures for the sustained improvement of the energy efficiency of the municipal supply systems have been supported through the KfW programme 'Energy-Related Urban Renewal—District Supply' in the form of soft loans on behalf of BMVBS since February 2012 (Article 7 notification).

In addition, KfW offers other programmes for municipalities (for instance the 'Municipal Energy Supply' programme) which have not been included in the 3rd NEEAP and the Article 7 notification as they focus primarily on investments concerning conversion (Article 7 notification).

**PI3: Investment support programmes in companies:**

The KfW's Energy Efficiency Programme for companies is as well an important element of energy efficiency policy in Germany, supporting energy efficiency measures in the areas of building and energy technology; building envelopes; machinery; process cooling and heating; heat recovery/waste heat utilization; measurement, regulation and control technology; information and communication technology; procurement of low emission commercial vehicles. The support includes for SMEs not only support on the investment costs but also on the associated costs for planning and implementation.

The anticipated energy savings must be calculated before the application is filed; minimum requirements exist with regard to the level of final energy savings:

- for new investments: specific savings of at least 15% as compared to the sector average;
- for replacement investments: specific savings of at least 30% as compared to the average consumption of the three previous years).

Under the KfW Renewable Energies (Standard/Premium) program, funding is provided for projects where renewable energies are used to generate electricity and where electricity/heat is generated in combined heat and power installations in the form of soft loans and partly also through redemption loans. The effects of the program in terms of final energy savings are examined here.

The two programs, 'Promotion of high efficiency cross-cutting technologies in SMEs' (funding is provided for e.g. energy-efficient pumps, drives or compressed air systems in the form of investments grants) and 'Promotion of energy efficient and climate friendly production processes in the manufacturing sector', were launched under the Energy Efficiency Fund of the Federal Ministry of Economics and Technology [BMWi] (Article 7 notification).

#### **PI4: National Climate Protection Initiative & further programs:**

With its national climate protection initiative Germany intends to exploit the existing potential for reducing emissions. Many projects and programs benefit from funding under this initiative. This includes four major support programs, targeting climate projects in cultural, social and other public institutions, small-scale CHP plants, industry-grade refrigeration technologies and biomass use. In addition, a number of individual projects are supported, ranging from targeted innovation support to the diffusion of existing energy efficiency technologies to general information, motivation and awareness-raising campaigns, targeting behavioral changes by private and commercial energy consumers. The program has laid important foundations for modern, safe and climate-friendly energy supply system in Germany. At the same time, it has established comprehensive measures for efficient climate protection. With its national climate protection initiative, BMUB plans to exploit the existing potential for reducing emissions at low cost. In addition, the international climate protection initiative supports measures for adaptation to climate change and for protecting climate-related biodiversity in developing and threshold countries. For the national initiative, € 280 million has been earmarked, while € 120 million has been designated for the international initiative. ([www.klimaschutz.de/](http://www.klimaschutz.de/))

### **4.2.1 Activity coverage**

**PI1:** The program targets private buyers and homeowners, landlords and housing companies. Basically all investors in residential buildings who are aiming to improve energy efficiency levels may receive financial support. The program is carried out by KfW (state owned promotional bank), which acts in close cooperation with the Federal Ministry of

Building, Transport and Urban Development (Article 7 notification).

Within the construction program the construction or initial purchase of KfW Efficiency-Houses is eligible for support. Within the Energy Efficient Construction and Rehabilitation programme (focus on loans) all measures that contribute to achieve KfW-Efficiency House as well as individual measures that fulfill the technical requirements of the program are eligible. Concerning Energy Efficient Construction and Rehabilitation program all measures that contribute to achieve KfW-Efficiency House including planning and supervision, as well as secondary work; individual measures that fulfill the technical requirements of the program are eligible (Gumb, 2009).

**PI2:** The program targets cities, districts and municipalities, municipally owned companies as well as Non-profit organizations. The following products are eligible for financial support:

- Investment loans to finance municipal and social infrastructure projects
- Investment loans to finance environmental protection and energy efficiency investments
- Energy-efficient rehabilitation of public facilities.

**PI3:** [Investment support programs in companies]: This program targets the commerce, trade and services sector as well as industries. Hence, companies are the main target group. The aim is to give companies the opportunity to reduce their energy requirements and protect themselves against rising energy prices. Funding is provided for building envelope, building services, lighting, stationary drives, thermal cross-cutting technologies, processes.

**PI4:** The program targets companies, building owners as well as municipalities within the following sectors: Commerce, trade and services; industry; private households; public authorities. Funding is provided for Building envelope, building services, stationary drives, thermal cross-cutting technologies, processes.

**Table 4.2: Sectoral coverage, technologies and obligated parties.**

Policy measure	Sectoral Coverage	Eligible technologies	Obligate parties/target groups
<b>PI1: Support programmes for energy-efficient construction and renovation</b>	Private households	Building envelope, building services, basically all measures that contribute to achieve KfW-Efficiency House; individual measures that fulfill the technical requirements of the program	Home and property owners; owners and developers for new buildings
<b>PI2: Investment programmes in municipalities</b>	Cities, districts and municipalities	Municipal and social infrastructure, environmental protection and energy efficiency	Municipalities

and social facilities	Municipally owned companies Non-profit organizations	investments projects, Energy-efficient rehabilitation of public facilities	
<b>PI3: Investment support programmes in companies</b>	Commerce, trade and services, industry	Building envelope, building services, Lighting, stationary drives, thermal Cross-cutting technologies, Processes	Companies
<b>PI4: National Climate Protection Initiative — further programmes at national level to promote investments in energy efficiency</b>	Commerce, trade and services; Industry; private households; public authorities	Building envelope, building services, stationary drives, thermal cross-cutting technologies, processes	Property owners and property developers

## 4.2.2 Target setting

**P1:** According to the 3rd NEEAP (June 2014) as well as the article 7 notification the impact of the support programmes for energy-efficient construction and renovation is quantified as follows:

	New annual saving from 2014	Saving Total (2014 – 2020)	Early actions savings Total (2009-2013)
KfW energy-efficient construction	6.2 PJ	175 PJ	219 PJ
KfW energy-efficient renovation	0.8 PJ	22 PJ	27 PJ
KfW replenishment	0.8 PJ	23 PJ	6 PJ
Total	7.8 PJ	220 PJ	252 PJ

Based on these figures, the impact of this measure is estimated to be high.

**PI2:** According to the 3rd NEEAP (June 2014) as well as the article 7 notification the impact of the support programmes for energy-efficient construction and renovation is quantified as follows:

	New annual saving from 2014	Saving Total (2014 – 2020)	Early actions savings Total (2009-2013)
IKK energy-efficient renovation	0.2 PJ	5.6 PJ	7 PJ
IKU energy-efficient renovation	0.1 PJ	1.6 PJ	2 PJ
IKK/IKU energy-efficient renovation	0.00 PJ	0.02 PJ	0.03 PJ
IKK Urban Lightning	0.00 PJ	0.08 PJ	0.06 PJ
Total	0.3 PJ	8.05 PJ	9.63 PJ

**PI3:** According to the 3rd NEEAP (June 2014) as well as the article 7 notification the impact of the support programmes in companies is quantified as follows:

	New annual saving from 2014	Saving Total (2014 – 2020)	Early actions savings Total (2009-2013)
KfW Efficiency	3.7 PJ	104 PJ	61 PJ
KfW Renewable	0.01 PJ	0.1 PJ	0.2 PJ
Cross cutting technologies / processes	0.7 PJ	123.3 PJ	66 PJ
Total	4.41 PJ	123.2 PJ	66 PJ

**PI4:** According to the 3rd NEEAP as well as the article 7 notification, the impact of the National Climate Protection Initiative is quantified as follows:

	New annual saving from 2014	Saving Total (2014 – 2020)	Early actions savings Total (2009-2013)
General Promotn under National Climate Protection Programmes	0.1 PJ	3.1 PJ	4.1 PJ

**Table 4.3: Target setting, participation principles, calculation method and flexibility**

Policy measure	Target setting	Participation principles	Calculation method	Flexibility
<b>PI1:</b>	220 PJ	Voluntary	Deemed savings, based on experiences from past years	No flexibility
<b>PI2:</b>	8.05 PJ	Voluntary	Deemed savings, based on experiences from past years	No flexibility
<b>PI3:</b>	123.2	Voluntary	Scaled savings based on expected future support volumes	No flexibility
<b>PI4:</b>	3.1 PJ	Voluntary	Scaled savings based on expected future support volumes	No flexibility

### 4.2.3 Implementation specifics

**PI1:** The design and product details of the promotional programmes are agreed with the Federal Ministry of Building, Transport and Urban Development which is the body responsible for the measure. The program is carried out by KfW (state owned promotional bank) which acts in close cooperation with the Ministry (Article 7 notification).

A prerequisite to apply for a promotional loan or grant is the involvement of an energy consultant. It is his responsibility to check whether the construction or refurbishment project is properly designed to achieve the targeted efficiency level by using an internet-based tool to compare the technical details of the project with the targeted efficiency level. The promotional effects are measured year by year by an independent scientific research institute (CA EED Factsheet ).

**PI2:** The design and product details of the promotional programmes are agreed with the Federal Ministry of Building, Transport and Urban Development, which is the body responsible for the measure. The program is carried out by KfW (German development Bank).

**PI3:** The design and product details of the promotional programmes are agreed with the Federal Ministry of Economic Affairs and Energy, which is the body responsible for the measure. The program is carried out by KfW (German development Bank).

**PI4:** The National Climate Protection Initiative is a programme of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).



**Table 4.4: Roles of administration, verification and motorization and control and compliance of each alternative measure**

<b>Policy measure</b>	<b>Administrator – Institutional set-up</b>	<b>Verification and monitoring</b>	<b>Control and compliance</b>	<b>Additionality requirements</b>
<b>PI1: Support programmes for energy-efficient construction and renovation</b>	Responsibility: Federal ministry of Transport, Building and Urban Development; Administrator: KfW-Bank	So far no information available	So far no information available	
<b>PI2: Investment programmes in municipalities and social facilities</b>	Responsibility: Federal ministry of Transport, Building and Urban Development; Administrator: KfW-Bank	So far no information available	So far no information available	
<b>PI3: Investment support programmes in companies</b>	Responsible: Federal Ministry of Economic Affairs and Energy; Administrator: KfW-Bank	So far no information available	So far no information available	
<b>PI4: National Climate Protection Initiative – further programmes</b>	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	So far no information available	So far no information available	

## 4.2.4 Adaptation of policy measures

Table 4.5: Policies, vintage and re-design

Policy measure	Vintage of policy measures	Frequency of re-design	Drivers for re-design
<b>PI1: Support programmes for energy-efficient construction and renovation</b>	KfW started in 1996 with the promotional programmes for energy efficiency in the housing sector, the programmes were continuously developed further and the Efficiency House Standard was introduced in 2009. There is no predefined timeframe for the programmes, as promotional activities for the purpose of climate protection and energetic improvement in the housing sector is by law one of the core activities and targets of KfW as promotional bank.	Continually	So far no information available
<b>PI2: Investment programmes in municipalities and social facilities</b>	Start 2007, 2009, 2012 – end not specified	Continually	So far no information available
<b>PI3: Investment support programmes in companies</b>	Start 2009/2012 end not specified	Continually	So far no information available
<b>PI4: National Climate Protection Initiative – further programmes</b>	Start 2009 – end not specified	Continually	So far no information available

## 4.3 Estimated results of alternative measures

Table 4.6: Estimated results of policy instruments

Policy measure	Total administrative costs	Total investment costs	Total incentive costs	Total savings
<b>PI1: Support programmes for energy-efficient construction and renovation</b>	No information available	1.5 billion per year expected	No information available	7.8 PJ annually
<b>PI2: Investment programmes in municipalities and social facilities</b>	No information available	200 million per year expected	No information available	0.3 PJ annually
<b>PI3: Investment support programmes in companies</b>	No information available	3 billion per year	No information available	4.41 PJ annually
<b>PI4: National Climate Protection Initiative – further programmes</b>	No information available	A sum of 120 million euros is available for use by the initiative annually.	No information available	0.8 PJ annually

## 4.4 Observed or Potential Implementation Barriers/Risks

The observed risks are mainly connected with financing issues. Apart from that despite the overall successful development of KfW's loan programmes for energy-efficient refurbishment of buildings, there is still a considerable potential for further energy savings in the area, these include:

**Table 4.7: Risks and barriers**

Barrier	Possible solutions
Frequently, investments in building rehabilitation prove only profitable over long periods of time	Better architecture of the promotional offers (e.g. introduction of grants)
The possibility for municipalities to take up loans is heavily restricted	Promotion of Public Private Partnership models
Heritage-listing requirements and standards	Special promotional offers for the energy-efficient renovation of heritage-listed buildings
Many energy saving potentials are not exploited	Support of integrated energy concepts focusing on overall energy efficiency

Policy measure	Broader feasibility and implementation barriers	Double-counting, materiality and/or eligibility risks
<b>PI1: Support programmes for energy-efficient construction and renovation</b>	Financing	No information available
<b>PI2: Investment programmes in municipalities and social facilities</b>	Financing	No information available
<b>PI3: Investment support programmes in companies</b>	Financing	No information available
<b>PI4: National Climate Protection Initiative — further programmes</b>	Financing	No information available

This section should highlight deficiencies and or best design options to ensure that selected alternative measures bring about energy savings that are eligible, additional and correctly identified under the target of Article 7 of the EED.

## 4.5 Conclusions

Four policy measures with the greatest contribution to achieve Germany’s targets to meet Article 7 requirements of the EED have been analyzed. All measures have been in place for a couple of years already undergoing continuous redesign. It can be said that all analyzed programmes have been in place for some years and form thus a sound base for Germany’s

target achievement for Article 7.

Regarding targeted end use sectors all sectors are covered. There is however no measures especially targeted at the transport sector. One measure is directly targeted at municipalities and cities. The selected measures are all implemented in order to support individuals/companies/municipalities to invest in energy efficient technologies.

The assumed/indicated savings are based partly on assumptions, estimates and forward projections of savings measured in the past. Expected changes in framework conditions have been explicitly taken into account in the estimation of future savings.

As all programmes are based on public funding, the main risk of implementation is thus also connected with financing. The availability of sufficient funding for supporting the energy efficiency measures is a decisive factor in the success of the schemes. Further risks are connected with the uptake of energy efficient investments from the demand side.

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## 5 Greece – CRES, UPRC

### 5.1 Classification of alternative policy measures

Totally, 18 alternative policy measures were specified during the submission of the National Energy Efficiency Action Plan regarding the fulfillment of the requirements under Article 7 of the Energy Efficiency Directive (EED).

All the measures are analyzed within the framework of the current study. Specifically, 14 measures foresee the provision of financial support and incentives, two measures promote the conduction of training and educational activities and the implementation of EU standards and two measures are legislative and institutional. Four measures target to the reduction of primary energy consumption, while the rest of them to the reduction of the final energy consumption. Finally, six measures have already been in effect since 2011, in contrary with the majority, which are planned and their implementation is expected to start in 2015.

Specific information about the classification of alternative policy measures is provided in the following table.

**Table 5.1: Alternative measures.**

Policy measure	Type of measure	Principal objective	Course of implementation
<b>PI1: "Energy saving at home" programme</b>	Financing and incentives	<b>Reduction of primary energy</b> by incentivizing citizens to uptake interventions in order to improve their households' energy efficiency.	2011-2015
<b>PI2: "Exoikonomo / SAVE" programme</b>	Financing and incentives	<b>Reduction of primary energy</b> by encouraging technical interventions, awareness-raising actions and mobilization of citizens with emphasis on municipal public buildings and spaces.	2011-2015
<b>PI3: "Exoikonomo / SAVE II" programme</b>	Financing and incentives	Promoting the uptake of actions and recognized good practices to <b>decrease primary energy consumption</b> in existing public buildings and infrastructure.	2011-2015
<b>PI4: Energy upgrading of residential building</b>	Financing and	<b>Reduction of final energy</b> by enabling homeowners to make effective interventions to improve the energy	2015-2020

sector		incentives	efficiency of their home.	
<b>PI5: Energy upgrading of public buildings</b>		Financing and incentives	<b>Reduction of final energy</b> in existing buildings of the public and general public sector.	2015-2020
<b>PI6: Energy upgrading of commercial buildings</b>		Financing and incentives	<b>Reduction of final energy</b> by providing incentives through subsidizing actions and recognized good practices to in existing commercial buildings.	2015-2020
<b>PI7: Implementation of energy management system based on ISO 50001 to government entities and public sector</b>		Standards (>EU requirements)	<b>Reduction of final energy</b> by promoting energy management in public and general public sector agencies so as to manage, measure and improve energy efficiency in their buildings and facilities.	2015-2020
<b>PI8: Energy upgrading of existing buildings through Energy Services Companies</b>		Financing and incentives	<b>Reduction of final energy</b> by providing incentives to enhance the business activity of Energy Service Companies (ESCOs).	2015-2020
<b>PI9: Educational and training activities in employees of the tertiary sector</b>		Training and education	Raise their energy awareness and improve their energy behaviour of staff in the tertiary sector so as to reduce <b>final energy consumption</b> .	2015-2020
<b>PI10: Installation of electronic and intelligent metering of electricity</b>		Financing and incentives	<b>Reduction of final energy</b> by replacing 80% of existing conventional electricity meters.	2014-2020
<b>PI11: Replacement of old public and commercial light trucks</b>		Financing and incentives	<b>Reduction of final energy</b> by replacing old public and private light trucks with new.	2015-2020
<b>PI12: Replacement of old passenger vehicles</b>		Financing and incentives	Replacing public and private old passenger vehicles to reduce <b>final energy consumption</b> .	2011-2015
<b>PI13: Fuel substitution of passenger vehicles</b>		Financing and incentives	<b>Reduction of final energy</b> by incentivizing the replacement of the fuel of existing private passenger vehicles.	2015-2020
<b>PI14: Operational Programme "Environment and Sustainable Development" programmes</b>		Financing and incentives	To inform domestic users (owners and tenants) of the energy efficiency of their home, rational energy use, and of interventions in order to <b>reduce primary energy consumption</b> .	2011-2015
<b>PI15: Development of the Thessalonica metro</b>		Financing and	To serve passengers and thereby replace private means of transport in	2017-2020



	incentives	order to <b>reduce final energy</b> .	
<b>PI16: Extension of the Athens Metro</b>	Financing and incentives	To serve passengers and thereby replace private means of transport in order to <b>reduce final energy</b> .	2013-2020
<b>PI17: Offsetting fines for arbitrary houses with energy efficiency measures</b>	Legislative	<b>Reduction of final energy</b> through the implementation of energy efficiency measures financed partly by the imposed fines for arbitrary houses.	2014-2020
<b>PI18: Energy managers in public buildings</b>	Legislative	<b>Reduction of final energy</b> through the continuous monitoring of energy consumption and the verification of the efficient operation of the heating and cooling systems.	2014-2020

## 5.2 Analysis of design and implementation features of alternative policy measures

### 5.2.1 Activity coverage

The selected measures can be characterized by significant variety regarding the targeted end use sectors. Specifically, the majority of the measures focus on the public and transport sector (totally 11 measures), while other measures will be implemented in the residential sector (3 measures) and tertiary sector (3 measures). Finally, one measure has a horizontal impact across sectors.

The measures, which foresee interventions in the buildings of the residential, public and tertiary sector, promote a significant variety of eligible technologies such as energy upgrade of the envelope and the E/M systems, the installation of heating and hot water systems, CHP, RES, upgrade of urban places, etc.

Whereas those policy measures targeting at the transport sector, promote the replacement of the old vehicles with new more efficient ones and the development of the appropriate transport infrastructure.

The main potential stakeholders except from the government, which is responsible for the design and the implementation of the proposed measures, involve all the residential, public and tertiary sector, the municipalities, all the passenger and the holders of private and public vehicles. Other important participating parties related with the financing of the planned interventions include the involved funds and the ESCOs.

Specific information about the activity coverage of the measures is provided in the following table.

**Table 5.2: Sectoral coverage, technologies and obligated parties, UK**

Policy measure	Sectoral Coverage	Eligible technologies	Obligated/Eligible parties
<b>PI1: "Energy saving at home" programme</b>	Residential sector	Energy upgrade of the building envelope, the E/M installations and heating and hot water system.	Homeowners, national fund of entrepreneurship and development, energy inspectors, suppliers and installers.
<b>PI2: "Exoikonomo / SAVE" programme</b>	Public sector	Energy upgrade of the building envelope, lighting systems, the E/M installations and heating and hot water system, energy-intensive facilities and technical infrastructure, installation of BEMS, CHP, RES and energy planning of outdoor spaces.	Municipalities and CRES
<b>PI3: "Exoikonomo / SAVE II" programme</b>	Public sector		Municipalities
<b>PI4: Energy upgrading of residential building sector</b>	Residential sector	Energy upgrade of the building envelope, the E/M installations and heating and hot water system.	Home owners, special purpose fund, energy inspectors, suppliers and installers.
<b>PI5: Energy upgrading of public buildings</b>	Public sector	Energy upgrade of the building envelope, lighting systems, the E/M installations and heating and hot water system, technical infrastructure, installation of BEMS, CHP, RES and energy planning of outdoor spaces.	Public buildings of the whole public and general public sector, energy inspectors, suppliers and installers.
<b>PI6: Energy upgrading of commercial buildings</b>	Commercial & Tertiary Sector		Owners of commercial buildings (i.e. offices and stores), special purpose fund, suppliers and installers.
<b>PI7: Implementation of energy management system based on ISO 50001 to government entities and public sector</b>	General Public sector	The ISO can lead indirectly to the implementation of all the eligible technologies.	Public sector, buildings' energy managers and the certification bodies.

<b>PI8: Energy upgrading of existing buildings through Energy Services Companies</b>	Commercial & Tertiary Sector	Energy upgrade of the building envelope, lighting systems, the E/M installations and heating and hot water system, technical infrastructure, installation of BEMS, CHP, RES and energy planning of outdoor spaces.	Energy Service Companies (ESCOs), special purpose fund, suppliers and installers.
<b>PI9: Educational and training activities in employees of the tertiary sector</b>	Commercial & Tertiary Sector	Behavioral measure	Tertiary sector and special purpose fund.
<b>PI10: Installation of electronic and intelligent metering of electricity</b>	Cross-cutting measure	Smart metering systems	Residential and tertiary sector (i.e. electricity consumers) and Hellenic Electricity Distribution Network Operator.
<b>PI11: Replacement of old public and commercial light trucks</b>	Transport	Replacing old light trucks and private cars	Public bodies and the private sector.
<b>PI12: Replacement of old passenger vehicles</b>	Transport	Replacing old passenger vehicles with new	Owners of private passenger vehicles.
<b>PI13: Fuel substitution of passenger vehicles</b>	Transport	LPG passenger vehicles	Owners of private passenger vehicles.
<b>PI14: Operational Programme "Environment and Sustainable Development" programmes</b>	Public sector	Energy upgrade of the building envelope, lighting systems, the E/M installations and heating and hot water system, technical infrastructure, installation of BEMS, CHP, RES and energy planning of outdoor spaces.	Buildings of public sector, energy inspectors, suppliers and installers.
<b>PI15: Development of the Thessalonica metro</b>	Transport	Transport infrastructure	All types of passengers
<b>PI16: Extension of the Athens Metro</b>	Transport	Transport infrastructure	All types of passengers
<b>PI17: Offsetting fines for arbitrary houses with energy efficiency measures</b>	Residential sector	Energy upgrades of the building envelope, the E/M installations and heating and hot water system.	Homeowners, energy inspectors, suppliers and installers.

<b>PI18: Energy managers in public buildings</b>	Public sector	Collection and monitoring of energy data, verification of the efficient operation of heating and cooling systems and monitoring of maintenance and repair work related with energy savings.	Public sector and buildings' energy managers.
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## 5.2.2 Target setting

The Greek energy savings target for the period 2014-2020 according to the Article 7 is presented either cumulatively amounting to 3,332.7 ktoe or as the total new annual savings, which is equal to 902.1 ktoe. No specific energy savings target exists per each measure separately, but all the measures have to contribute to the fulfillment of the energy savings target.

**PI1:** provides financial incentives for the implementation of energy-saving interventions in 70,000 residences. **PI2** promotes actions and proven best practices in order to reduce the energy consumption of 104 municipalities emphasizing on the municipal building sector, the upgrade of public spaces and in the area of municipal and private transport and energy intensive municipal facilities. **PI3** constitutes the continuation of “Exoikonomo/SAVE” programme and foresees the upgrade of municipal buildings and infrastructure in 139 municipalities. **PI4** provides capital subsidy and soft loans to 200,000 homeowners for the implementation of energy saving interventions in order to improve the energy efficiency of their buildings. **PI5** targets to the provision of financial incentives and the implementation of proven best practices in order to reduce the energy consumption of 280 public buildings.

**PI6:** aims at the provision of financial incentives and the implementation of proven best practices in order to reduce the energy consumption of 3,500 commercial buildings. **PI7** focuses on the implementation of energy management system based on ISO 50001 to 4,000 public buildings. **PI8** foresees the implementation of energy saving projects through the energy performance contracts and Energy Service Companies (ESCOs) in 3,000 buildings of the tertiary sector. **PI9** promotes the implementation of educational and training activities in 40,000 employees of the tertiary sector in order to increase their energy awareness and skills. **PI10** aims at the utilization of 5.76 million approximately electronic metering in order to measure the electricity consumption of industrial, commercial and residential consumers and to facilitate the promotion of financial or other incentives to promote rational organization of consumption behavior.

**PI11:** targets to the replacement of 10,000 EURO III light trucks of the public and tertiary sector with new EURO V vehicles through the partial or complete exemption from the special registration tax. Similarly, **PI12** aims at the replacement of 50,000 EURO III passenger vehicles with new EURO V vehicles through the partial or complete exemption from the special registration tax. **PI13** foresees the provision of 35,000 grant incentives for fuel

switching of the existing private passenger vehicles from gasoline to LPG or CNG. Within the framework of PI14, various measures were financed by the Operational Programme "Environment and Sustainable Development" targeting to the improvement of energy efficiency. PI15 and PI16 aim at the increased utilization of fixed rail transport in the cities of Thessalonica and Athens facilitating the utilization of 310,000 and 290,000 passengers on daily basis correspondingly. Finally, 90,000 home owners will take the advantage of offsetting the fines for arbitrary houses with energy efficiency measures, while energy managers will be appointed in 15,000 public buildings.

Almost half of the measures will utilize the scaled method for the quantification of the achieved energy savings, while the rest of measures the deemed method.

No additionally requirements have been specified thus far in the national notification report and the National Energy Efficiency Action Plan in compliance with Article 7. Whereas during the implementation of the existing measures flexibility was observed to relate mostly to compliance options offered (i.e. Large range of eligible actions), while no trading or borrowing provisions are included in any of the new alternative measures.

Regarding the utilized methodologies for the estimation of the energy savings three different approaches were utilized. The calculation for the case of the implementation of energy interventions in buildings was performed taking into consideration the average primary energy consumption of the specific categories of buildings as resulted by the analysis and evaluation of the submitted Energy Performance Contracts, the estimated energy savings from the implementation of the planned interventions and the numbers of the buildings.

For the case of the measures for the transport sector and the installation of electronic meters the calculations were based on the average energy consumption, the estimated reduction of the energy consumption and the number of the performed interventions.

Finally regarding the PI14, the achieved energy savings were based on the official estimations as provided by the Operational Program, which financed the implementation of the interventions.

Specific information about the target setting of the measures is provided in the following table.

**Table 5.3: Target setting, participation principles, calculation method and flexibility**

Policy measure	Target setting	Participation principles	Calculation method savings
<b>PI1: "Energy saving at home" programme</b>	70,000 residences	Voluntary	Scaled savings based on evaluating the EPC data issued in connection with the programme.
<b>PI2: "Exoikonomo / SAVE" programme</b>	104 municipalities	Voluntary	Scaled savings based on the analysis of the data in the technical sheets of proposals submitted under the programme.
<b>PI3: "Exoikonomo / SAVE II" programme</b>	139 municipalities	Voluntary	Scaled savings from processing the results from EPCs issued from participating municipalities.
<b>PI4: Energy upgrading of residential building sector</b>	200,000 residences	Voluntary	Scaled savings based on the use of the results of the estimation under PI1.
<b>PI5: Energy upgrading of public buildings</b>	280 public buildings	Voluntary	Scaled savings based on evaluating the EPC data issued for office buildings in the public sector.
<b>PI6: Energy upgrading of commercial buildings</b>	3,500 tertiary buildings	Voluntary	Scaled savings based on evaluating the EPC data issued for office buildings in the tertiary sector.
<b>PI7: Implementation of energy management system based on ISO 50001 to government entities and public sector</b>	4,000 public buildings	Voluntary	Deemed savings based on the average consumption described in the above measure (PI6) and the assumption of a 10% decrease in final energy consumption due to behavioral measures.
<b>PI8: Energy upgrading of existing buildings through Energy Services Companies</b>	3,000 tertiary buildings	Voluntary	Scaled savings based on evaluating the EPC data issued for office buildings in the tertiary sector.
<b>PI9: Educational and training activities in employees of the tertiary sector</b>	40,000 employees	Voluntary	Deemed savings based on the estimation that a total of 40 000 tertiary sector technical staff will be educated, 85% of them being influenced, which will result in a reduction of final energy consumption by 10%.

<b>PI10: Installation of electronic and intelligent metering of electricity</b>	5,760,000 meters	Mandatory	Deemed savings based on a study from the Dutch consulting company (DNV KEMA) assuming a reduction of final electricity consumption by 8% and that 95% of the meters will be installed in the residential sector and 5% in the tertiary sector.
<b>PI11: Replacement of old public and commercial light trucks</b>	10,000 vehicles	Voluntary	Deemed savings based on data by the Association of Motor Vehicle Importers Representatives (AMVIR), statistical data and estimations by CRES studies, as well as market data.
<b>PI12: Replacement of old passenger vehicles</b>	50,000 vehicles	Voluntary	Deemed savings based on data by the Association of Motor Vehicle Importers Representatives (AMVIR), statistical data and estimations by CRES studies, as well as market data.
<b>PI13: Fuel substitution of passenger vehicles</b>	35,000 vehicles	Voluntary	Deemed savings based on data by the Association of Motor Vehicle Importers Representatives (AMVIR), statistical data and estimations by CRES studies, as well as market data.
<b>PI14: Operational Programme "Environment and Sustainable Development" programmes</b>	-	Voluntary	Scaled or deemed savings according to the peculiarities of each program.
<b>PI15: Development of the Thessalonica metro</b>	310,000 passengers	Mandatory	Deemed savings based on a study by the ATHENS METRO S.A on estimated number of passengers served, number of stations extended and replacement of cars with the use of the underground railway network.
<b>PI16: Extension of the Athens Metro</b>	290,000 passengers	Mandatory	Deemed savings based on a study by the ATHENS METRO S.A estimating the numbers of passengers served daily in the Athens Metro since 2011 and

					the replacement of private vehicles.
<b>PI17: Offsetting fines for arbitrary houses with energy efficiency measures</b>	90,000 residences			Voluntary	Scaled savings based on the use of the results of the estimation under PI1.
<b>PI18: Energy managers in public buildings</b>	15,000 buildings	public		Mandatory	Deemed savings based on the use of the results of the estimation under PI5 and the assumption for reduction of final energy consumption by 5%.

### 5.2.3 Implementation specifics

The Ministry of Environment, Energy and Climate Change is responsible for the planning, implementation and the monitoring of the proposed measures in collaboration with the support of other Ministries such as the Ministry of Development and Competitiveness for measures in the tertiary sector and the Ministry of Infrastructure, Transport and Networks for measures in the transport sector.

Moreover, the Hellenic Electricity Distribution Network Operator SA is responsible for the effective coordination of the measure PI10.

The verification, monitoring and control method will be based on conducting inspections from the authority, which is responsible for planning and financing each measure separately. No further information about the foreseen verification, monitoring and control procedures is provided.

Specific information about the implementation of the measures is provided in the following table.

**Table 5.4: Roles of administration, verification and motorization and control and compliance of each alternative measure**

Policy measure	Administrator – Institutional set-up	Verification, monitoring, control and compliance
<b>PI1: "Energy saving at home" programme</b>	Ministry of Environment, Energy and Climate Change, Ministry of Development and Competitiveness, National Fund for Entrepreneurship and Development.	Inspections
<b>PI2: "Exoikonomo / SAVE" programme</b>	Ministry of Environment, Energy and Climate Change, Ministry of	Inspections



	Development and Competitiveness, Municipalities and Center for Renewable Energy Sources and Saving.	
<b>PI3: "Exoikonomo / SAVE II" programme</b>	Ministry of Environment, Energy and Climate Change and Municipalities	Inspections
<b>PI4: Energy upgrading of residential building sector</b>	Ministry of Environment, Energy and Climate Change, Ministry of Development and Competitiveness, National Fund for Entrepreneurship and Development.	Inspections
<b>PI5: Energy upgrading of public buildings</b>	Ministry of Environment, Energy and Climate Change, Ministry of Development and Competitiveness and Public sector.	Inspections
<b>PI6: Energy upgrading of commercial buildings</b>	Ministry of Environment, Energy and Climate Change and Ministry of Development and Competitiveness.	Inspections
<b>PI7: Implementation of energy management system based on ISO 50001 to government entities and public sector</b>	Ministry of Environment, Energy and Climate Change, Ministry of Development and Competitiveness and Public Entities.	Inspections
<b>PI8: Energy upgrading of existing buildings through Energy Services Companies</b>	Ministry of Environment, Energy and Climate Change and Ministry of Development and Competitiveness.	Inspections
<b>PI9: Educational and training activities in employees of the tertiary sector</b>	Ministry of Environment, Energy and Climate Change and Ministry of Development and Competitiveness.	Inspections
<b>PI10: Installation of electronic and intelligent metering of electricity</b>	Ministry of Environment, Energy and Climate Change and Hellenic Electricity Distribution Network Operator SA.	The Hellenic Electricity Distribution Network Operator SA will verify and control the installation of the meters
<b>PI11: Replacement of old public and commercial light trucks</b>	Ministry of Economy, Ministry of Infrastructure, Transport and Networks, Ministry of Environment, Energy and Climate Change.	Inspections
<b>PI12: Replacement of old passenger vehicles</b>	Ministry of Economy, Ministry of Infrastructure, Transport and Networks, Ministry of Environment, Energy and Climate Change.	Inspections
<b>PI13: Fuel substitution of passenger vehicles</b>	Ministry of Economy, Ministry of Infrastructure, Transport and Networks, Ministry of Environment, Energy and Climate Change.	Inspections
<b>PI14: Operational Programme "Environment and Sustainable Development" programmes</b>	Ministry of Environment, Energy and Climate Change, Public authorities and Municipalities.	Inspections
<b>PI15: Development of the Thessalonica metro</b>	Ministry of Environment, Energy and Climate Change, Ministry of	Inspections

	Infrastructure, Transport and Networks, Attiko Metro SA.	
<b>PI16: Extension of the Athens Metro</b>	Ministry of Environment, Energy and Climate Change, Ministry of Infrastructure, Transport and Networks, Attiko Metro SA.	Inspections
<b>PI17: Offsetting fines for arbitrary houses with energy efficiency measures</b>	Ministry of Environment, Energy and Climate Change	Inspections
<b>PI18: Energy managers in public buildings</b>	Ministry of Environment, Energy and Climate Change, Ministry of Inferior, Ministry of Development and Competitiveness and Public Entities.	Inspections

## 5.2.4 Adaptation of policy measures

No significant changes have been undertaken during the implementation of the existing measures PI3, PI12, PI 14 and PI16 in relation with their initial planning. Nevertheless, for the case of PI1 and PI2 significant redesigns have been fulfilled in order to improve the overall effectiveness of the implemented measures.

Specifically, in PI1 the establishment of the first category of incentives with higher percentage of grand (70%) and the acceptance of the secondary residences as eligible buildings led to the increased participation of households in the measure. Correspondingly, significant alteration in PI2 was the decision to increase the public funding of the proposed municipalities' interventions from 70% to 100%. The main driver for the redesign of both of the measures was the low participation. These redesigns, which happened once, had as result increased participation rates and thus a more effective implementation of both measures.

Specific information about the adaptation of the measures is provided in the following table.

**Table 5.5: Policies, vintage and re-design**

Policy measure	Vintage of policy measures	Frequency of re-design	Drivers for re-design
<b>PI1: "Energy saving at home" programme</b>	The main redesign of the program was performed with the establishment of the first category of incentives with higher percentage of grand (70%) and with the acceptance of the secondary residences as eligible buildings	Once	Low participation in the program
<b>PI2: "Exoikonomo / SAVE" programme</b>	The main redesign of the program was performed with	Once	Low implementation of the program and inability

the decision to increase the funding of the program from 70% to 100% from the NSRF 2007-2013

from the municipalities to cover their own contribution to the budget

### 5.3 Estimated results of alternative measures

The total investment cost for the existing measures (PI1, PI2, PI3, PI12, PI14, PI15 and PI16) exceeds the amount of 2 billions €. For the planned measures no estimations for the budget required for their implementation have been provided.

Measures PI2, PI3 PI14, PI15 and PI16 was 100% financed from the National Strategic Reference Framework (NSRF) 2007-2013. Measure PI1 foresaw the provision of grants ranging from 15% to 70% of the total eligible budget for each household. Finally, the financial support of measure PI12 was an inconsiderable portion of the total cost for the replacement of the old car with a new more efficient car.

Measures aiming at the improvement of energy efficiency in the residential sector account for 48% of the total contribution of the alternative policy measures, constituting the highest contribution to the overall target, while measures foreseen for the tertiary sector appear to have the second highest contribution with 18%. Measures of public sector, transport sector and electronic meters are envisaged to bring about a lower contribution, namely 13%, 11% and 11% correspondingly.

It should be mentioned that for the estimation of the total energy savings the straightforward method was selected.

Specific information about the estimated results of the measures, in terms of estimated savings and budgetary needs, is provided in the following table.

**Table 5.6: Estimated results of policy instruments**

Policy measure	Total investment costs	Administrative costs (high, medium, low)	Total savings (ktoe)
<b>PI1: "Energy saving at home" programme</b>	Total available budget: 548.2 mil. €	High	83.8
<b>PI2: "Exoikonomo / SAVE" programme</b>	Total foreseen cost: 100 mil. €	Low	3.7
<b>PI3: "Exoikonomo / SAVE II" programme</b>	Total foreseen cost: 75 mil. €	Low	8.3
<b>PI4: Energy upgrading of residential building sector</b>	-	High	239.5

<b>PI5: Energy upgrading of public buildings</b>	-	Medium	12.8
<b>PI6: Energy upgrading of commercial buildings</b>	-	Medium	31.6
<b>PI7: Implementation of energy management system based on ISO 50001 to government entities and public sector</b>	-	Low	28.1
<b>PI8: Energy upgrading of existing buildings through Energy Services Companies</b>	-	Medium	50.8
<b>PI9: Educational and training activities in employees of the tertiary sector</b>	-	Medium	76.8
<b>PI10: Installation of electronic and intelligent metering of electricity</b>	-	Low	96.8
<b>PI11: Replacement of old public and commercial light trucks</b>	-	Medium	11.3
<b>PI12: Replacement of old passenger vehicles</b>	-	Medium	22.7
<b>PI13: Fuel substitution of passenger vehicles</b>	-	Medium	10.4
<b>PI14: Operational Programme "Environment and Sustainable Development" programmes</b>	The total cost of the measure depends on the number of the participating buildings, which will lead to the achievement of the specified energy savings target.	Low	14.2
<b>PI15: Development of the Thessalonica metro</b>	Total foreseen cost: 900 mil. € approximately	Low	21.4
<b>PI16: Extension of the Athens Metro</b>	Total foreseen cost: 100 mil. € approximately	Low	29.3
<b>PI17: Offsetting fines for arbitrary houses with energy efficiency measures</b>	-	High	107.8
<b>PI18: Energy managers in public buildings</b>	-	Low	52.6

## 5.4 Observed or Potential Implementation Barriers/Risks

The aforementioned alternative measures will in principle aim to tackle the following persisting barriers and risks, identified to hamper the smooth implementation of energy

savings policy and the uptake of energy efficiency actions in Greece. Those are described underneath for each sector separately:

Residential sector: Limited awareness of the public due to insufficient information, insufficient fundability from end users and the strict evaluation criteria from the banks for borrowing the end users.

Public sector: Lack of motivation from public entities for participation and the low technical capability of the municipalities' technical staff.

Transport sector: Insufficient fundability from the end users and technical constraints during the construction of necessary infrastructure leading to delays and to deviations from the initially planned budget.

Tertiary Sector: Lack of motivation from companies to participate under proposed actions and programmes and uncertainty regarding realized energy savings. Especially for the ESCOs sector, main barriers highlighted concern continuing administrative complexity, subsequent high transaction costs and delays, funding and liquidity problems from the ESCOs part associated with difficulties in access to finance (i.e. strict evaluation criteria from banks to borrow the ESCOs).

Electronic metering: Insufficient fundability from the operator side and potential reluctance from end users to pay their contribution to the overall cost.

Furthermore, triggered risks from potential double counting of the measures were elaborated. Specifically, a proposed approach for the minimization of risks for double counting is the implementation of energy efficiency interventions in different buildings. Nevertheless, in case where two different measures will be implemented in the same building, the energy savings resulting from the following measure will be estimated according to the new energy performance of the building, as resulted by the completion of the first intervention.

Finally, no issues about the materiality test are mentioned into the notification report and the National Energy Efficiency Action Plan.

Specific information about the observed or potential implementation barriers or risks of the measures is provided in the following table.

**Table 5.7: Risks and barriers**

<b>Policy measure</b>	<b>Broader feasibility risks and implementation barriers</b>	<b>Double-counting, materiality and/or eligibility risks</b>
<b>PI1: "Energy saving at home" programme</b>	Insufficient information and limited awareness, insufficient fundability from end users and difficulty in access to finance.	Potential double counting with PI4 and PI17 → Implementation of interventions in different buildings.
<b>PI2: "Exoikonomo / SAVE" programme</b>	Low technical capability of the municipalities' technical staff	Potential double counting with PI3, PI5 and PI14 → Implementation of interventions in different buildings.
<b>PI3: "Exoikonomo / SAVE II" programme</b>	Low technical capability of the municipalities' technical staff	Potential double counting with PI2, PI5, PI7 and PI14 → Implementation of interventions in different buildings.
<b>PI4: Energy upgrading of residential building sector</b>	Insufficient fundability from end users and difficulty in access to finance.	Potential double counting with PI1 and PI17 → Implementation of interventions in different buildings.
<b>PI5: Energy upgrading of public buildings</b>	Lack of motivation from public entities for participation.	Potential double counting with PI2, PI3 and PI14 → Implementation of interventions in different buildings.
<b>PI6: Energy upgrading of commercial buildings</b>	Insufficient fundability from end users and difficulty in access to finance.	Potential double counting with PI8 → Implementation of interventions in different buildings.
<b>PI7: Implementation of energy management system based on ISO 50001 to government entities and public sector</b>	Lack of motivation from public entities for participation	Potential double counting with PI2, PI3, PI5, PI14 and PI18 → Calculations with the new energy performance of the buildings.
<b>PI8: Energy upgrading of existing buildings through Energy Services Companies</b>	Administrative barriers, insufficient fundability from ESCOs and difficulty in access to finance	Potential double counting with PI6 → Implementation of interventions in different buildings.
<b>PI9: Educational and training activities in employees of the tertiary sector</b>	Lack of motivation from companies for participation and uncertainty in the outcome of achieved energy savings	Potential double counting with PI6 and PI8 → Calculations with the new energy performance of the buildings.
<b>PI10: Installation of electronic and intelligent metering of electricity</b>	Insufficient fundability from the operator and end users' unwillingness to pay their contribution to the overall	Potential double counting with all the measures resulting in the reduction of electricity consumption.

cost		
<b>PI12: Replacement of old passenger vehicles</b>	Insufficient fundability from candidate owners	Potential double counting with PI13, PI15 and PI16 → Calculations with the new energy performance of the transport.
<b>PI13: Fuel substitution of passenger vehicles</b>	Insufficient funds from candidate owners	Potential double counting with PI12, PI15 and PI16 → Calculations with the new energy performance of the transport.
<b>PI14: Operational Programme "Environment and Sustainable Development" programmes</b>	Lack of motivation from public entities for participation	Potential double counting with PI2, PI3 and PI7 → Implementation of interventions in different buildings.
<b>PI15: Development of the Thessalonica metro</b>	Technical constraints leading to delays and budget deficit	Potential double counting with PI12 and PI13 → Calculations with the new energy performance of the transport.
<b>PI16: Extension of the Athens Metro</b>	Technical constraints leading to delays and budget deficit	Potential double counting with PI12 and PI13 → Calculations with the new energy performance of the transport.
<b>PI17: Offsetting fines for arbitrary houses with energy efficiency measures</b>		Potential double counting with PI1 and PI4 → Implementation of interventions in different buildings.
<b>PI18: Energy managers in public buildings</b>		Potential double counting with PI2, PI3, PI5, PI7 and PI14 → Calculations with the new energy performance of the buildings.

## 5.5 Conclusions

18 measures have been selected totally for the compliance of Greece with the requirements of Article 7 of EED. The majority of them (14 measures) provides financial support and incentives, while the rest of them either promote the conduction of training and educational activities and the implementation of EU standards or are legislative and institutional.

Only six measures have been already in place, whereas the majority of them are planned and their implementation is expected to start in 2015. From the existing measures significant redesigns have been fulfilled only for the case of two measures.

The selected measures can be characterized by significant variety regarding the end use

sectors. Specifically, the majority of the measures focus on the public and transport sector (totally 11 measures), while three measures will be implemented in the residential sector and three in the tertiary sector. Even if the number of energy savings measures in residential sector is relatively low, their contribution to the overall target is the highest (48%). Measures targeted to the tertiary sector have the second highest contribution with 18%, while the other sectors contribute approximately by 11% separately. The estimation of the total energy savings has been performed according to the straightforward method, while almost half of the measures will utilize the scaled method for the quantification of the achieved energy savings while the savings for the rest them are calculated based on the deemed method.

There are major areas of concern about Greek alternative measures proposed in compliance with Article 7 of the EED. Specifically, no additional requirements have been specified and no issues about the materiality test have been mentioned.

Furthermore, triggered risks from potential double counting of the measures were elaborated proposing as main approach the implementation of energy efficiency interventions in different buildings. Nevertheless, in case where two different measures will be implemented in the same building, the energy savings resulting from the following measure will be estimated according to the new energy performance of the building, as resulted by the completion of the first intervention.

The verification, monitoring and control method will be based on conducting inspections from the authority, which is responsible for planning and financing each measure separately. Though, no specific information about the foreseen verification, monitoring and control procedures is provided thus far.

Finally, the identified barriers, which are known to hamper the smooth implementation of energy savings policy and the mobilization of energy efficiency interventions in Greece, were identified and highlighted. The main persisting hindrances include the limited awareness of both the public and the residential sector, the lack of motivation from public entities for participation and the low technical capability of the municipalities' technical staff in the public sector. In the residential sector, the insufficient fundability from the end users still pose serious threats in the targeted participation rates. Technical constraints during the construction of necessary infrastructure in the transport sector also exist, while lack of motivation from companies to participate under proposed actions and programmes is also the result of uncertainty regarding realized energy savings in the tertiary sector.



## 6 Italy – FIRE

### 6.1 Classification of alternative policy measures

Italy has proposed three different policy measures in order to achieve its 20-20-20 energy efficiency targets. The main one, which will cover 60% of the incentives, is the white certificate scheme, a tradable white certificate system.

In addition to this, two other policy measures are provided by Italian legislation at national level as alternative policies:

- Tax deductions;
- Thermal account.

White certificates, tax deductions and thermal account, even if applicable on similar energy efficiency measures, cannot be summed up and thus double accounting is not permitted (and it is verified within control and verification activities).

The table below summarizes the main characteristics of these two measures.

**Table 6.1: Italian alternative measures.**

Policy measure	Type of measure	Principal objective	Course of implementation
<b>PI1: Tax deductions (detrazioni fiscali 55%-65%)</b>	Tax deductions (55%-65% of the costs incurred for the implementation of the energy efficiency project) for energy efficiency in buildings	Improve energy efficiency mainly in residential buildings. Annual target at 2020: 0.98 Mtoe final consumption.	On-going since 2007, but subject to annual revisions due to its fiscal nature.
<b>PI2: Thermal account (conto termico)</b>	Incentive that covers a certain amount of EE project total expenses, as an average between 20 and 40%, granted in 1, 2 or 5 years depending on the project size	Improve energy efficiency mainly in public buildings. Annual target at 2020: 1.47 Mtoe final consumption.	On-going since 2013, but with limited success up to the end of 2014.

## 6.2 Analysis of design and implementation features of alternative policy measures

### 6.2.1 Activity coverage

Both the alternative measures provided by the Italian legislation cover the building sector. Tax deductions refer mainly to the residential sector (thermal RES and energy efficiency), due to its fiscal characteristics, whereas the thermal account covers both the public sector (thermal RES and energy efficiency) and the residential sector (thermal RES only). Double accounting for the residential sector is ensured through specific declarations from the applicant and through documental and spot on-site verification.

Both measures support traditional energy efficiency technologies related to the building envelope and the energy plants (boilers, heat pumps, solar collector, etc.). They don't explicitly into account the additionality of savings.

Distributors of gas or electricity or heat/energy retailers/heat and transport fuel suppliers/ ...

**Table 6.2: Alternative measures main indicators.**

Policy measure	Sectoral Coverage	Eligible technologies	Obligate parties	Other stakeholders
<b>PI1: Tax deductions (detrazioni fiscali 55%-65%)</b>	Buildings (mainly residential)	"1. Building envelope (insulation and windows) 2. Boilers (DHW and heating) 3. Thermal renewable energy sources (solar, heat pumps, biomass)"	Not applicable	ESCOs, installers, energy efficiency technology producers, end-users, Ministry of economy
<b>PI2: Thermal account (conto termico)</b>	Buildings (mainly public)	"1. Building envelope (insulation and windows) 2. Boilers (DHW and heating) 3. Thermal renewable energy sources (solar, heat pumps, biomass)"	Not applicable	ESCOs, installers, energy efficiency technology producers, end-users

Installers, ESCOs, technology producers are all interested in utilizing these policy measures to increase their business opportunities. The Ministry of Economy, on the other hand and referring to the tax deductions, is worried about the impact on taxes (in terms of loss of revenues for the State), even if many studies state the higher benefits (in terms of global

market, taxes paid by involved stakeholders and reduction of black labor). For this reason tax deductions are subjected every year to a potential and drastic revision (even to a possible abolition).

### 6.2.2 Target setting

For tax deductions, the National Energy Strategy published in 2012 is intended to overcome the barriers to the deployment of energy efficiency improving solutions and to achieve the challenging saving targets the Italian State has set itself, by streamlining and strengthening the schemes and actions in each sector. This includes the extension over time of the tax deductions for energy efficiency improvement actions, specifically in the civil building renovation sector. The Government has currently extended the action through 2015 (up to June 2016 for actions on the common parts of buildings) but it has already decided to revise it, with a view of rationalizing expenditure and ensuring an adequate duration of the scheme, instead of a year-by-year extension. The Ministry of economic development also plans to introduce different deduction percentages depending on the considered solution, with the aim to improve the support to more complex and longer pay-back time projects.

The results so far delivered by the scheme are substantial and allow the Government to estimate its saving potential in the coming years up to 2020.

The following figure illustrates the saving trend during the years as reported in the notification from the Italian government to the European Commission. Savings are estimated in terms of recent years results and expectations and are indicative, but offer an indicative target for this policy measure (within the notification yearly target savings are indicated for each available measure – i.e. white certificates, tax deductions, and thermal account –, but they represent actual targets only for white certificates, being it an EEO scheme).

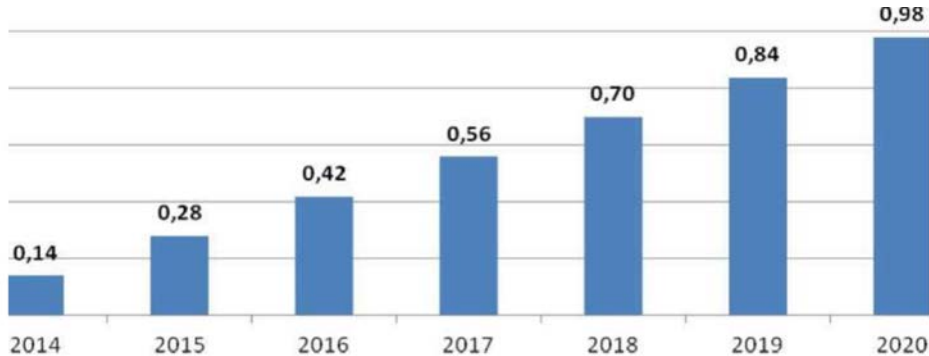


Figure 6.1: Annual final energy savings expected from the tax deduction scheme (Mtoe).

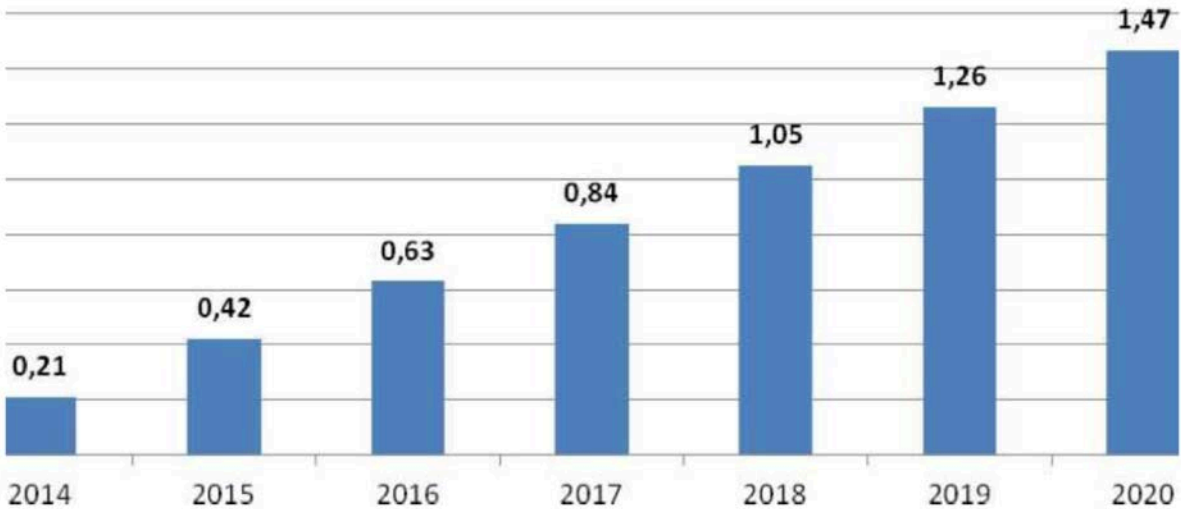
Source: Italian notification on art. 7 of the EED.

Since the Thermal Account was rolled out in July 2013, the Government does not yet have sufficient monitoring data to estimate expected savings based on past performance.

Nevertheless, a number of simulations have been carried out in order to measure the contribution of the Thermal Account to the saving targets laid down in Article 7 EED.

Compared to the forecasts in the National Energy Strategy, the reference scenario for estimating the savings that can be achieved through the Thermal Account has partly changed. The National Energy Strategy envisaged a regulatory review of the tax deductions for energy efficiency-improving measures in order to avoid overlapping of the two incentive schemes. As it is necessary to maintain the types of actions qualifying for tax deductions unchanged (in June 2013 the deductions were raised to 65%), this review has been postponed, and this fact might entail changes to the types of actions currently covered by the Thermal Account. Nevertheless, a prudential estimate of the savings achievable by the Thermal Account compared to the earlier estimate made in the National Energy Strategy has been made. Double accounting is forbidden and its risk is reduced by terms of documental and spot on-site verification, besides in case of false declarations from the applicant a ten years exclusion from every national support scheme is provided.

The following figure illustrates the saving trend during the years as reported in the notification from the Italian government to the European Commission.



**Figure 6.2: Annual final energy savings expected from the Thermal Account (Mtoe).**

*Source: Italian notification on art. 7 of the EED.*

**Table 6.3: Alternative measures targets and other indicators.**

Policy measure	Target setting	Participation principles	Calculation method savings	Flexibility
<b>PI1: Tax deductions (detrazioni fiscali 55%-65%)</b>	0.98 Mtoe/year final energy uses at 2020	Voluntary	Ex-ante	Flexibility in terms of financing and technology mix.
<b>PI2: Thermal account (conto termico)</b>	1.47 Mtoe/year final energy uses at 2020	Voluntary	Ex-ante.	Flexibility in terms of financing and technology mix. Possibility for public bodies to book the incentive in order to have added time for the implementation of the energy efficiency measure.

### 6.2.3 Implementation specifics

For tax deductions, ENEA (the Italian agency for new technologies, energy, and economic sustainable development) is in charge of the technical evaluation of the proposals, whereas Agenzia delle Dogane is in charge of the fiscal aspects. ENEA has got three persons working on this measure, plus a subcontract in the past year for a call center that was awarded to some consumers associations. Agenzia delle Dogane has a dedicated office to the evaluation of the admissibility of the proposals to the fiscal deduction.

One of the weakness of this scheme is the lack of on-field controls, so that the verification procedure is limited to the documentation alleged to the proposal. The admitted energy efficiency measures are: building envelope interventions, solar thermal, condensing and biomass boilers, heat pumps, and other mixed solutions. The lack of strong evaluation and verification procedures is balanced by the type of admitted actions and by the unlikelihood of false declaration, due to the fiscal controls and the particular bank payment allowed to access the tax deduction. Besides, for the complex projects a technical report from a technician is required to confirm the good project design and implementation.

There are no strong requirement in terms of qualification of the installers or in terms of quality of the projects, apart from the conformity to the national standards.

There are no penalties, apart from the eventuality of fiscal controls resulting in non-conformity to the law. No additionality is taken into account, since the deductions is calculated on the basis of the investment cost and not of the produced energy savings.

The main advantage of this scheme, and the reason of its success, is its simplicity and the benefits in terms of renovation market improvements and of reduction of black labor.

For the thermal account, GSE (the national Energy services manager body that is in charge of all the incentive schemes, including RES and with the exclusion of tax deductions) is in charge of the evaluation of the proposals and of on-field verification. GSE has got five persons working on this measure. AEEGSI and ENEA have minor roles in terms of standard contract definition and verifications.

Controls are provided for both on the documentation and on-field. The admitted energy efficiency measures are: building envelope interventions, solar thermal, condensing and biomass boilers, heat pumps. The proposals are more detailed and complex than the ones requested from tax deductions.

Projects can be presented both from end-users or from ESCOs, providing for an increased flexibility.

There are no penalties, but in case of false declaration or of non-conformity to standards the proponent risks fines or legal prosecution, depending on the case. No additionality is taken into account, since the incentive is calculated on the basis of the investment cost and not of the produced energy savings.

**Table 6.4: Indicators related to implementing agencies, M&V, and additionality.**

Policy measure	Administrator – Institutional set-up	Verification and monitoring	Additionality requirements
<b>PI1: Tax deductions (detrazioni fiscali 55%-65%)</b>	ENEA is in charge of technical evaluation while Agenzia delle Entrate is in charge of the administration of the fiscal and economical issues.	Limited control on energy and technical compliance (only documental). Fiscal controls apply as for every tax deduction.	Every 1-2 years eligible measures and tax deduction percentages are updated. Specific minimum efficiency requirements apply for each measure (i.e. additionality is not explicitly accounted for in terms of savings, but non additional solutions are not admitted to the scheme).
<b>PI2: Thermal account (conto termico)</b>	GSE is in charge of the scheme (operational rules, projects validation, reports verifications, and statistics)	Documental (on all applications) and on-site (spot check) verification.	Specific minimum efficiency requirements apply for each measure (i.e. additionality is not explicitly accounted for in terms of savings, but non additional solutions are not admitted to the scheme).

### 6.2.4 Adaptation of policy measures

Tax deductions exist since 2007 and has been subjected to many redesigns. For example the

number of years over which the deduction is recovered has passed from five to three and finally to ten years (present situation). Also some interventions have been added over the years and the level of deductions has passed from 55% to 65% (present situation) and should decrease to 55% the next year. The procedure for requesting the deductions have been simplified for many technologies.

The main redesign decisions have been taken considering the economic impact of the policy measure and the market trend of the renovation sector, which was the reason behind the increase to 65% of the deduction in 2013.

Thermal account exists since 2013 and then there has been no modification yet. Considering the limited results achieved, the government is producing a revision of the guidelines to facilitate the participation of the public sector, with an increased flexibility of the timelines and a simplification of the procedures.

**Table 6.5: Policies updates.**

Policy measure	Vintage of policy measures	Frequency of re-design	Drivers for re-design
<b>PI1: Tax deductions (detrazioni fiscali 55%-65%)</b>	Every 1-2 years the policy has been updated with reference to eligible measures, minimum requirements, documentation for application, tax deduction percentages.	Almost yearly, due to fiscal and economic discussion within the Italian fiscal law	Fiscal concerns, technology baseline modification.
<b>PI2: Thermal account (conto termico)</b>	The first amendment of the policy is due in 2014 (after around 2 years) with the main aim of improving its effectiveness and usability.	Ideally 2-3 years	Efficacy of the measure. Technology baseline modification. Decisions on tax reductions for the overlapping technologies.

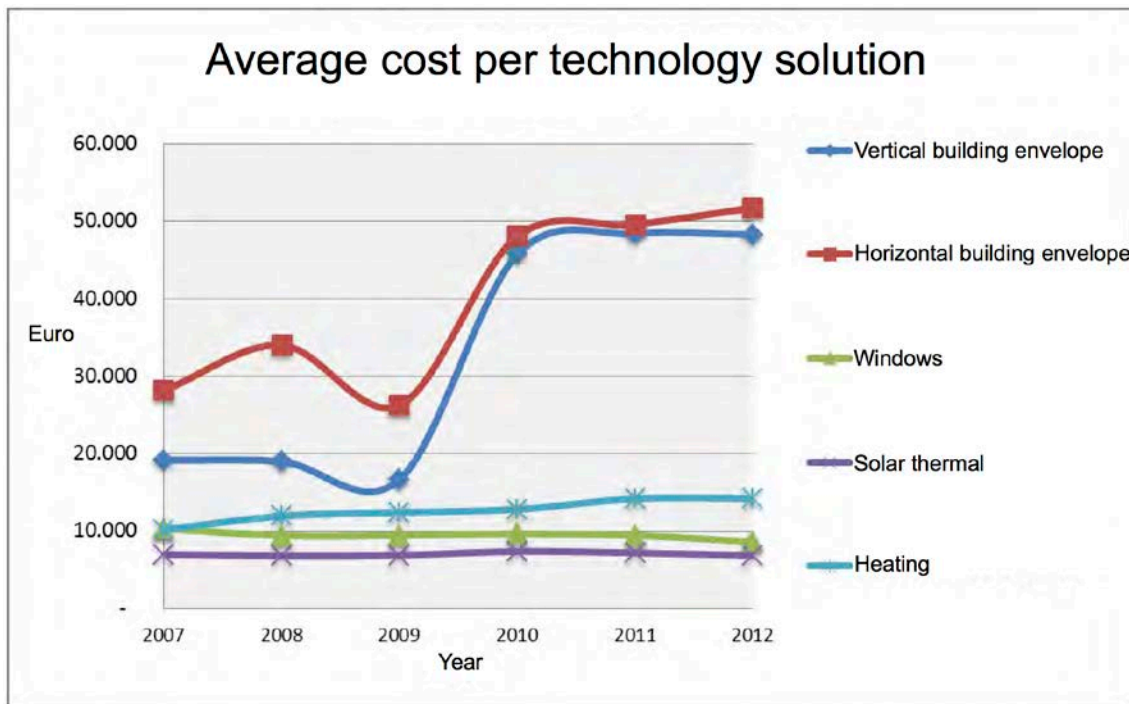
### 6.3 Estimated results of alternative measures

For tax deductions data on total costs and savings, and indicators about the average cost of investments are available for every year and are summarized in the figures below. It is more difficult to evaluate the cost effectiveness of the scheme. Being an incentive calculated as a percentage of the investment cost, it doesn't make much sense a cost effectiveness indicator like incentive/CAPEX. However it is possible to refer to the following benefit/cost ratio indicator:

$$I_{eff} = \frac{\text{discounted economic value of tax deduction}}{CAPEX}$$

Considering a discount rate at 5% it is to calculate the following values, depending on the amount of the tax deduction:

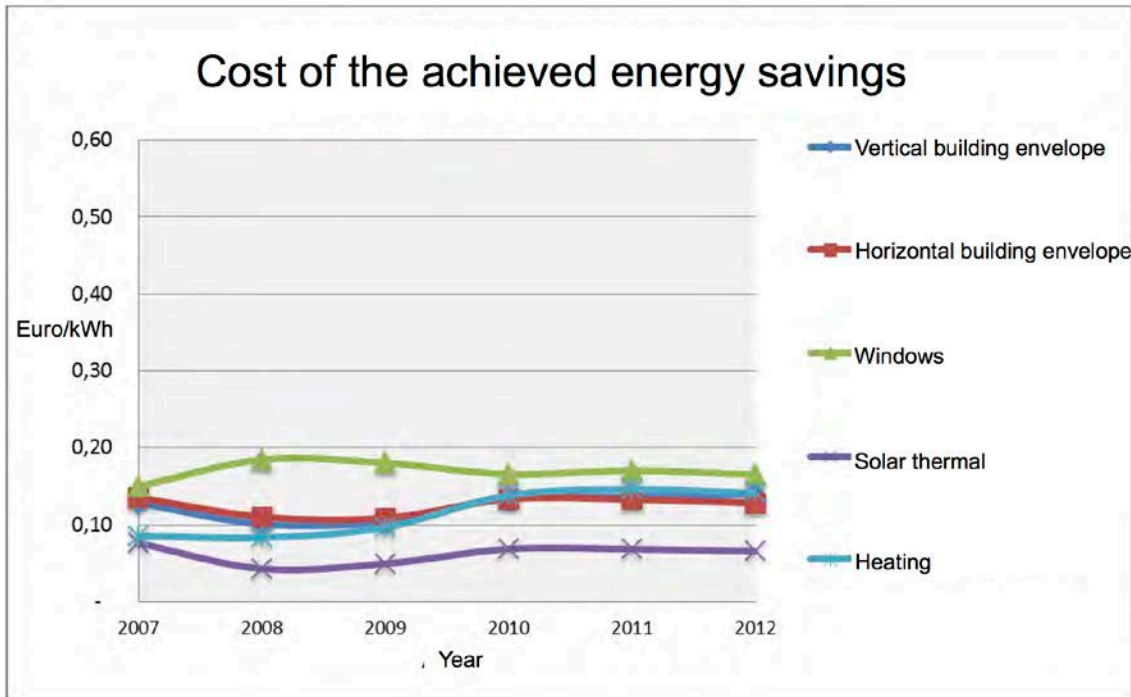
- $I_{eff}$ =50% in case of tax deduction at 65% (valid for 2013 and 2014);
- $I_{eff}$ =42% in case of tax deduction at 55% (valid until 2013 and from 2015 on).



**Figure 6.3: Average cost per technology for tax deductions.**

*Source: ENEA 2013 report on tax deductions.*





**Figure 6.4: Cost of the achieved savings per technology for tax deductions.**

*Source: ENEA 2013 report on tax deductions.*

There are no official information about the administrative costs of the scheme. It can be estimated nevertheless below 1% of the cost of the scheme. This is in line with the limited administrative work for evaluation and control of the proposals and the projects.

With respect to the thermal account scheme there are less official available information, due to the recent introduction of the scheme. The total cost in 2013 has been of less than 4 million euro, which is a small amount of money, considering the global allowed cap of 900 million euro. Data available from GSE at 3rd November 2014 show a strong increase in applications (from 3,300 in 2013 to 8,525 in 2014) and in the annual incentive (around 20 million euros annually and 26 million euro cumulated). With the available data it is not possible to discuss further cost-benefit indicators at the moment.

**Table 6.6: Indicators about costs, savings, and cost-effectiveness.**

Policy measure	Total administrative costs	Total incentive costs	Total savings	Cost effectiveness
<b>PI1: Tax deductions (detrazioni fiscali 55%-65%)</b>	Not available, but below 1% of the total incentive cost.	2012: 1,585 M€ - 1.26 €/kWh 2011: 1,820 M€ - 1.27 €/kWh 2010: 2,533 M€ - 1.25 €/kWh 2009: 1,410 M€ - 0.95 €/kWh 2008: 1,925 M€ - 0.98 €/kWh 2007: 799 M€ - 1.01 €/kWh (kWh final consumption)	2012: 1,260 GWh 2011: 1,435 GWh 2010: 2,032 GWh 2009: 1,487 GWh 2008: 1,961 GWh 2007: 788 GWh (kWh final consumption)	0.067 €/kWh (€ of incentive given to users as tax deduction per saved kWh)  Benefit-cost ratio: 55%-65% not discounted 42%-50% discounted at 5% rate
<b>PI2: Thermal account (conto termico)</b>	Not available, but high due to the limited success of the scheme so far (estimable higher than 5%).	3.89 M€ in 2013 around 20 M€ at the end of October 2014.	Not available yet	Not available yet

*Note: total savings are based on the declarations from the applicants, which rely on simplified evaluation or on calculations done by qualified professionals. That means that actual savings can be different.*

## 6.4 Observed or Potential Implementation Barriers/Risks

Both policy measures don't allow for double counting through verifications on projects that are carried on both for thermal account and for white certificates. This can't ensure a total lack of double counting, but the risk is limited and in case of ascertained non conformity of a certain project the incentives will be withdrawn and more penal or civil consequences are provided by the regulations.

Another common attribute is the lack of explicit additionality evaluation, due to the character of both policies (incentives linked to the capital cost of investments). Nevertheless the Government has requested the presence of additional savings through the minimum efficiency requirements that are set for each admitted technology.

The main risk for tax deductions is the possibility that the conservative approach of the

Ministry of economy, interested in limiting the reduction of tax incoming, may succeed in closing the incentive scheme, as dreaded many times in the last years (every year there is a discussion on this point when the finance law is prepared).

The main risk for thermal account is a failure due to the competition from tax deductions (on technologies related to heating and cooling RES for residential buildings), which are both simpler and characterized by a higher benefit/cost ratio, and some design issues that are not allowing the public administration sector to participate as forecasted. Among the design issues the following can be listed: the complexity of the documentation requested to the applicant even for small projects, the difficulty to present EPC projects for the public administration due to the short timing, and the lack of sufficient information, especially for the public sector. In particular the public administration should be able to access the scheme during the EPC tendering procedure, through a reservation process. Unfortunately the scheme requests that the implementation of the projects starts within 60 days from the application and closes within 12 months, two deadlines that are difficult to meet in practice.

It is worth noticing that such issues can happen with new schemes, and can be overcome with the right modifications of the regulations. A revision of the rules is expected shortly and requested from a recent law (D.L. 12th September 2014 n. 133), which requests a simplification of the rules for application and the possibility to present energy efficiency projects also for social housing and inhabitants cooperatives.

**Table 6.7: Barriers and risks linked to the considered policies.**

Policy measure	Broader feasibility risks and implementation barriers	Double-counting, materiality and/or eligibility risks
<b>PI1: Tax deductions (detrazioni fiscali 55%-65%)</b>	The main risk associated with a tax deduction scheme in a period of high public debt and crisis is the possibility that the reduction of tax revenues will bring the Government to hinder the development of the scheme or even close it. Until now the good results obtained in contrasting the crisis of the construction sector and the net tax revenues due to the reduction of the black labor has been a successful antidote.	Not allowed with national incentives and verified
<b>PI2: Thermal account (conto termico)</b>	The better economic performance and simplicity of rules of tax deductions has hindered the development of the thermal account in the residential sector until now. Public administration has theoretically the possibility to access this scheme with EPC contracts, but the time requirements make it very difficult to achieve. The possibility of direct access after the project has been	Not allowed with national incentives and verified

implemented is limited in such cases. Information and a modification of the rules expected by the end of 2014 should improve this situation.

## 6.5 Conclusions

Both policy measures can and should help Italy in reaching its 2020 energy saving targets and are designed in order to be a good complement to the white certificate scheme. Tax deductions worked very well at stimulating energy efficiency in the residential sector, contributing primarily to an early achievement of the target set by 2006/32/EC directive at 2016. The thermal account has yet to demonstrate its effectiveness, but after the revision of the rules it could become a good support scheme to help the public administration in the renovation of their building stock.

An interesting point that can be considered is the different approach chosen by the Italian government with respect to measurement and verification of energy savings among the three schemes that are covered by article 7 of the EED directive.

White certificates adopt three different methodologies (deemed savings, simplified monitoring plans and monitoring plans) and have a transparent evaluation of additionality and of technology lifespan. Besides, the savings are mainly measured through meters.

Both tax deductions and thermal account don't provide for an explicit additionality and don't request meters to measure the savings, considering the extent of the policy measures and the type of accepted technologies. They can be confronted with the deemed saving approach used within the white certificate scheme, but in fact different rules are considered in each policy scheme.

This implies some difficulty in comparing the different schemes cost effectiveness, but allows for a good compromise in terms of acceptability from market operators and end-users. The effect on the market, nevertheless, can be interesting with every approach.

## 7 Sweden – SEI

### 7.1 Classification of alternative policy measures

It is important to underline that Sweden considers that Energy Efficiency schemes (EEOs) are not the most appropriate instruments for the country to achieve the energy savings targets set by the EED and therefore it intends to achieve them by implementing alternative measures. The reason for this is that, according to the Plan for Implementation of article 7 of the EED sent by Swedish Government on 5 December 2013, “an obligation scheme for energy saving (white certificate) is not considered to deal with market failure that is not already addressed by other instruments, with the result that white certificates would not promote more efficient energy usage in Sweden in a more cost-effective way”.

The table below includes the set of measures that Sweden included in the Plan for implementation of article 7 of the EED as of 5 December 2013 as well as in the third National Energy Efficiency Action Plan, NEEAP 2014.

As the table below shows, the main aim of the alternative measures foreseen by Sweden is to reduce energy intensity of the economy. There are several measures designed to build capacity at a local and /or regional level: 3 out of 8 measures are meant to work with municipalities.

As far as measures to work with industry, Sweden grants financial support to industries without prioritizing any specific technology in particular.

**Table 7.1: Alternative measures to achieve the energy saving targets set by the EED in Sweden**

Policy measure	Type of measure	Principal policy objective	Course of implementation
<b>PI1: Energy taxes and carbon dioxide taxes</b>	Energy taxes and carbon dioxide taxes	Reducing energy intensity of the economy	1994- open (beyond 2020)
<b>PI2: Municipal energy and climate advice</b>	Training and education programs	The purpose of the advice is to mediate impartial, free and technology neutral information and advice concerning energy efficiency options.	1997-open (beyond 2020)

<b>PI3: Support for energy efficiency in municipalities and county councils</b>	Financing schemes or instruments or fiscal schemes	Reducing energy intensity of the economy	2010-2014
<b>PI4: Sustainable municipalities</b>	Training and education, regulation and agreements	To strengthen the institutional capacity of participating municipalities to implement local energy and climate strategies.	2003-open (beyond 2020)
<b>PI5: Regional climate and energy strategies</b>	Regulations or voluntary agreements/financing schemes or instruments or fiscal schemes	The purpose of the initiative is to strengthen the conditions for the development and implementation of regional energy and climate strategies.	2008-open (beyond 2020)
<b>PI6: Energy audit checks</b>	Regulations and voluntary agreements and financing schemes or instruments or fiscal schemes.	To provide financial support to companies whose energy consumption is above 500MWh per year so they can carry out an energy audit	2009- open (beyond 2020)
<b>PI7: Programme for energy efficiency in electricity-intensive industries (PFE)</b>	Financing schemes or instruments or fiscal schemes.	Reducing energy intensity of the economy	2005-2017
<b>PI8: Network management in industry</b>	Regulations or voluntary agreements and training and education	To promote the formation of operator networks whose purpose will be to raise awareness of how to make energy consumption more efficient at all levels in industrial companies through the provision of information and the knowledge exchange	2009 - open (beyond 2020)
<b>PI9: Technology procurement</b>	Financing schemes or fiscal schemes	Promoting the development of new technology and the use of more energy-efficient products and systems.	2003 - open (beyond 2020)

<b>PI10: Information initiatives</b>	Training and education program	Tools development with the aim of disseminating knowledge concerning energy consumption.	2007 - open (beyond 2020)
<b>PI11: Environmental inspections and inspection guidance</b>	Regulations or voluntary schemes	To ensure the principle of conservation is being followed and provide capacity building.	1998 - open (beyond 2020)

## 7.2 Analysis of design and implementation features of alternative policy measures

Some general considerations about how Sweden has transposed the EED directive are as follow:

- Sweden intends to achieve the cumulative energy saving using instruments other than obligation schemes for energy saving.
- Sweden intends to include the energy sold and used in the transport sector in the basis used to calculate the energy saving.
- Sweden intends to divide up the entire period 2014-2020 into two intermediate periods, with the first period covering the years 2014-2016 and the second period covering the 2017-2020. A checkpoint will therefore be introduced following the end of the first period.
- Sweden intends to apply the method specified in Article 7 (2) (c), i.e. to use values of 1% for 2014 and 2015; 1.25% for 2016 and 2017; and 1.5% for 2018, 2019 and 2020 in the calculation of the cumulative energy saving. This will result in a reduction of 20.8%, which is less than the 25% permitted by the Directive.

### Energy taxes and carbon dioxide taxes

Through the energy and carbon dioxide tax being levied in Sweden pursuant to the Swedish Energy Tax Act(1994:1776), Sweden is fulfilling the minimum tax levels specified in Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (the Energy Taxation Directive).

The energy tax on electricity is primarily levied on those who generate taxable electric power commercially and those who supply electrical power commercially. Those liable to pay energy tax and carbon dioxide tax on fuel are primarily warehouse keepers, consignees and stockholders approved by the Swedish Tax Agency.

Furthermore, end users, i.e. households and businesses are obliged to pay full CO<sub>2</sub> taxes as a general rule. There are a few exemptions that are clearly listed and refer to certain industrial activities.

For heating fuel outside the EU emissions trading scheme (EU ETS), the industrial, combined heat and power, agriculture, forestry and aquaculture sectors pay 30% of the general energy tax level and 30% of the general carbon dioxide tax level. From 2015 onwards, these sectors will pay 60% of the general carbon dioxide tax level. For heating fuel within the EU ETS, the industrial and combined heat and power sectors pay 30% of the energy tax level, but no carbon dioxide tax. For diesel, the industrial sector pays the full energy and carbon dioxide tax, while the agriculture, forestry and aquaculture sectors pay the full energy tax, but pay a lower level of carbon dioxide tax at SEK 1.70/litre. The Swedish parliament has decided that this level will be reduced to SEK 0.90/litre in 2015.

### **Municipal energy and climate advice**

The Swedish Energy Agency pays out state support to the country's municipalities to enable them to obtain energy and climate advice. Energy and climate advice is provided in all of Sweden's 290 municipalities. The support is regulated through Ordinance (1997:1322) on support for municipal energy and climate advice and the Swedish Energy Agency's Regulations (STEMFS 2008:2, STEMFS 2008:6).

The purpose of the advice is to mediate impartial, free and technology-neutral information and advice concerning energy efficiency options. The Swedish Energy Agency supports the municipal energy and climate advice both financially and through the provision of training and information. There are a total of 14 energy agencies distributed across the country.

The energy and climate advice is targeted at a number of target groups and areas:

- Industry: The advice is aimed at small and medium-sized enterprises and organizations). For example, advisors may support the introduction of systematic energy work through their company advice (energy management) or make the company aware of the need for energy audits and the availability of government support for energy audits.
- The public: Advisors may for example provide homeowners with information regarding investments in heating systems.
- Transport advice aimed at companies and the public.

Each month, the municipal energy and climate advisors report to the Swedish Energy Agency on the nature and number of advice initiatives during the past month, and the measures that will be adopted as a result of the advice given.



## **Support for energy efficiency in municipalities and county councils**

Although, this program terminated at the end 2014, we considered it was worth it to mention it.

Since 2010, the Swedish Energy Agency provided state support to municipalities and county councils for strategic work in connection with energy efficiency from a system perspective within individual organizations. Energy efficiency support was granted to approximately 96% of the country's municipalities and county councils. This work was regulated through Ordinance (2009:1533) on state support for energy efficiency in municipalities and county councils and the Swedish Energy Agency's regulations and general recommendations (STEMFS 2010:5) concerning state support for energy efficiency in municipalities and county councils. The municipalities and county councils that were granted were obliged to report the results to the Swedish Energy Agency annually, which facilitates national follow-up.

### **Sustainable municipalities**

'Sustainable Municipalities' is a cooperation programme administered by the Swedish Energy Agency which is intended to strengthen the institutional capacity of participating municipalities to implement local energy and climate strategies. Work in connection with Sustainable Municipalities has been taking place since 2003, firstly through a five-year pilot phase (2003-2007) involving five municipalities, and then through a three-year phase (2008-2010) involving 66 municipalities. Since 2011, a third programme period has been implemented, with a focus on the development, application and dissemination of cutting-edge examples of methods for municipal work aimed at creating the right preconditions for the sustainable use of energy both locally and regionally. The work has been carried out in nine project areas, divided into two thematic areas (industry policy and energy-smart planning). A total of 37 municipalities participated in the programme. The thematic area of industry policy encompasses the project areas of energy management systems for local development and energy-driven business development. The thematic area of energy-smart the project areas of energy-efficient planning in small and medium-sized municipalities and the energy-efficient reconstruction of the 'Million Programme'<sup>2</sup>

### **Regional climate and energy strategies**

Since 2008, all county administrative boards have been given the task of managing and coordinating work in connection with the development and implementation of regional energy and climate strategies. Since 2010, the county administrative boards have received financial reimbursement from the government for their work, paid by the Swedish Energy Agency. The Swedish Energy Agency wants to support the work of the county administrative

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<sup>2</sup> This refers to major housing blocks from the 1960s and 1970s.

boards. The purpose of the initiative is to strengthen the conditions for the development and implementation of regional energy and climate strategies. The work is carried out in cooperation with the Sustainable Municipalities programme in relation to regional energy issues, training for the county administrative boards and other regional bodies such as the Energy Agencies and Regions/Regional Associations, in addition to process management training for the county administrative boards. The county administrative boards must also provide regional support for municipalities and county councils in their work relating to energy efficiency within the framework of the energy efficiency support. The county administrative boards report their results annually to the Swedish Energy Agency

### **Energy audit checks**

Companies with energy consumption in excess of 500 MWh per year have been able to apply for financial support to carry out an energy audit since 2010. Additionally, enterprises involved in the primary production of agricultural products may apply for support if their activity involves at least 100 livestock units. The support aims to eliminate any lack of awareness by conducting an audit of the organization's energy consumption, and thereby promote the implementation of potentially profitable energy efficiency measures. The support covers up to 50% of the cost of an energy audit, subject to a maximum of SEK30000. The Swedish Energy Agency is responsible for administration of the energy audit support. The support is regulated through Ordinance (2009:1577) on state support for energy audits and the Swedish Energy Agency's regulations and general recommendations (STEMFS 2010:2) on state support for energy audits. Companies receiving support undertake to report on the energy efficiency measures they have implemented.

### **Programme for energy efficiency in electricity-intensive industries (PFE)**

The programme for energy efficiency in energy-intensive industries (PFE) aims to promote energy efficiency among Swedish energy-intensive industrial companies. Participation is voluntary and participating companies receive an exemption from energy tax on electricity (0.5 hour/kWh) used in the manufacturing process. The programme is regulated through the Swedish Programme for Improving Energy Efficiency Act (2004:1196). The Swedish Energy Agency is the competent authority for the programme and the Swedish Tax Agency handles any tax reductions. In order to join the programme, the participating company must meet any criteria that are set regarding energy intensity, use electricity in the manufacturing process and be assessed as able to implement any measures arising as a result of participation in the programme. Through its participation, the company undertakes to perform an energy audit, introduce a certified energy management system, introduce special routines and implement electricity efficiency improvement measures. The company must report to the Swedish Energy Agency on three occasions during the period.

The guidelines for government support for environmental protection announced in 2008 have restricted the scope to grant tax exemptions to companies. As a result of this, the

Programme for Improving Energy Efficiency Act (2004:1196) was repealed in 2012. This means that companies can no longer join the programme. However, the provisions of the repealed Act still apply to companies that joined up until 2012. This means that the majority of programme participants will leave the PFE programme on 30 June 2014, and the companies that joined last will leave in 2017. The second programme period is currently underway with around 90 participating companies, and will continue to generate effects over the coming years

### **Network management in industry**

The Swedish Energy Agency is working to promote the formation of operator networks in industry. The purpose of these networks is to raise awareness of how to make energy consumption more efficient at all levels in industrial companies through the provision of information and the exchange of knowledge. Networks have for example been formed in the mining and steel industries, material processing industries and the sawmill industry.

The network for energy efficiency (ENIG) started in 2009 with the aim of creating, collating and disseminating information concerning energy efficiency within the Swedish manufacturing industry. The focus is placed on casting, surface treatment, heat treatment, sheet metal forming and plastic processing. The purpose of the project is to reduce the company's energy consumption by 5% per year, or by a total of 30% by 2015, and to promote the implementation and commercialization of at least ten new energy-efficient processes or products.

The Energy Efficiency in the Sawmill Industry network (EESI) started in 2010 and has the purpose of helping to reduce the specific energy consumption in the sawmill industry by at least 20% by 2020. The project is now in its second phase. The target will be achieved through a programme for energy efficiency involving measures ranging from energy consumption audits to the modelling of efficiency options and a plan for demonstrations at selected sawmills. The project is part-financed by the Swedish Energy Agency, but the majority of the financing comes from the industry.

The Swedish Energy Agency also runs a network within the construction and property sectors, which includes bodies from the public sector, industry and property and tenancy owners. The network is divided into a number of client groups:

- The client group for premises (BELOK) and the client group for housing (BEBO) are the client groups for owners and managers of commercial and residential properties respectively. The client group (BeLivs) is aimed at food premises. The purpose of the network is to establish and follow up demonstration projects for energy efficiency relating to existing apartment buildings and premises and to drive the development of technology and system solutions for energy efficiency.
- The client group for commercial tenants (HyLok) aims to ensure that government

authorities set an example through the energy efficiency of their own activities, and by reducing the overall energy consumption of the premises that they use. The activities of HyLok include benchmarking, 'green IT' and energy-efficient server rooms, acquisition strategies for energy statistics, 'green offices', 'green tenancies' and public procurement.

### **Technology procurement**

Technology procurement is an instrument that aims to promote the development of new technology and the use of more energy-efficient products and systems. The Swedish Energy Agency administers project support pursuant to Ordinance (2003:564) on grants for measures promoting effective and environmentally sustainable energy supply. The Swedish Energy Agency carries out technology procurement projects and demonstration/market introduction projects in the building sector, industry and transport sectors. Technology procurements are primarily carried out within the areas of heating and control systems, hot water and sanitation, ventilation, white goods, lighting and industry. Technology procurement is aimed at a number of target groups: manufacturing companies, the public sector and industry. The use of technical procurement in the BELOK and BeLivs networks for example is a proven method promoting energy efficiency in residential buildings and commercial premises.

### **Information initiatives**

A number of Swedish authorities have developed information-based tools with the aim of disseminating knowledge concerning energy consumption. Such information initiatives are aimed at households, companies and authorities:

- The energy calculation is administered by the Swedish Energy Agency and is a web-based calculation program that aims to provide households with information on how they can make their energy consumption more efficient.
- Energiaktiv (Energy active) is a web-based information and advice portal. The website is the result of the collaboration among the Swedish National Board of Housing, Building and Planning, the Swedish Board of Agriculture and the Swedish Energy Agency, which is primarily aimed at home, and property owners, but also companies in the manufacturing industry, transport and agriculture. The purpose of the portal is to mediate information and support the implementation of energy efficiency measures in homes and commercial premises. The structure is process-supporting and guides users step-by-step from assessment to the follow-up of measures.

### **Environmental inspections and inspection guidance**

The Swedish Environmental Code (1998:808) entered into force in 1998. At the time, the requirement for energy conservation and the use of renewable energy became of greater

importance when it was highlighted in a rule of consideration, which is the mainstay of the Environmental Code. According to the Environmental code, all enterprise operators must be more economical with energy and use renewable energy sources in the first instance. This means that operators must:

- acquire knowledge regarding energy consumption;
- identify possible measures; and
- Implement reasonable measures on an ongoing basis.

The inspection authorities are responsible for ensuring that the principle of conservation is being followed, and additionally also have the task of providing advice. They are entitled to request any information required for the inspection, such as audits, analyses and measures. It is therefore particularly important that the work relating to energy conservation is documented. Pursuant to the Environmental Inspection Regulation (SFS 2011:13), the Swedish Energy Agency has had inspection responsibility for matters concerning self-regulation by operators since 2011 with regard to energy conservation and the use of renewable energy sources. This work involves the provision of support and advice to the operative inspection authorities, municipalities and county administrative boards and following up and evaluating the operative inspections.

**7.2.1 Activity coverage**

Table 7.2 includes broadly what is the sector coverage of each measure, the obligated and benefited parties.

In some cases, we included the instruments (broadly speaking) are being used to execute the policy measure. We would like to underline here that one of the main principles of the Swedish energy efficiency policy is that policies should be general and not tied to specific technologies.

**Table 7.2: Sector coverage, obligated and benefited parties of each alternative measure**

Policy measure	Sectorial Coverage	Eligible technologies	Obligated parties	Benefited parties
<b>PI1: Energy taxes and carbon dioxide taxes</b>	Crosscutting measure	Not specified	All consumers of energy pay the energy tax. All activities leading to the emission of CO <sub>2</sub> are subject to the CO <sub>2</sub> tax.	N/a

<b>PI2: Municipal energy and climate advice</b>	Public sector	Not specified	Municipalities	SMEs, the public
<b>PI3: Support for energy efficiency in municipalities and county councils</b>	Public sector	Strategic planning for energy efficiency	N/A	Municipalities and county councils.
<b>PI4: Sustainable municipalities</b>	Public sector	Methods for municipal work aimed at creating the right preconditions for the sustainable use of energy both locally and regionally. Two thematic areas: industry policy and energy-smart planning.	Municipalities	Municipalities
<b>PI5: Regional climate and energy strategies</b>	Public sector	Not specified	County administrative Boards	Municipalities, Energy Agencies and Regional Associations.
<b>PI6: Energy audit checks</b>	Industrial sector	Support to carry out an energy audit	N/a	Companies with an energy consumption in excess of 500 MWh, also enterprises involved in the primary production of agricultural products
<b>PI7: Programme for energy efficiency in electricity-intensive industries (PFE)</b>	Industrial sector	Introduction of an energy management system, perform of energy audits, special routines introduction and electricity efficiency improvement measures implementation	N/A	Swedish energy-intensive industrial companies

<b>PI8: Network management in industry</b>	Crosscutting sector, currently manufacturing sawmill and construction sectors have a Network.	N/A	N/A	Enterprises
<b>PI9: Technology procurement</b>	Building, industry and transport	Development of a new technology and the use of more energy-efficient products and systems through procurement schemes consisting of particular interest groups, such as landlords, or companies in the food retail chain.	The Swedish Energy Agency	The specific interest groups targeted, such as landlords (of various types of buildings) or companies in the food retail chain. The scheme has made it possible to obtain new energy-efficient equipment at a lower price thanks to organized purchasing.
<b>PI10: Information initiatives</b>	Households, companies and public sector	Information-based tools	Swedish authorities (voluntary scheme)	Households, companies and authorities
<b>PI11: Environmental inspections and inspection guidance</b>	Energy/electricity supply and distribution	Use of renewable energies	Enterprise operators	Municipalities, county administrative boards

## 7.2.2 Target setting

In order to completely avoid the risk of a duplicate calculation of energy savings from supplementary instruments, Sweden intends to study and calculate the effects of various instruments as a package. Since the basis for Swedish Energy efficiency policy is the impact on price signaling through the application of general economic instruments, the overall impact of the instruments used in Sweden will be calculated in accordance with the methodology laid down in the directive for calculating impact of energy and carbon dioxide taxes. In other words, Sweden has expressed an overall target in its notification to the European Commission in accordance with article 7, which includes only taxes (to minimize

the risk for double counting). Thus, Swedish energy efficiency policy consists of a package of all policy measures, but when expressed in figures only taxes are considered.

As it was said at the introductory section, Sweden intends to achieve a total energy saving of 106 TWh by 2020 according to the annex V of the 2014/27/EC (The total energy consumption in Sweden in 2025 was equal to 598 TWh).

The effect of other, supplementary measures will therefore not be followed up or calculated separately in relation to follow up Article 7. Their impact is included in the assessment of the impact of the taxes. They will be followed up for other purposes. However the Swedish Energy Agency has calculated accumulated energy savings for some of the measures. For instance aid for improving energy efficiency at local authorities and county councils could result in an accumulated energy saving of 10TWh over the 2014-2020 period, 0.5 TWh from support to energy audits and just under 14TWh from municipal energy and climate advice.

Therefore, it was not possible to allocate energy saving to each measure individually. Instead, specific information about the energy target setting per sector is provided in the following table.

*Source: Ministry of Enterprise, Energy and Communications (2013), Plan for implementing Article 7 of the Energy Efficiency Directive.*

### 7.2.3 Implementation specifics

Table 7.3 shows the set-up of the roles of administration, verification and motorization and how control and compliance have been distributed within the Swedish Institutional system.

Following table below, we included additional clarification regarding the roles mentioned above.

**Table 7.3: Roles of administration, verification and motorization and control and compliance of each alternative measure**

Policy measure	Administrator – Institutional set-up	Verification and monitoring	Control and compliance	Additionality requirements
<b>PI1: Energy taxes and carbon dioxide taxes</b>	The Swedish Tax Agency	The Swedish Tax Agency	The Swedish Tax Agency	
<b>PI2: Municipal energy and climate advice</b>	Swedish Energy Agency	Municipalities	Swedish Energy Agency	



<b>PI3: Support for energy efficiency in municipalities and county councils</b>	Swedish Energy Agency	Municipalities and county councils.	Swedish Energy Agency	
<b>PI4: Sustainable municipalities</b>	Swedish Energy Agency	Municipalities	Swedish Energy Agency	
<b>PI5: Regional climate and energy strategies</b>	County administrative boards in cooperation with the “Sustainable Municipalities” program and other regional bodies such as Energy Agencies and Regional Associations	County administrative boards	Swedish Energy Agency	
<b>PI6: Energy audit checks</b>	Swedish Energy Agency	Swedish Energy Agency	Swedish Energy Agency	
<b>PI7: Programme for energy efficiency in electricity-intensive industries (PFE)</b>	Swedish Energy Agency and Swedish Tax Agency	Swedish Energy Agency	Swedish Energy Agency	The participating company must meet the criteria set for participation, e.g. implementing an energy management system, and verify savings. Participating companies must be assessed as able to implement any measures arising as a result of participation in the programme.
<b>PI8: Network management in industry</b>	Swedish Energy Agency	Swedish Energy Agency (partially), also industry organizations	Swedish Energy Agency	

<b>PI9: Technology procurement</b>	Swedish Energy Agency	Swedish Energy Agency	Swedish Energy Agency	
<b>PI10: Information initiatives</b>	Swedish Energy Agency, Swedish National Board of Housing, Building and Planning and the Swedish Board of Agriculture.	Relevant body	Relevant body	
<b>PI11: Environmental inspections and inspection guidance</b>	Swedish Energy Agency	Swedish Energy Agency	Swedish Energy Agency	

### **PI2 Municipal energy and climate advice**

Each month, the municipal energy and climate advisors report to the Swedish Energy Agency on the nature and number of advice initiatives during the past month, and the measures that will be adopted as a result of the advice given.

### **PI3 Support for energy efficiency in municipalities and county councils**

Municipalities and county councils receiving support are obliged to report the results to the Swedish Energy Agency annually, which facilitates national follow-up.

### **PI5 Regional climate and energy strategies**

The county administrative boards report their results annually to the Swedish Energy Agency.

### **PI6 Energy audit checks**

Companies receiving support undertake to report on the energy efficiency measures they have implemented and the effects thereof.

### **PI7 Programme for energy efficiency in electricity- intensive industries**

The company must report to the Swedish Energy Agency on three occasions during the period.

In general there are no penalties foreseen in case obligated parties don't observe the measures. There are only ordinary measures in case of tax avoidance. And given the energy and CO2 taxes scheme is two decades old, it counts with a well-developed implementation experience.

Regarding additionality, this is determined in accordance with the notification from Sweden to the European Commission in December 2013.

## 7.2.4 Adaptation of policy measures

The Swedish energy efficiency policy has remained broadly the same since 2009. Most of them were implemented before the EED was borne (see in section 7.1 the date of implementation of each measure).

Regarding future redesign and/or amendments of the existing measures it is too early to say anything about policy details since Sweden has a new government since September 2014 and substantial changes regarding alternative measures might happen.

Only tax rates will be reviewed and amended annually through an index-linked scheme which takes into consideration any changes in the consumer price index.

**Table 7.4: Vintage, frequency and drivers for design of each measure**

Policy measure	Vintage of policy measures	Frequency of re-design	Drivers for re-design
<b>PI1: Energy taxes and carbon dioxide taxes</b>	Agriculture, forestry and aquaculture sectors will pay a lower level of carbon dioxide tax (from SEK 1.70/litre to SEK 0.90/litre in 2015) in 2015	Tax rates are not fixed over time but are reviewed and amended annually through an index-linked scheme which takes into consideration any changes in the consumer price index. This maintains the control signal given by the taxes over time	So far no information available
<b>PI2: Municipal energy and climate advice</b>		Continually	So far no information available
<b>PI3: Support for energy efficiency in municipalities and county councils</b>		Continually	So far no information available

<b>PI4: Sustainable municipalities</b>		Continually	So far no information available
<b>PI5: Regional climate and energy strategies</b>		Continually	So far no information available
<b>PI6: Energy audit checks</b>		Continually	So far no information available
<b>PI7: Programme for energy efficiency in electricity-intensive industries (PFE)</b>		Continually	So far no information available
<b>PI8: Network management in industry</b>		Continually	So far no information available
<b>PI9: Technology procurement</b>		Continually	So far no information available
<b>PI10: Information initiatives</b>		Continually	So far no information available
<b>PI11: Environmental inspections and inspection guidance</b>		Continually	So far no information available

### 7.3 Estimated results of alternative measures

In many cases costs for various measures are intertwined, making almost impossible to allocate costs to only one measure.

Furthermore, a comprehensive evaluation has not been carried out yet, however there are some underway.

Table 7.5 shows total approximate costs for some alternative measures. In no case was possible to allocate administrative, investment and incentive costs for any of the measures.

**Table 7.5: Administrative, investment and incentive costs of each alternative measure**

<b>Policy measure</b>	<b>Total administrative costs</b>	<b>Total investment costs</b>	<b>Total incentive costs</b>	<b>Total costs</b>
<b>PI1: Energy taxes and carbon dioxide taxes</b>	N/A	Not available	Not available	
<b>PI2: Municipal energy and climate advice</b>	Not available	Not available	Not available	140 million SEK/year
<b>PI3: Support for energy efficiency in municipalities and county councils</b>	Not available	Not available	Not available	270 million SEK/year, together with regional climate and energy strategies
<b>PI4: Sustainable municipalities</b>	Not available	Not available	Not available	Depends to a very high degree on the number of participating municipalities, which has varied.
<b>PI5: Regional climate and energy strategies</b>	Not available	Not available	Not available	See above PI3
<b>PI6: Energy audit checks</b>	900,000SEK/year	Not available	3.2 million/year	7 million SEK/year government expenses, excluding companies' own spending
<b>PI7: Program for energy efficiency in electricity-intensive industries (PFE)</b>	This is difficult to measure in exact terms because the idea was that participants get a waiver from their electricity tax in exchange for carrying out energy efficiency measures.			
<b>PI8: Network management in industry</b>	Not available	Not available	Not available	Not available

<b>PI9: Technology procurement</b>	Not available	Not available	Not available	108 million SEK/year
<b>PI10: Information initiatives</b>	Not available	Not available	Not available	Not available
<b>PI11: Environmental inspections and inspection guidance</b>	Not available	Not available	Not available	Not available

## 7.4 Observed or Potential Implementation Barriers/Risks

Sweden has expressed an overall target in its notification to the European Commission in accordance to article 7, which includes only taxes, minimizing thus the risk for double counting.

Therefore, Swedish energy efficiency policy consists of a package of policy measures, but when it comes to express in figures deemed energy savings only those corresponding to taxes are considered.

Table 7.6 includes potential barriers and risk that each of measures face when it comes the moment of their implementation. It was been filled in conjunction with stakeholders from the Swedish Energy Agency

**Table 7.6: Observed and potential implementation risk of each alternative measure**

<b>Policy measure</b>	<b>Broader feasibility risks and implementation barriers</b>	<b>Double-counting, materiality and/or eligibility risks</b>
<b>PI1: Energy taxes and carbon dioxide taxes</b>	NO	Yes, the risks were eliminated in the notification to the EU Commission, where all other measures were left out from the calculations because they work in concordance with the taxes.
<b>PI2: Municipal energy and climate advice</b>	There are occasional difficulties with recruiting qualified staff, because the tasks are demanding, while the job is not perceived to be with high enough status.	See above

<b>PI3: Support for energy efficiency in municipalities and county councils</b>	Municipalities had initially problems in understanding how to measure energy efficiency in the first place	See above
<b>PI4: Sustainable municipalities</b>	This depends completely on each municipality's level of ambition.	See above
<b>PI5: Regional climate and energy strategies</b>		See above
<b>PI6: Energy audit checks</b>	The main issue is whether the companies actually carry out the measures identified in the audit.	See above
<b>PI7: Programme for energy efficiency in electricity-intensive industries (PFE)</b>	No. The program was wound up because of state subsidy rules from the EU.	
<b>PI8: Network management in industry</b>		These measures are rarely measured in actual figures.
<b>PI9: Technology procurement</b>	This measure has proven a success-story.	
<b>PI10: Information initiatives</b>	Reaching out to the appropriate target group.	
<b>PI11: Environmental inspections and inspection guidance</b>		

To ensure selected alternative measures are successful, the Swedish stance remains neutral about technology, i.e. not favoring one of many technologies unless there is clear evidence to the contrary.

## 7.5 Conclusions

The implementation of article 7 of the EED that Sweden have designed consists of a combination of financial instruments, with a clear focus on energy and carbon dioxide taxes and targeted information initiatives to provide good conditions for achieving an improvement in energy efficiency that is effective under Swedish socio-economic terms.

These instruments complement each other and it is interaction of all of them, which provides the energy savings required by the EED.

We observed that some of the measures adopted by Sweden are especially useful for disseminating and raising awareness at a local level (municipalities, general public, companies). To foster their impact, some of the measures foresee not only financial support but also technical advice (PI8, PI9).

The decision made by Sweden about uniquely using alternative measures is based in a consolidated set of measures that are achieving the deemed energy savings required by the article 7 of the EED.

Furthermore, the great part of these measures were established before the entry into force of the EED and in its design, a strong cultural component, among others, needs to be considered in order to understand that their success might only apply to the Swedish cultural context, making it success under different cultural conditions quite unfeasible.



## References (D-Heading)

Plan for implementation of article 7 of the Energy Efficiency Directive, 5 December 2013, Ministry of Enterprise, Energy and Communications.

3rd National Energy Efficiency Action Plan (NEEAP) of Sweden, 2014.

[http://ec.europa.eu/energy/sites/ener/files/documents/2014\\_neeap\\_en\\_sweden.pdf](http://ec.europa.eu/energy/sites/ener/files/documents/2014_neeap_en_sweden.pdf)

Stakeholders Interviewed

Swedish Energy Agency

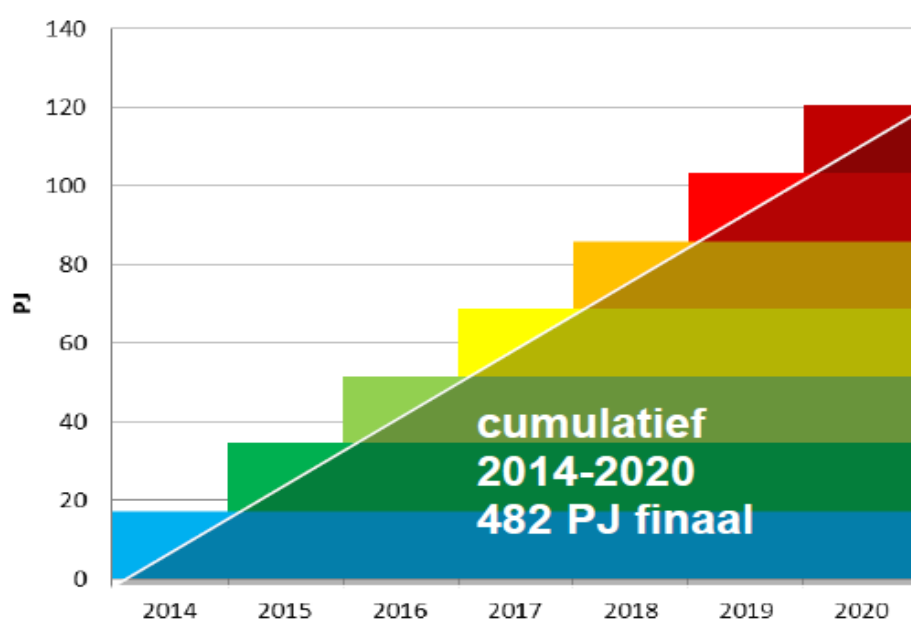
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## 8 The Netherlands – JIN

The European Union has set itself the goal of reducing EU primary energy consumption by 20 % by 2020, compared to current projections. A key instrument to help attain this goal is the EU Energy Efficiency Directive (2012/27/EU) (EED), which entered into force on 5 December 2012. The Directive included further cross-sectoral provisions to increase energy efficiency at European level, and was transposed into national law by 5 June 2014.

The Article 7 of the EED dictates that an energy efficiency obligation scheme and/or an alternative system to an energy efficiency obligation scheme by taking alternative policy measures may be adopted by a MS in order to achieve the 1.5 % annual energy savings target. In order to reach this target the Netherlands is using a broad set of mainly existing measures, which can be classified as ‘alternative measures’ under the EED, hence it has not opted for an energy efficiency obligation scheme. For the Netherlands this means a target of at least 482 PJ cumulative savings on final energy consumption up to 2020 – after taking account of the degrees of freedom offered by the EED (ECN 2013) [1].



**Figure 8.1: Energy Efficiency Targets in final energy use in the Netherlands**

*Source: ECN 2013*

The Netherlands is using about 40 policy instruments (including agreements, regulatory standards, fiscal incentives, direct subsidies and ‘green’ lending facilities) in several sectors (built environment, transport, agriculture/horticulture, industry and SMEs). An overview of

these instruments can be found in the National Energy Efficiency Action Plan (2014)<sup>3</sup> [2].

Several policy instruments fall under the umbrella of various agreements, and they are indicated separately at the extent that information is available. An important such agreement is the EnergieAkkoord (Energy Agreement for Sustainable Growth)<sup>4</sup> [3], where In 2013 employers, employees and NGOs, under the direction of the Sociaal-Economische Raad [Social and Economic Council of the Netherlands] (SER), conducted negotiations with the aim of establishing an agreement, which would provide continuity of energy policy over a longer period and provide an additional stimulus for the Dutch economy. The ambitions of the Energy Agreement include achieving additional energy savings of 100 PJ in final terms per year by 2020, compared with established policy. The Agreement includes the impacts of new European policy for the transport sector in this 100 PJ. The objective is expected to be achieved at least 35% by 2016 and at least 65% by 2018. In case that the full target will not be reached by then, additional policies will take place targeting at the end users. The policies that fall under the Energy Agreement are presented in Table 8.1.

**Table 8.1: Policies under the Energy Agreement relevant to Article 7**

Policy measure	Type of measure	Sector
<b>Enforcement of environmental management Act for industry and building related use</b>	Regulation and agreements	Industry
<b>Enforcement of environmental management Act for MJA3 companies</b>	Regulation and agreements	Industry
<b>Company specific agreements, MEE companies</b>	Voluntary agreements	Commercial
<b>Energy Investment Allowance (EIA)</b>	Financial/ Tax reduction	Industry
<b>Higher price incentive (CO2 sector system)</b>	Financial	Agriculture and horticulture
<b>Revolving funds and supplementary measures</b>	Financial/ Funds	Built environment
<b>Formulation on commitments, voluntary agreement on rent</b>	Voluntary agreements	Built environment
<b>EUR 400 Million subsidy for housing corporations</b>	Financial/ Subsidy	Built environment
<b>Enforcement of Environmental Management Act (buildings)</b>	Regulation and agreements	Built environment

<sup>3</sup><http://www.rijksoverheid.nl/bestanden/documenten-en-publicaties/rapporten/2011/07/01/tweede-nationale-energie-efficiencie-actie-plan-voor-nederland/nationaal-energie-efficiencie-actieplan.pdf>; [http://ec.europa.eu/energy/sites/ener/files/documents/2014\\_neeap\\_en\\_netherlands.pdf](http://ec.europa.eu/energy/sites/ener/files/documents/2014_neeap_en_netherlands.pdf)

<sup>4</sup>[http://www.energieakkoordser.nl/~media/files/internet/publicaties/overige/2010\\_2019/2013/energieakkoord-duurzame-groei/energieakkoord-duurzame-groei.ashx](http://www.energieakkoordser.nl/~media/files/internet/publicaties/overige/2010_2019/2013/energieakkoord-duurzame-groei/energieakkoord-duurzame-groei.ashx)

The energy savings potential of the Netherlands can be captured with the proposed policies and is split among the various sectors. As the table below shows, the existing policies can achieve the 50% savings under the EED, while the rest can be achieved in other measures in buildings, industry, transport and agriculture.

**Table 8.2: Policies under the Energy Agreement relevant to Article 7**

Policies in sectors	Final energy savings (PJ) in 2020 (with a baseline of 2013)	Savings per sector (PJ)
<b>Existing policy measures (cross cutting, all sectors)</b>	22-60	50% of savings under EED
<b>Buildings</b>	13-43	Private property: 3 Rental housing: 7-12 Service sector: 3-28
<b>Industry, agriculture</b>	9-17	ETS industry: 0.5 Non-ETS industry: 0.3 Other industry: 1-8 Energy Investment Allowance: 5 Indoor horticulture: 3

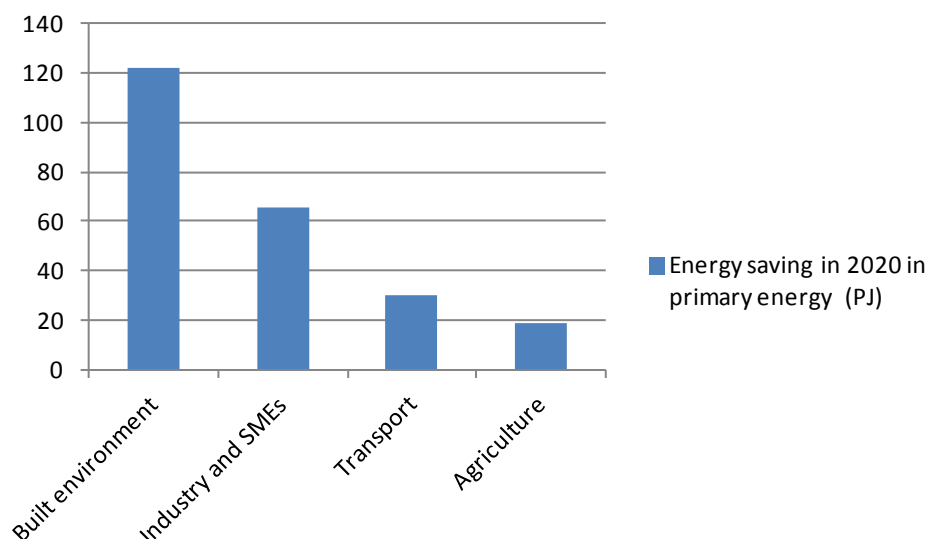
In this report, a selection of these policy instruments will be reviewed in more detail. A choice was made to focus on a set of 13 policy instruments from different categories including voluntary (sector) agreements, regulatory standards, lending facilities, and fiscal incentives and/or direct subsidies, which were considered most relevant for the Article 7 implementation and expected to deliver the most in their combinations.

**Table 8.3: Policies under the Energy Agreement relevant to Article 7**

Policy instrument	In NEEAP 2011 & 2014	In this report
Energy tax	X	
Energy Investment Deduction (EIA)	X	X
Environmental Investment Deduction (MIA)	X	
Random depreciation at will (VAMIL)	X	
MJA (1,2,3)	X	X
MEE	X	X
Green Financing Scheme	X	X
National Revolving Fund		X
Green Deal	X	X
Energy Research Subsidy	X	
Subsidy: Market Introduction for Energy Innovations (MEI)	X	
Subsidy: Investments in Energy Savings (IRE)	X	
Energy Performance Norm (or Coefficient)	X	X
More with Less programme (covenants, incentives, and EPAs)	X	
400 MLN EUR subsidy to housing associations	X	X

Adaptation of Real Estate Valuation system (WWS)	X	X
Ecodesign en energy labels	X	X
Temporary subsidy on insulation glass	X	
VAT reduction on labour costs related to measures improving the energy performance of buildings	X	X
Innovation Agenda Built Environment	X	
State Building Agency (Rijksgebouwendienst)		X
Sustainable Heat existing buildings	X	
'Milieucentraal' communications and information campaign	X	
Enforcement of Environmental Management Act for Utility / commercial buildings	X	
Block by Block programme	X	X
Roll-out smart energy meters	X	
Industrial heat use	X	
Feed-in tariff scheme (MEP – ended in 2007)	X	
Transport taxes, such as MRB/BPM, CO2-differentiation, lease cars) & fiscal greening	X	
Energy label for cars and tires	X	
Longer and heavier road trucks	X	
Experiments Sustainable Mobility	X	
Sustainable logistics	X	
Sustainable mobility pilots	X	
Lean and Green: Logistics	X	
Lean and Green: Personal mobility	X	
Mobility Management	X	
Incentives for inland shipping	X	
European norms for vehicles	X	
Programm 'Het Nieuwe Rijden', 'the new driving' on behaviour	X	
Demolition regulation for 'old' vehicles (ended in 2010)	X	
Other fiscal (tax) incentives and direct subsidies (e.g. MIA, Vamil, MEI, IRE and Demonstration projects)	X	
Internal CO2 trading system for greenhouse sector	X	
Innovation programme 'Greenhouse as energy source'	X	
Number of policy instruments	41	13

The aforementioned policies are expected to generate a total of 237 PJ primary energy savings in 2020, with the highest contribution in savings in the built environment.



**Figure 8.2: Energy Savings in 2020 in sectors in the Netherlands (Source: NEEAP 2014 [3])**

As the alternative policies in Article 7, as explicitly mentioned in the Third National Energy Efficiency Action Plan in the Netherlands (2014) refer primarily to energy savings in buildings and industry and at a lesser extent to transport and agriculture, this report focuses henceforth on the policies of the first two sectors.

## 8.1 Classification of alternative policy measures

The four tables below provide a snapshot of the basic characteristics of the thirteen instruments selected for evaluation, which are categorized into:

- Agreements
- Regulatory standards
- Fiscal measures and subsidies, and
- Lending or financing facilities

### 8.1.1 Agreements

The table below presents a basic description of 6 main voluntary agreements that the national government signed with different stakeholders. There are three agreements specifically targeting the built environment (the first two are the Block-by-block agreement [12] and agreement with housing corporations [4] [5]). The third agreement – from the State Real Estate managing authority ('Rijksgebouwendienst') is more of a unilateral pledge to engage in energy savings in their own building stock. For specific sub-categories of industry and SMEs there is either the Long Term Agreements (MJA3) or Long Term Agreement on

energy efficiency in ETS companies (MEE). The Green Deal [6] [7] framework is truly cross-sectoral as it basically is an open platform for societal stakeholders to indicate policy barriers for various ‘green’ objectives, which also includes renewable energy and energy savings (but also for example biodiversity and water management).

**Table 8.4: Classification of agreements**

Policy measure	Sectoral scope	Principal objective / target achievement	Timeline of policy instrument	Obligated parties
<b>Long term agreement on energy efficiency in ETS companies (MEE)</b>	Industry & SMEs	Reduction of primary energy. Overall target is derived from 'combined' Energy Efficiency Plans). 35 PJ primary energy savings achieved in 2010-2012 period (which was 93% of target; and of which 23 PJ was achieved as part of the industrial processes, the remaining savings can be attributed to up- or downstream measures) and 33 PJ expected in 2013-2016 period (both process and up-and downstream measures), according to combined efforts in Energy Efficiency Plans (and additional measures). But 5 companies achieved 50% (17 companies 80%) of total savings at industrial facilities, while only 2 facilities achieved 80% of up-and downstream savings. So contribution to overall savings is not evenly distributed. Sectors Chemicals, paper/cardboard, metallurgic and Other generated highest savings, while refineries and glass sectors only had minor contributions.	MEE agreement signed on 2 October 2009, and will be in force up until 2020.	Companies falling under the EU ETS. Currently there are about 205 industrial facilities that fall under the EU ETS (some have several installations; total of about 450 installations). There are about 80 industrial facilities falling under the EU ETS some of which have multiple installations, making the total number of MEE installations about 120. Those 80 ETS-MEE installations represent the bulk of the energy consumption under the EU ETS companies in the Netherlands.
<b>Long term agreements MJA3</b>	Industry & SMEs	Reduction of primary energy. Overall target is set at a 30% reduction of primary (fossil) energy consumption over the 2005-2020 period. Over the 2005-11 period a total primary energy savings of 60PJ was achieved. Without own renewable energy production or purchase this was 26PJ (energy savings). It seems that the MJAs are targeted not only on energy savings, but also on fossil energy savings, which means that renewable energy production and use are also considered eligible options in this agreement.	MJA 1 started in 1992 and ran until 1998, MJA 2 started in 1998 and was converted into MJA 3 during 2005. MJA3 will run up until 2020.	SMEs (not falling under EU ETS). In 2010, about 900 companies from 31 sectors participated in this voluntary agreement, and agreed to take measures to improve the energy performance of their business activities. These companies represent about 20% of the energy use (219PJ) of the industrial sector in the Netherlands.
<b>Green Deals</b>	Cross-cutting sectors	Renewable energy, reduction of primary and final energy, environmental targets	In October 2011, about 73 green deals were signed by national government and private	Government as a third partner: (the initiatives come from society)

stakeholders.

<b>Rijksgebouw dienst E2020 ambition</b>	Built Environment	Reduction of final energy in public buildings. -2% energy savings per annum per object, with a total asset related savings of 25% in 2020 relative to 2008.	The RGB as such exists for a long period, but the E2020 plan, was initiated in 19xx as part of the xxx 'Schoon en Zuinig' agreement of 2007.	Government building agency
<b>Voluntary agreements with housing corporations / Covenant Energy Savings with social housing corporations</b>	Built Environment	Reduction in final energy / net zero energy. Social housing corporaties will make extra investments in the building stock, which will result in 24 PJ of additional energy savings in 2020. Renewed 2012 agreement set the ambition on an average energy label B for the entire social housing stock (with an 1,25 energy index on average) in 2020.	Since it is part of the working programm 'Schoon and Zuinig', the plan started in October 2008. Covenant was updated in 2012.	Housing corporations, Agreement between AEDES/Woonbond (branch organisation of housing corporations) and the state to improve the energy efficiency of buildings. In 2012 also 'Vastgoed Belang' joined the agreement.
<b>Blok voor Blok</b>	Built Environment	Reduction of final energy use	Scheme started mid-2011, and is still running in 2015. The overall objective is to upgrade at least 23.500 buildings. The idea is to stimulate the formation of consortia that will be active in a municipality to improve the energy performance of at least 1500 - 2000 buildings.	Consortia of constructors, municipalities, project developers, homeowners

## 8.1.2 Regulatory Standards

In the regulation and standards category of policy instruments, the Energy Performance Coefficient (EPC) [8] and real estate evaluation/scoring system (WWS) target the built environment. The EPC is the cornerstone methodology to determine the energy label of a house (property). A validated EPC (energy label) is required for stakeholders who want to rent out their property or aim to sell it, and there are specific minimum EPC scores that new buildings have to meet. There is a direct link between the EPC method and the WWS, where - since 2011 – the rent prices of 'non-liberalised' property (generally houses / apartments with a rent below or equal to 700 EUR per month) is included in this scoring method so that a higher rent price can be set for more energy efficient buildings.



**Table 8.5: Classification of regulatory standards**

Policy measure	Sectoral scope	Principal objective / target achievement	Timeline of policy instrument	Obligated parties
<b>EPC and Lente Akkoord</b>	Built Environment	Improvement of the energy performance of buildings, which includes the reduction of final energy use, but also the application of renewable energy technologies.	In 1995 the so-called Energy Performance Norm was introduced. As per 1 January 2006 a minimum EPC of 0,8 for new residential dwellings (as part of the 'Lente-Akkoord', in subsequent agreements the EPC norm was updated, with an EPC of >0,6 as per 2011, and >0,4 as per 2015. Minimum EPC norms for different building types are in force (see source 2).	Project developers, building and construction companies and all other stakeholders involved in the building column (e.g. architects, subcontractors, technology/materials suppliers. But directly affected parties are building and construction companies.
<b>Woningwaardering stelsel</b>	Built Environment	Improvement of the energy performance of (social housing) buildings, which includes initiatives to reduce the use of final energy (but also measures focussing on renewable energy production and use).	As per 1 July 2011, the EPC performances of buildings have become an integrated element in the WWS system, and this means that the determination of rent for non-liberalised sector houses is differentiated per energy performance of the building (higher label enables higher rent).	Landlords, tenants and social housing corporations that rent outside the 'liberalised' sector (i.e. below a certain threshold for monthly rent, about EUR 710)

### 8.1.3 Fiscal measures and subsidies

A range of fiscal measures and subsidies is being used in the Netherlands that among others foster energy savings in various sectors. Both the Energy Investment Allowance (EIA) [9] and the temporary VAT reduction in insulation are somewhat more generic instruments that target quite broad stakeholder groups. Furthermore, a direct subsidy has been granted to the housing associations. Fiscal instruments generally have a longer time-span (or history), while subsidies are generally designed for more specific purposes and sectors.

**Table 8.6: Classification of fiscal measures and subsidies**

Policy measure	Sectoral scope	Principal objective / target achievement	Timeline of policy instrument	Obligated parties
<b>Energy Investment Allowance (EIA)</b>	Cross-cutting sectors	Renewable energy, reduction in primary energy. No quantitative target set. No figures on savings accounted for are available	Instrument is already in place since 1997 and has since then not fundamentally changed. The eligible technologies on the list and the rebate percentages have changed, but its function as a tax rebate instrument on an eligible investment has remained.	Companies (voluntary to invest or not)
<b>EUR 400 million subsidy for housing</b>	Built Environment	Reduction of final energy use	See Covenant Energy Savings with social housing corporation.	Social rental sector, social housing corporations

corporations

<b>Reduction in VAT in construction</b>	Built Environment	To stimulate building and construction sector. Co-target is reduction of final energy use. However, amongst most popular measures were, kitchen, bathroom, attic and extension measures.	Temporary measure (1 March 2013 to 1 July 2015) where VAT on labour (not materials) for energy efficiency measures is lowered from 21% to 6%	Building and construction companies, who can charge lower VAT on labour.
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### 8.1.4 Lending facilities

In the Netherlands, the lending policies implemented for the energy efficiency are the Green Funds [10] and the Revolving Funds Scheme, which both require the grants / loans to be repaid. The green funds scheme has a broader sectoral scope, and focusses on commercial enterprises, while the revolving fund(s) primarily target house owners in the built environment.

**Table 8.7: Classification of lending facilities**

Policy measure	Sectoral scope	Principal objective / target achievement	Timeline of policy instrument	Obligated parties
<b>Green Funds Scheme</b>	Cross-cutting sectors	Reduction of primary / final energy / Environmental targets	Scheme operational since 1995, and provides investors with cheaper loans to execute certain 'green' investments.	Private investors (commercial and non-commercial), but also NGOs and public bodies are eligible. Making use of this financing instrument is voluntary. The incentive for investors is that, they can get cheaper loans via these green funds (typically 1% lower than the commercial market rates). The funds get their capital as a result of a deduction of capital tax or the 'green capital' they provide.
<b>Revolving funds</b>	Built Environment	Triggering investments in measures that improve the energy performance of buildings.	In effect as per 21 January 2014.	Residents / owners who need financing for measures to improve the energy performance of buildings.

## 8.2 Analysis of design and implementation features of alternative policy measures

The tables below provide an overview of key design and implementation features of the selected policy instruments. There is a specific focus on aspects such as the basic energy savings calculation method (i.e. top-down / bottom-up, ex-ante/deemed savings or ex-post/measured real savings), as well as materiality and additionality.

### 8.2.1 Agreements

Voluntary agreements, such as MJA3, MEE, RGB and social housing ones use a robust baseline or benchmark their own existing activities or building stock. Due to their diverse nature, there are no clear and uniform baseline selection methods. Additionality for most agreements is not structurally assessed, but in some cases policy evaluations provided some additionality estimates, that can be as low as 15% [14]. In most cases these agreements are used in conjunction with other support schemes, such as fiscal measures / subsidies, or green financing instruments. From that perspective it would be difficult to determine the 'policy additionality', which relates to what share of the (deemed) energy savings can be attributed to a specific policy instrument. In most agreements, materiality effects can be quite high, as the energy savings planning is becoming an integrated part of a companies' or subsectors' operating processes.

Several agreements include articles referring to a (voluntary) obligation to invest in energy savings measures that have a certain limited repayment period (for example below 5 years). For such investments it would be hard to determine if the associated energy savings would be additional from an economic perspective. Economic additionality would then relate to energy saving investments with a relatively high return on investment indicating that such investments might just as well be a part of the autonomous or business as usual upgrades.

Materiality in most agreements seems quite high, as most agreements rely upon developing an energy savings plan or strategy, and monitoring the effect of implemented technologies and measures. Within that process, it becomes clearer which resources (external expertise, finance, others.) are needed to implement the energy savings strategy. Especially in multi-stakeholder processes such energy savings strategies / plans are needed to ensure that all (local) partners can work together effectively.

**Table 8.8: General features of agreements**

Policy measure	Type of measure	Calculation method of savings (baseline setting & benchmarking method)	Additionality requirements determination (calculation method)	Materiality and double counting (qualitative info)
Long term agreement on energy efficiency in ETS companies (MEE)	Voluntary Agreements	All energy consumption will be converted into primary energy, based on LHV of energy. Electricity will be accounted for with a 42% conversion efficiency. For process related measures the savings are the sum of the annual savings during the start of the new planning period (historical consumption is used as reference). For up- and downstream (keten)	No additionality accounting, but a 2013 survey under all MEE participants shows that 64% of respondents indicated that 80% (so 20% 'additionality') of measures would also have been taken without the MEE agreement (for 2010-2012 period). For 2013-2016 period 50% 'additionality' is expected.	Highly detailed process, where public officials engage with the companies to develop their Energy Efficiency Plans. The process is supported by a range of tools to help MEE companies to perform good evaluations and energy savings strategies. Materiality as such is quite high since there is a high level of exchange of information, and

measures the N-1 year is taken as a baseline. There is a comprehensive software tool (EVA) to aid stakeholders to calculate and present their energy balance in matrix form, which includes all energy flows, and all relevant energy functions.

validation. In order to prevent double-counting with other EE agreements (e.g. MJA3), there will be a case-by-case decision on how to allocate the realised savings to each agreement. This is especially relevant for so-called pathway measures, spanning across the boundaries of the own facility. Interrelations with other non-EE measures (e.g. CO<sub>2</sub>-savings), no double counting is considered to take place, since the energy savings performance is different from the CO<sub>2</sub>-savings performance. Both measures can thus claim such an effect that could arise from a single measure. MEE (2013) enquiry indicate that they value MEE most, when it comes to initiate actions on energy savings. Other 'supporting' measures, such as the EU ETS, EIA, MIA, VAMIL, and energy tax rebate (which are mostly financial measures) are considered of lower relevance for 'materiality' reasons. Neither the EIA, MIA, VAMIL or exemption or energy tax provide clear signals on where to start saving energy. The way the accounting under the EU ETS is performed shows some similarities with the energy balance in matrix form the MEE uses, and might have a spin-off effect with regards to energy savings in the process (EU ETS does not cover up - and downstream savings, so MEE is broader in scope).

<b>Long term agreements MJA3</b>	Voluntary Agreements	For process related measures the savings are the sum of the annual primary energy savings during the start of the new planning period (historical consumption is used as reference). For	No official additionality accounting but an evaluation of the instrument resulted in an estimated additionality of about 50%, but is based on a number of (inter)national studies so	The MJA3 scheme has a positive contribution to awareness creation, and as such the route-maps, and other process oriented reportings (and information exchange) do facilitate and speed-up
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		<p>up- and downstream (keten) measures the N-1 year is taken as a baseline. For most MJA sectors monitoring reports are provided which show the primary energy consumption of the previous year (split up in different energy sources), and the primary energy consumption of the reporting year. The difference (in most cases a reduction) is allocated to the various measures that the sector companies have taken. For the glass industry the 2013 sector report allocates energy savings to 1) reduced production volume, 2) process efficiency measures (e.g. oven revisions, optimisation of pre-oven/feeder, improvements of energy monitoring, switch high to low pressure compressed air), 3) supply chain efficiency measures (e.g. extra use of recycled glass, substituting synthetic soda with natural soda).</p>	<p>is not necessarily an exact representation. But this number is deemed quite high especially for initiatives focussed on process efficiency improvements. There a 15% additionality is suggested.</p>	<p>the uptake of energy saving measures. However, insofar as this improves materiality is uncertain and above all very difficult to quantify.</p>
<b>Green Deals</b>	Voluntary Agreements	<p>No specific monitoring and reporting format, so deemed savings are best available option. An ex-ante evaluation study showed that for energy savings the achievement (in terms of savings) is highly dependent on the scale of the initiative, and the replication potential of these initiatives. In several green deals the financing (investment and exploitation phase) are key hurdles. Other green deals (only) ask for changes in auxiliary legislation. For those green deal initiatives, it remains to be seen if financing under current financial-economic conditions is viable.</p>	<p>Additionality is not ensured and difficult to prove, as proposed measures in green deals could have been taken at a later stage. Most measures are also likely to make use of other financial schemes, such as taxes and subsidies.</p>	<p>Materiality should be quite high, as initiative is driven by societal / private stakeholders, who for example want to achieve energy savings or renewable energy production and use. Double counting is possible since the green deal is likely to be used in combination with other (financial) measures. Also, in case the green deal results in a change of some regulation that creates a barrier, it is unclear if one allocates the projects' impact to the green deal or to the changed legislation.</p>

<b>Rijksgebouwdienst - E2020 ambition</b>	Voluntary Agreements	Savings performance of a 2% per annum basis for individual objects. On aggregate a 25% savings performance in 2020 relative to 2008 energy consumption. It seems that also renewable energy production (behind the meter) is also considered an eligible measure. No formal accounting method found, but it is likely that for new builds EPC tools will be used, and for refurbishments the effects per measure/technology will be calculated on an ex-ante basis. No information was found on whether ex-post monitoring was found.	First package of measures, resetting and optimisation of existing climate installations in RGD buildings can hardly be seen as an additional measure, but the experiment on the integrated solar roof concept is rather innovative.	Materiality effect can be determined only on a case-by-case basis, as measures are tailored to specific buildings (e.g. monuments, working spaces, etc.). Double counting is not tackled in this measure.
<b>Voluntary agreements with housing corporations / Covenant Energy Savings with social housing corporations</b>	Voluntary Agreements	The SHAERE database is developed and managed by AEDES, which is the official monitoring programme of this covenant. Within SHAERE the energy consumption of the building stock is registered. The baseline performance is the previous year (for year on year improvements), and of course the chosen reference year (2008) for the aggregate multi-year target.	From the SHAERE report it is unclear if the energy use data has been corrected for weather conditions, neither is a check performed on whether or not the deemed savings are truly additional. Some measures could be considered non-additional from the technological perspective as some measures are already common practice, however, from a financing perspective many investments can be considered additional, due to the recent bankruptcy of a large housing corporations (which has billions of bad financial products on its balance sheet), for which the other housing corporations were also accountable for. This led to instatement of a 'verhuurdersheffing', which deteriorated the financial capacities of housing corporations, making it more difficult for them to invest. The 400 mln. EUR financial support of the national government only partially addresses this problem.	Not taken into account in official monitoring system, so is likely to be corrected afterwards to 'convert' deemed gross savings into additional deemed savings.

<b>Blok voor Blok</b>	Voluntary Agreements	No official and standardized monitoring and reporting initiative is linked to the block for block scheme. As such 'deemed savings' estimates can be provided based on either sample monitoring or top-down estimates.	Additionality is not ensured in this scheme, as - at best - the schemes results are based on deemed energy savings. As a result the claimed results can not be validated. Some corrections for the non-additional activities should also be incorporated in the deemed savings calculations.	Materiality effect of this program, is considered to be quite high, as local consortia with local organisations are developed. Local financing programs, are linked to local initiatives in a collective manner, which can help in higher levels of acceptance. However, double counting can occur, as no ex-post accounting is in place.
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## 8.2.2 Regulatory standards

Regulatory standards such as the EPC focus on new buildings, but are also a basic requirement for those stakeholders who want to rent out or sell their house. For new buildings a specific minimum EPC threshold applies, which could be used to determine deemed energy savings. The EPC (or energy label) for existing buildings will not so much have a direct impact on energy savings, but can render the energy performance of the specific building more transparent. This increased transparency will improve the bargaining position of the house buyer, and as such will be valued more as a decision variable when renting or selling buildings. The WWS is a clear calculation method aiming to determining a fair rent for houses in the so-called 'non-liberalised' sector (generally houses with a rent of no more than approximately EUR 700). If and when the energy performance of a building also becomes a decision parameter in building transactions, then building owners will be stimulated to focus on improving the energy performance of their building stock.

The EPC basically uses a methodology that allows building and construction companies to test, if a certain combination of technologies, materials, and practices will meet the minimum EPC norm. In principle the EPC norm allows for relatively easy determination of the (technical) additionality of new energy efficient buildings. The technical additionality (e.g. 0,1) would then be the difference between the minimum required EPC score (e.g 0,8) and the actual calculated EPC score (e.g. 0,7). However, policy evaluation studies have shown that (especially) in the past the EPC minimum norms could be achieved with relative easy measures, and with existing technologies and practices. In those cases, both technical and economic additionality of the energy savings could be questioned, since suitable technologies were already on the market, which in quite a few cases even led to lower building and constructions costs. However, with the EPC norm becoming stringent, several technologies and measures are now being introduced, which are increasingly uneconomic, meaning that such initiatives have a higher degree of additionality.

The EPC and WWS in itself have a low contribution in terms of materiality. For the building and construction sector the EPC score of a new building is 'just one more' variable that has

to be taken into account when developing a new building on top of all kinds of technical norms, and safety standards. Also for determining a fair rent price for non-liberalised sector houses, the WWS includes the EPC just as one of the scoring variables. In addition the EPC and WWS in itself do not foster energy savings investments, but try to assign a more prominent weight and economic value to the energy performance of buildings. If and when the economic impact of the energy performance of a building (e.g. low energy efficient house can charge a significantly lower rent; or, house buyer can bargain for a lower price on a low energy efficient house) is high enough some investments might be triggered. Again in most cases for energy savings activities it is likely that a combination of a minimum of 2 or more policy instruments is used; resulting in a problem with allocating the impact to a certain measure.

**Table 8.9: General features of regulatory standards**

Policy measure	Type of measure	Calculation method savings (baseline setting & benchmarking method)	Additionality requirements & determination (calculation method)	Materiality and double counting (qualitative info)
<b>EPC and LenteAkkord</b>	Regulations & Agreements	There is an extensive EPC calculation methodology (and supporting tools) available (see source 3). The EPC in its basic form is an index that comprises of different technical parameters. These technical parameters will need to be described in detail, such as the insulating value of certain materials used in roofs, walls, floors, etc., but also energy performance characteristics of tapwater, ventilation installations. The EPC norm assigns a certain weight to each parameters in order to obtain the final index. The minimum performance norm per building type/category is leading, and is updated with some regularity as new technologies and practices enter the market. Since the EPC is an index with several weighted technical parameters, it is not always easy to calculate the energy savings, since also renewable energy technologies are weighted in the EPC. If a baseline would have to be determined, then it could be based on the minimum EPC performance norm of the previous period (see timeline column G-2).	A 2010 evaluation study indicated that the step from EPC 1,0 to 0,8 was not considered to result in real innovations, but did lead to the changes in the technologies and materials that are used in new building construction. Still the technologies and practices used were considered rather conventional. Also there have been questions with regards to whether the ex-ante calculated EPC performances are actually achieved in real practice (no ex-post calculations are performed). The EPC instrument itself, combined with the economic crisis (that also hit the building and construction sector) has given this sector a drive in the right direction, where sustainable building concepts seem to be able to survive in the longer run, relative to conventional methods.	Materiality is ensured as the building and construction company has the burden of prove for showing the EPC performance of a new building plan. As a result project developers have to consider the EPC in their design and development stages (before getting an environmental permit).



<b>Woningwaar deringstelsel</b>	Regulations & Agreements	Deemed energy savings, as the scheme does not support individual projects of initiatives. Also not all landlords / tenants / housing associations have standardized monitoring and reporting schemes in place, although housing associations generally have an overview of the energy labels of their building stock. Within initiatives such as 'Stroomversnelling' several housing associations are investing in improving energy performance of buildings, by applying 3 principles 1) tenants pay their energy costs to the corporation, 2) corporations invest that money into energy performance improvements, and 3) building companies provide low-cost retrofitted buildings with low- to no energy consumption.	Given the focus on the category of social housing (EUR 710 monthly max. rent threshold, and maximised annual income of about 32.500 EUR the additionality of the investments could be slightly higher relative to normal conditions. Moreover, in general the split incentive problem (tenants will have lower energy bill, but corporations cannot freely and proportionally increase rents as a result of additional costs/investments), contributes to higher additionality performance relative to private home owners who also live in the same building.	The linking of the WWS with the energy labelling (making rents more dependent on the energy performance of buildings) does not guarantee any materiality, as it is - at best - an indirect financing instrument. The maximum level of extra rent that could be charged, should be sufficient to trigger the investments in energy performance improvement measures. So, if the 'incentive' in isolation is strong enough to trigger such investments is questionable, since the WWS system also includes other factors that affect the maximum rent corporations can charge.
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### 8.2.3 Fiscal measures and subsidies

Both the temporary VAT reduction and the EIA are generic instruments that stimulate investments in certain desirable activities amongst which also energy savings investments. Subsidy schemes are generally more focused on (or earmarked for) specific target groups or activities. The two fiscal instruments do not oblige stakeholders to perform some form of monitoring and reporting, and as such (ex-post) deemed savings, based on aggregated data (e.g. total investment per technology category) can only be calculated.

The EIA applies certain economic norms (in ranges) that are expressed in the volume of energy saved (in Nm<sup>3</sup> natural gas equivalents) per EUR invested. These range norms disqualify investments with a too high return on investment and ensure a higher level of additionality, but also set a limit on specific investments that have a too low expected energy savings performance per EUR invested.

With most fiscal instruments and subsidies one could generally question if and to what extent certain energy savings investments can be considered additional in time. In many cases the fiscal stimulus or direct subsidy might help to make some invest earlier than otherwise would have been the case. However, the investments could just as well have been made somewhat later in time making it hard to determine the true additionality. In such cases it is also sensible to validate the real objective of a certain policy instrument. For example, the temporary VAT exemption for energy savings activities in the built

environment was primarily designed to provide a (temporary) stimulus the building and construction sector, which was heavily affected by the financial and economic crisis. Although those investments might have been made later in time, the fact that such investments were made earlier during a financial and economic crisis should ensure a higher level of economic additionality. For these types of measures, materiality is generally higher since the schemes are linked to or earmarked for specific investments and activities.

**Table 8.10: General features of fiscal measures and subsidies**

Policy measure	Calculation method (baseline setting & benchmarking method)	savings & determination method)	Additionality requirements & (calculation method)	Materiality and double counting (qualitative info)
<b>Energy Investment Allowance (EIA)</b>	Benchmarking is done based on the assumption of old technologies / practices being replaced. For replacement of a capital good (bedrijfsmiddel) the historical energy use is used as a reference. With a new building or expansion the average (default) energy use of equivalent technologies used in that branch are used as reference. The latter results in a certain weighted average (default) Energy Savings coefficient resulting in an energy savings (expressed in natural gas equivalents; default conversion factors are used). Investments must also meet certain norm savings expressed in savings per EUR invested in order to be eligible for the EIA. The norm for buildings for instance is 0,2 to 1,0 Nm3 savings per EUR invested, and for cars it is 0,2 - 0,8 Nm3 saved per EUR invested. The guidance does not seem to be very clear on which reference period should be applied (could be one year period before investment, or any other time unit)		For some stakeholders the existence of the EIA scheme has put them on track to start investing in energy saving technologies, but there are also stakeholders who would have invested disregarding of the existence of the EIA. The percentage of free-riders is estimated to lie within the range of 44%-64%, which means that additionality performance (on average) is about 50%, which is estimated to be equivalent to about 500 mln Nm3 of real additional savings in natural gas consumption.	Materiality is ensured as investments are made. Only actual investments (and prove of that) are considered eligible under the scheme. While free-riders (additionality) is accounted for, there is no check on double counting, since the EIA can be combined with other instruments: such as MEE and MJAs, but interactions can also occur with Environmental Management Act, SDE(+) / MEP, EU ETS, and MIA/VAMIL; more interactions with regional support schemes can also occur. EU ETS has potential to reduce effectiveness of EIA, since ETS can also trigger EE savings investments. SDE/MEP feed-in subsidies were aligned with EIA, and EIA is aligned with MIA/VAMIL so that these instruments do not accumulate. Double counting could occur, if and when EIA and MEE or EIA and MJAs are combined. However, EIA is a financial instrument, and MEE/MJA is voluntary (non-financial instrument. Therefore it is the intention to combine these instruments.
<b>EUR 400 million subsidy for housing corporations</b>	-			
<b>Reduction in VAT in construction</b>	Deemed savings method, as tax authority does not ask for monitoring and reporting of energy savings.		Additionality is not ensured, but the temporary nature of the measure indicates that the building and construction sector (as well as households) are in recession and are reluctant to invest. Any investment might have occurred at some point in the future as part of regular maintenance and refurbishment cycles, so investments are made earlier than would otherwise	Materiality effect is questionable with some institutes claiming increase in offers and some do not observe any effects.

## 8.2.4 Lending facilities

Lending facilities provide finance to stakeholders for certain desired investments. Deemed savings can only be calculated, since both lending facilities do not ask for reporting specifically on energy savings achieved (such monitoring would increase the transaction costs of the lending facility). Deemed savings are typically derived from aggregate data for specific investment categories in combination with typical savings performances per technology / category.

Such lending facilities are quite often used in combination with other policy instruments (e.g. EPA advice, voluntary agreement, etc.), which makes it difficult to determine the ‘policy additionality’. On top of that, the economic additionality for some technologies and practices funded by such lending schemes can be questioned. The reason for this is that many investments in technologies in energy savings are off the shelf and often have a good return on investment. Still, stakeholders with a good solvency position, but a (temporary) poor liquidity position might benefit from lending facilities and engage in investments that can be considered additional (even though this would be a standard off-the-shelf technology).

Just as with fiscal measures and subsidies, the lending facilities only provide conditional or earmarked finance for specific investments, which should ensure a higher level of materiality.

**Table 8.11: General features of lending facilities**

Policy measure	Calculation method (baseline setting & benchmarking method)	savings & determination method)	Additionality requirements & (calculation method)	Materiality and double counting (qualitative info)
<b>Green Scheme</b>	<b>Funds</b>	Project plans asking for 'green funding' have to meet specific requirements, but are not reporting on energy savings in quantitative terms. In buildings refurbishments a minimum improvement of 4 energy label steps is required. For investments in micro-chp equipment and space heating (heat pumps) no energy savings information is requested. For public lighting and heat grid operators some quantitative savings estimate needs to be provided in the project plan.	No additionality accounting or check is performed, but it is likely that this scheme has free riders, just as with the EIA (comparable scheme), and/or a certain share of the investments are non-additional.	Project initiators who want to make use of the scheme are requested to indicate if subsidies have been received for the project. Combining the scheme with other instruments is possible, so EIA and this scheme could be used together.

<b>Revolving funds</b>	No official and standardized monitoring, reporting and accounting protocol in force. So, deemed savings are likely to be calculated based upon aggregate data. Real savings would require monitoring on a case-by-case basis.	Additionality is not ensured in this scheme, as - at best - the schemes results are based on deemed energy savings. As a result the claimed results cannot be validated. Some corrections for the non-additional activities should also be incorporated in the deemed savings calculations.	Materiality of the scheme is quite high (not 100% sure), as loans granted are earmarked to be spend on measures to improve the energy performance of buildings. Double counting with other schemes could occur, but this can only be determined on a case by case basis.
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## 8.2.5 Activity coverage, target setting and implementation specifics

A large share of the selected policy instruments (partially) targets the built environment (RGB, EIA, VAT reduction, subsidy, agreements, WWS, and EPC). For several industries and SMEs there are specific subsector covenants, that – in most cases can also be used with other policy instruments. The table below provides a more detailed overview of the way in which targets are set per instrument, as well as the key eligible technologies and which parties are targeted by the instrument.

**Table 8.12: Activity coverage of policy instruments**

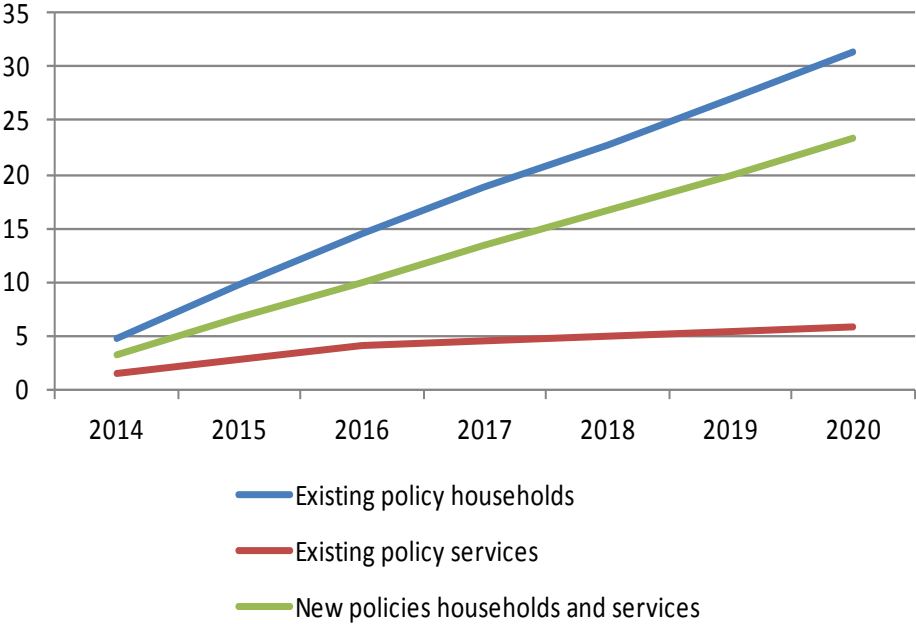
<b>Policy measure</b>	<b>Subsectoral coverage</b>	<b>Eligible technologies</b>
<b>Long term agreement on energy efficiency in ETS companies (MEE)</b>	Energy intensive industries	In principle all measures resulting in primary energy savings. Within the MEE framework, entire lists of possible measures (generic measures and subsector specific measures) have been developed which can be used as a reference.
<b>Long term agreements MJA3</b>	Industry / commercial sector	A broad range of technologies and practices related to process-efficiency, production pathway (supply chain) efficiency, product chain efficiency, production and purchase of renewable energy.
<b>Green Deals</b>	All sectors, where renewable energy and energy savings are possible, but there are also green deals on non-energy topics, such as biodiversity, water management, etc.	The green deals do not focus specifically on technologies, but aim to remove policy and market barriers for such technologies. The innovative character of the green deals is estimated to be relatively low, since there is a focus on existing technologies.
<b>Rijksgebouwdienst - E2020 ambition</b>	Public buildings	All conventional building and construction technologies and practices, and measures that improve the energy performance, such as insulation materials, renewable energy technologies, etc. An important first step in this process was to reset and optimise the existing building climate systems of the RGB for 210.000 m <sup>2</sup> of working spaces in State Buildings. Other measures include innovative applications of integrated solar pv roofs, and other experiments.

<b>Voluntary agreement with housing corporations / Covenant Energy Savings with social housing corporations</b>	Residential sector (existing buildings)	Broad set of eligible technologies, ranging from insulation materials, but also renewable energy technologies, such as solar panels. However the focus of the agreement also seems to focus on lowering the total cost of housing for the renters, which means that the measures taken should really result in lower costs. If that is not the case, the agreement called 'Woonlastenwaarborg' will cause that housing associations cannot increase rents proportionally (this for example could be a problem with district heating systems, which are generally equally expensive relative to conventional heating methods).
<b>Blok voor Blok</b>	Residential sector (existing buildings)	Broad range of technologies and practices are eligible. However, since the blok-by-blok program is not a financing scheme, the terms and conditions of the financial instruments used at a local level also determine which technologies are considered to be eligible.
<b>Policy measure</b>	<b>Subsectoral coverage</b>	<b>Eligible technologies</b>
<b>EPC and LenteAkkord</b>	Residential sector (new buildings)	All conventional building and construction technologies and practices, and measures that improve the energy performance, such as insulation materials, renewable energy technologies, etc.
<b>Woningwaarderingsstelsel</b>	Residential sector	This is an indirect instrument, which should trigger social housing corporations to invest in improving the energy performance of their buildings. This does not necessarily imply that only energy saving measures apply. Also renewable energy technologies, such as district heating and solar panels could improve the EPC, but do not necessarily reduce energy costs of a building, meaning that the measures do not necessarily translate in lower or equal cost level for social renters (if rent goes up and energy expenses remain at same level, than cost of ownership increases).
<b>Policy measure</b>	<b>Subsectoral coverage</b>	<b>Eligible technologies</b>
<b>Energy Investment Allowance (EIA)</b>	All sectors (excluding households, public bodies and non-profit organisations)	So-called energy list with eligible investments / measures is published (and updated) every year.
<b>EUR 400 million subsidy for housing corporations</b>	Residential sector (existing buildings)	-
<b>Reduction in VAT in construction</b>	Residential sector (existing buildings)	<a href="http://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/btw/tarieven_en_vrijstellingen/diensten_6_btw/werkzaamheden_aan_woningen/verbouwen_en_herstellen/werkzaamheden_die_tijdelijk_onder_het_6_procent_tarief_vallen">http://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/btw/tarieven_en_vrijstellingen/diensten_6_btw/werkzaamheden_aan_woningen/verbouwen_en_herstellen/werkzaamheden_die_tijdelijk_onder_het_6_procent_tarief_vallen</a>
<b>Policy measure</b>	<b>Subsectoral coverage</b>	<b>Eligible technologies</b>
<b>Green Funds Scheme</b>	Construction sector	There is a broad range of possible project categories (including energy savings). See: <a href="http://www.rvo.nl/subsidies-regelingen/projectcategorie%C3%ABn-regeling-groenprojecten">http://www.rvo.nl/subsidies-regelingen/projectcategorie%C3%ABn-regeling-groenprojecten</a>
<b>Revolving funds</b>	Residential sector (existing buildings)	A combination of energy saving measures and renewable energy production technologies is eligible for financing.

From the 13 selected instruments, there are 8 policy instruments that directly target the built environment, and there are 2 more instruments with a cross-sectoral coverage, which also might target stakeholders in the built environment. This high number of instruments

targeting various stakeholders in the built environment is illustrative for the complex and fragmented nature of this ‘sector’. However, with that many instruments targeting one specific (sub) sector, there is an increasing risk that policy instruments either overlap or interact. This creates potential problems with in evaluating the assessing the overall effectiveness of individual instruments since other instruments might have contributed to achieve the (deemed) energy savings as well. Moreover, in the Netherlands – but also in a number of other EU member states – policy makers have the strategy of deploying a package of policy instruments that work together in order to achieve the desired level of energy savings. Although there are good reasons for deploying a package of instruments for one common target, it makes it harder to isolate the net contribution of a single policy instrument to energy savings.

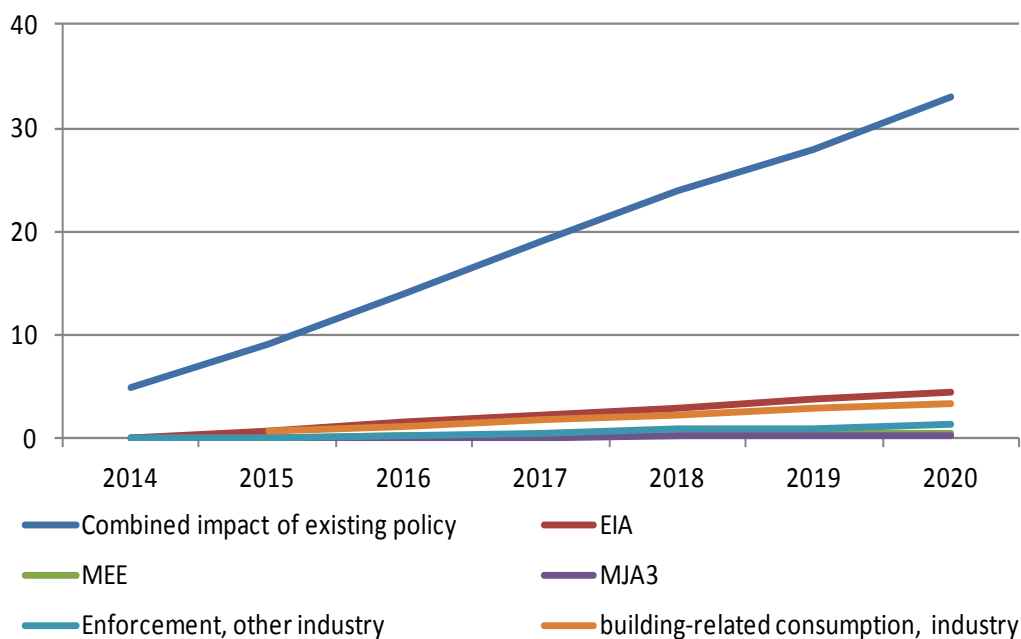
As a general understanding of the expectations of these policy instruments, based on official data, the mix of policies addressing the built environment (including all relevant instruments there) is expected to generate substantial savings in the Dutch economy (around 122 PJ primary energy savings in 2020) [2]. In terms of final consumption, the total effects of the existing and new policies are presented below



**Figure 8.3: Final energy savings in households and services (PJ) in 2020**

*Source: Article 7 notification (2013) [11]*

Similarly, the total expected final energy savings in the industrial sector range from 108-220 PJ in 2020.



**Figure 8.4: Final energy savings (PJ) in 2020 in industry**

*Source: Article 7 notification (2013) [11]*

## 8.2.6 Adaptation of policy measures

Most of the existing instruments have undergone several redesigns since their first implementation. In very few cases there have been fundamental re-designs of the instruments, which resulted in the basic instrument to be quite similar through time. Quite often, the net effect of even small policy instrument changes can be quite significant on market stakeholders.

There are agreements with a longer history, and also agreements which are quite new. Re-design frequencies are moderate to low, while drivers for re-design generally are a result of a joint conclusion that agreed targets might not be met and additional resources could be needed. In such circumstances, these basic (voluntary) agreements serve as a good platform for further negotiations.

Regulatory standards generally have a longer history, and have undergone several smaller and larger changes to its design and net effect. The EPC methodology for example was fundamentally updated once, to better suit the current market conditions. This has resulted in a pre-update EPC era and a post-update era, where the actual EPC scores cannot be easily compared. Main drivers for redesign here relate to a higher ambition as regards to energy savings.

Fiscal measures generally have a longer history relative to subsidies, which have a more temporary (or sometimes one-off) character. Frequency of redesign for fiscal measures can

be annually when the public budget plans of the national government are revised. Drivers for re-design generally are either temporary additional support for a specific sector or purpose (higher net incentive), or public budget cut-backs (lower net incentive).

Lending facilities tend to exist for longer periods of time, as for most energy savings activities there is a structure need for finance. Redesign frequencies are somewhat lower, but the effectiveness of the green-funds scheme is sensitive to the net tax benefit for those individuals who provide the 'green funds'. In case the lending facility is linked to a fiscal incentive, the instrument is sensitive to increased ambitions (higher net incentive) or public budget cut-backs (lower net incentive).

**Table 8.13: Adaptation of policy instruments**

Policy measure	Timeline of policy instrument
<b>Long term agreement on energy efficiency in ETS companies (MEE)</b>	MEE agreement signed on 2 October 2009, and will be in force up until 2020.
<b>Long term agreements MJA3</b>	MJA 1 started in 1992 and ran until 1998, MJA 2 started in 1998 and was converted into MJA 3 during 2005. MJA3 will run up until 2020.
<b>Green Deals</b>	In October 2011, about 73 green deals were signed by national government and private stakeholders.
<b>Rijksgebouwdienst - E2020 ambition</b>	The RGB as such exists for a long period, but the E2020 plan, was initiated in 19xx as part of the xxx 'Schoon en Zuinig' agreement of 2007.
<b>Voluntary agreements with housing corporations / Covenant Energy Savings with social housing corporations</b>	Since it is part of the working programme 'Schoon and Zuinig', the plan started in October 2008. Covenant was updated in 2012.
<b>Blok voor Blok</b>	Scheme started mid-2011, and is still running in 2015. The overall objective is to upgrade at least 23.500 buildings. The idea is to stimulate the formation of consortia that will be active in a municipality to improve the energy performance of at least 1500 - 2000 buildings.
Policy measure	Timeline of policy instrument
<b>EPC and LenteAkkoord</b>	In 1995 the so-called Energy Performance Norm was introduced. As per 1 January 2006 a minimum EPC of 0,8 for new residential dwellings (as part of the 'Lente-Akkoord', in subsequent agreements the EPC norm was updated, with an EPC of >0,6 as per 2011, and >0,4 as per 2015. Minimum EPC norms for different building types are in force (see source 2).
<b>Woningwaarderingsstelsel</b>	As per 1 July 2011, the EPC performances of buildings have become an integrated element in the WWS system, and this means that the determination of rent for non-liberalised sector houses is differentiated per energy performance of the building (higher label enables higher rent).
Policy measure	Timeline of policy instrument
<b>Energy Investment Allowance (EIA)</b>	Instrument is already in place since 1997 and has since then not fundamentally changed. The eligible technologies on the list and the rebate percentages have changed, but its function as a tax rebate instrument on an eligible investment has remained.
<b>EUR 400 million subsidy for housing corporations</b>	See Covenant Energy Savings with social housing corporation.
<b>Reduction in VAT in construction</b>	Temporary measure (1 March 2013 to 1 July 2015) where VAT on labour (not materials) for energy efficiency measures is lowered from 21% to 6%



Policy measure	Timeline of policy instrument
Green Funds Scheme	Scheme operational since 1995, and provides investors with cheaper loans to execute certain 'green' investments.
Revolving funds	In effect as per 21 January 2014.

## 8.3 Estimated results of alternative measures

Information on the total administrative costs as well as the total investment costs for the existing measures was sparsely available. Even in cases where the administrative or the investment costs for the entire scheme are clear, most schemes determine the cost effectiveness per EUR spent/invested based upon deemed energy savings. As a result those cost-effectiveness results should be interpreted with care. Moreover, especially for sectors which are target by multiple instruments, the net cost-effectiveness could even be lower, since the total deemed savings would need to be allocated to different instruments.

More specific information about the cost-effectiveness of the various instruments is provided in the table below (as far as available).

**Table 8.14: Estimated results of policy instruments**

Policy measure	Cost-effectiveness (EUR transaction / administration costs per savings)	Cost-effectiveness (EUR investments per savings)
Long term agreement on energy efficiency in ETS companies (MEE)	NL Agency (now RVO) reported costs of 19,5 mln. EUR for the 2008-12 period, while MEE companies (aggregate estimate) spend 1,5 mln EUR in 2010-12 period. Considering that these costs can be attributed to the first round of energy efficiency plans (with 35 PJ of recorded gross savings for 2010-12 period), the cost effectiveness is estimated at (EUR 21 mln. / 35 PJ) = 0,6 EUR/GJ (primary).	No information available.
Long term agreements MJA3	Executive costs of the scheme (operated by RVO) amounted up to 15,3 mln. EUR per annum throughout the 2008-2012 period. Estimated to be 0,78 EUR/GJ primary energy saved. When corrected for additionality (50%), this will be 1,56 EUR/GJ saved.	Environmental Management Act prescribes that EE measures with a payback period of <5years should be implemented (such a criterion is difficult to enforce). In real practice several MJA sectors apply only measures with an even shorter pay-back period, which in some cases is rational given international competitiveness. This behaviour can be expected to increase for sectors and measures with a high capital intensity.
Green Deals	Unquantified, but public money from national, regional and local authorities is being used to facilitate the green deal process. The ex-ante evaluation study (source 2) for energy savings in the built environment refers to the block-by-block agreement, as the operational framework for this green deal.	n/a
Rijksgebouwdienst - E2020 ambition	n/a	n/a

<b>Voluntary agreements with housing corporations / Covenant Energy Savings with social housing corporations</b>	n/a	Unknown, as the type and variety of investments is high some measures might be highly cost-effective and some not. Overall the scope of cost-effective measures is limited by the accepted level of increase in rents. Rent increases are regulated for this sector, so some investments might thus not be economical.
<b>Blok voor Blok</b>	The national government has committed 15 mln. EUR and 2,5 mln. EUR thus far to facilitate the blok-for-blok process (support platform, some process funding, etc.). The quantitative effects are currently not specifically monitored, and effects are measured based upon energy label step upgrades (to a minimum upgrade to B, with at least 2 label steps). The energy label, as such is not a very good indicator of the actual energy performance of such a building. With the implementation of the smart meters in the Netherlands, there is a potential to start to monitor the real energy performances.	This is not a financing instrument, it is questionable if any additional savings can be claimed as a result of this scheme. If savings are created, these performances will - for the largest part - attribute to the financing measure used (e.g. EIA, Green FUNDS, loans, revolving funds, etc.)
<b>Policy measure</b>	<b>Cost-effectiveness (EUR transaction / administration costs per savings)</b>	<b>Cost-effectiveness (EUR investments per savings)</b>
<b>EPC and LenteAkkoord</b>	Administrative costs for local authorities, involve granting environmental and building permits, as well as enforcing. But not all of these costs, are additional or can be fully attributed to the EPC norm costs.	The 2010 evaluation study indicated that a building with EPC 0,8 could even be cheaper (in terms of construction costs) relative to an EPC 1,0 building. Since, in many cases, still conventional technologies and practices (non-innovative) are used to comply with EPC norms, one could wonder of the investments are truly additional, and thus whether normal autonomous developments would have delivered the same results. Any estimate of cost-effectiveness of the investments is therefore questionable. A 2013 evaluation study indicates that the adjustment from EPC 0,6 to 0,4 will result in investments with negative net present values, meaning that (according to specific assumptions; 5,5% interest and 30 year period) the additional investments will not be repaid. This implies for the building company that the higher sales premium the buyer has to pay for an EPC 0,4 building is not sufficiently offset by a lower energy bill, and lower other expenses. For some buyers this might not matter, as investments in houses or buildings are not always considered commercial investments.
<b>Woningwaarderingstelsel</b>	Costs of the scheme are deemed negligible, since it only included a legislative change. Not (yet) sure which competent authority supervises the proper operations of the WWS system.	n/a
<b>Policy measure</b>	<b>Cost-effectiveness (EUR transaction / administration costs per savings)</b>	<b>Cost-effectiveness (EUR investments per savings)</b>

<b>Energy Investment Allowance (EIA)</b>	An estimated 3,5 mln EUR per annum to run this scheme, while private stakeholders typically spend about 104 EUR per EIA application. For the period 2006-10 this comes to an administrative costs of 0,27 EUR per GJ primary energy saved.	Total CAPEX in 2006-2010 period was 5.509 mln EUR. Total primary energy savings was 4.349 mln Nm3 of natural gas equivalents (incl free riders) and 2.801 mln Nm3 (excl. Free riders). This results in an average cost-effectiveness of about 62,14 EURcapex/GJ of additional primary energy savings. Public spending (loss in tax income) is estimated to be 695 mln EUR for 2006-10 period, resulting in a cost-effectiveness of 7,84 EUR per GJ of primary energy saved.
<b>EUR 400 million subsidy for housing corporations</b>	-	-
<b>Reduction in VAT in construction</b>	Avoided tax income. But some other institutes also claim that thousands of jobs have been preserved.	Unknown, as there is no central registry of all measures falling under this category; and also not actual energy savings are monitored. Deemed (top-down) estimate based on sampling method is the best way to provide some quantitative information.
<b>Policy measure</b>	<b>Cost-effectiveness (EUR transaction / administration costs per savings)</b>	<b>Cost-effectiveness (EUR investments per savings)</b>
<b>Green Funds Scheme</b>	A total of 137 mln. EUR in 2011, and 167 mln. EUR in 2010. These costs represent 'losses' to the state tax authority due to lower capital taxation for private stakeholders who want to engage in green savings, and a small fraction of those costs represent executive costs. Other public costs/benefits, such as increased revenues from corporate taxation or income taxes are not included in these figures.	Savings not quantified, but environmental cost-benefit analysis is performed by CE Delft (see source 1); and "Every EUR of public funds spent generates a private investment of 40 EUR", so savings are not directly quantified (so deemed savings) - see source 3.
<b>Revolving funds</b>	No data available, but the scheme is quite similar in set up relative to Green Funds scheme, which is also a lending facility.	No data available, but the scheme is quite similar in set up relative to Green Funds scheme, which is also a lending facility.

## 8.4 Observed or Potential Implementation Barriers/Risks

Aside from any political risks associated with non- or reduced availability of public funds, or reduced fiscal or financial incentives, there are also a range of barriers-risks that arise from the market. Such risks include potential loss of international competitiveness, external shocks for instance in the financial capacities of regulated stakeholders.

For some agreements and/or sector that are competing internationally, it might not always be rational to be at the forefront of energy savings activities. Additional investments (above the EU or global average) could deteriorate the financial position of these sectors / industries, while the market situation might not so that all funding is required to manage day-to-day operational processes. In general, for most fiscal measures, subsidies, lending facilities, it can be stated that the current market (and financial and economic) position of the regulated stakeholders is an important determinant of the willingness to invest in energy savings. For example, in addition to a responsibility to ensure energy savings in their building

stock, social housing corporations also need to secure funding for other priorities, such as technical measures for (e.g. fire, health) safety and regular maintenance (e.g. plumbing, painting). For most financial instruments certain minimum conditions for the financial health of the regulated stakeholders apply. In some cases, the offered incentive (notably for lending facilities) do not provide an added value as compared to more regular financing options (e.g. increasing the mortgage for energy saving investments for house owners instead of using a revolving fund; or normal commercial finance).

Another category of barriers relates to technology implementation barriers that can range from ‘lack of information / knowledge’, and innovative nature of new technology to technical challenges when integrating new technologies / practices in existing processes. On top of that there can be a series of organizational barriers, which can especially be relevant for energy savings activities that rely on multi-stakeholder processes. Quite often (voluntary) agreements try to fill this gap, but despite the intentions and ambitions certain economic realities of the individual stakeholders can frustrate such multi-stakeholder processes.

**Table 8.15: Potential Implementation Barriers**

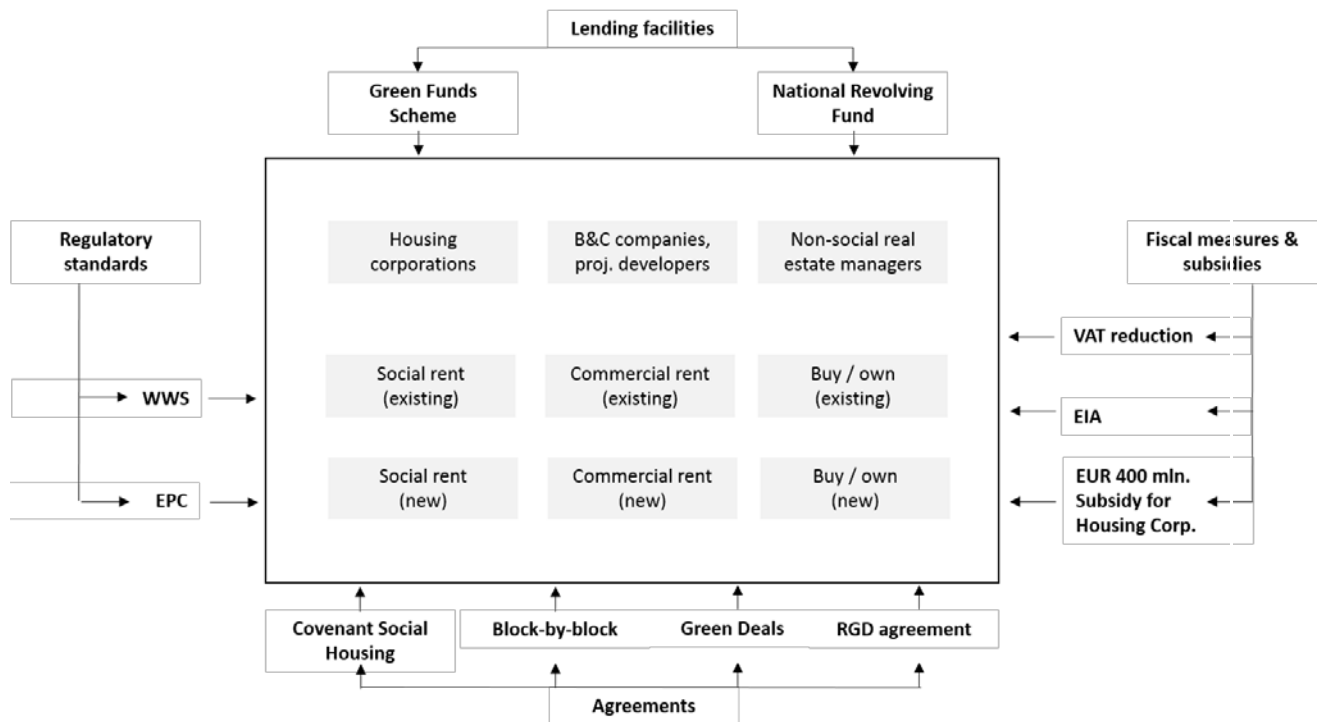
<b>Policy measure</b>	<b>Barriers to implementation &amp; operation to instrument</b>
<b>Long term agreement on energy efficiency in ETS companies (MEE)</b>	Efficiency performance level of many MEE companies is already best in class (worldwide), any further energy efficiency improvements will be viewed within the context of potential loss or gain of international competitiveness. This can be an issue even when undertaking EE investments with short pay-back period as market prices for final product might be low. The role and significance of the MEE is not the same in all sectors. In some sectors it really works, while in some it has only limited effect. Not much is known, about the underlying reasons of this diversified success-failure.
<b>Long term agreements MJA3</b>	Studies / evaluations show that MJA companies (on average) are not performing better in terms of energy savings relative to comparable EU countries. However, it is not certain if this is properly linked to the context, where achieving incremental savings in some MJA sectors might not be easy, as they already are highly efficient. NL glass sector claims to be at top-3 EU glass producers in terms of energy efficiency
<b>Green Deals</b>	In terms of design and operation there are no real barriers to this instrument, as it generally involves limited government finance (some process funding and in-kind funding is generally committed) However, during operation of the green deals, there can be legislative and policy changes proposed by market stakeholders, which will not be granted by the national government (e.g. because a fiscal measure might negatively affect the overall tax income of the state, or might not be perceived as an effective solution, considering other interests).
<b>Rijksgebouwdienst - E2020 ambition</b>	n/a
<b>Voluntary agreements with housing corporations / Covenant Energy Savings with social housing corporations</b>	Financial capabilities of housing corporations might not be adequate to achieve the 2020 target, as efforts need to be upscaled significantly.
<b>Blok voor Blok</b>	A multitude of barriers to refurbishment measures are identified in the various Block-for-block consortia initiatives, such as barriers for locally used financing schemes. Also quite good operational experiences are being exchanged via an online platform to share best practices and experiences.

<b>Policy measure</b>	<b>Barriers to implementation &amp; operation to instrument</b>
<b>EPC and LenteAkkoord</b>	With new technologies and practices being developed the EPC methodology does not always provide a proper reflection of the (weighted) performance of certain measures. In a few events this has resulted in a more fundamental adjustment of the EPC calculation methodology. With the advance from EPC 0,6 to 0,4 a certain tipping point seems to be reached where the economic returns are no longer at accepted levels (of course when applying different interest rates, and other assumptions a positive NPV can be achieved. An important barrier for buildings with a high energy performance level, is not so much the EPC instrument itself, but more the economic consequences resulting from the various decisions (what materials, what energy system, etc.) with regards to the design and planning of the building. In those cases where new sustainable buildings become largely uncompetitive (e.g. higher initial costs are not properly offset by returns.).
<b>Woningwaarderingstelsel</b>	-
<b>Policy measure</b>	<b>Barriers to implementation &amp; operation to instrument</b>
<b>Energy Investment Allowance (EIA)</b>	The use of this instrument has a longstanding tradition, as such there are no large barriers both the implementation and operation of the instrument. In general, there is a government ambition to reduce the costs associated with monitoring and enforcements, and to simplify all kinds of administrative procedures, which at some point might reduce the effectiveness and quality of control and enforcement.
<b>EUR 400 million subsidy for housing corporations</b>	-
<b>Reduction in VAT in construction</b>	No barriers to implementation, as it is a quite simple and straightforward fiscal measure. The operation of the instrument can be affected by the income position of households and the cash/lending capacities of SMEs, which has deteriorated in the past few years, generally resulting in a lower priority being assigned to energy saving investments.
<b>Policy measure</b>	<b>Barriers to implementation &amp; operation to instrument</b>
<b>Green Funds Scheme</b>	No significant barriers to implementation are identified. However, in operational terms there are quite some barriers that might affect the effectiveness of the instrument. The capacities of 'green funds' to attract private capital is affected by general capital and money market developments where alternative savings products are available to consumers. If competing alternatives exist, the green funds, can only pass through a lower interest rate discount to investors (in fact this discount has decreased from 1,2% to 0,9% on average, and results in an exponentially higher own capital requirement for the investor. Also the currently (very) low interest rates on the capital markets do not provide much more room to pass through an even further interest rate discount (which in some cases could become negative). In such situations the actual financing is not the biggest issue, but it is more the general level of macro-economic uncertainties that have made lending organisations more risk averse (lending money is relatively cheap but still investments are not picking up).
<b>Revolving funds</b>	No significant barriers to implementation are identified. However, in operational terms there are quite some barriers that might affect the effectiveness of the instrument. Competing alternatives do exist, i.e. increasing the mortgage might be a better solution in some cases. The currently (very) low interest rates on mortgages are quite similar to the interest rates offered on the 7 - 10 - 15 years loans of the scheme. If a house-owner is willing to invest, he could choose between the revolving fund, or simply increase its mortgage. Which option is best depends on the possibility to deduct the interest from the income taxes and whether or not the revolving fund loan will undergo similar creditability checks as applied by mortgage providers. As per 01-01-2015 the conditions for mortgages have changed making it harder to lend money for buying and refurbishing a house. So, in theory this instrument could not be very effective at all, as it does not have a clear advantage over existing financing possibilities.

## 8.5 Conclusions

The Netherlands uses a large set of predominantly existing instruments in its efforts to reach the national EE target. It can be observed that the various stakeholders in most sectors are targeted by at least two or more policy instruments. Most individual instruments do not make use of ex-post metered and reported monitoring protocols, but produced energy savings estimates (deemed savings) based on a set of default values and other parameters. Deemed savings are corrected for non-additionality at the aggregate (sectoral or national) level, but not for individual instruments. It can be observed that the Netherlands has a relatively large number of instruments, where in most sectors it is the strategy to deploy a package of different policy instruments, which altogether are expected to result in additional energy savings that contribute to reaching the EE 2020 target. The drawback of such an approach is that it is difficult to allocate the deemed energy savings to an individual policy instrument. The advantage however, is that when considering deemed savings achieved per policy package there is a lower risk of double counting, and the estimate of the cost-effectiveness of the policy package would also avoid any (arbitrary) impact allocation to individual instruments.

To illustrate the above, a simplified graphical overview of the various policy instruments that (partially) target the built environment is provided in the Figure below. The Figure (central box) shows the different segments of the built environment (social housing, commercial rent, and direct ownership, for both new and existing buildings). A number of key stakeholders (housing associations, building and construction companies, and private house owners /real estate managers) are also included. On each side of the box there are a number of policy instruments targeting specific (and sometimes overlapping) segments of the built environment.



**Figure 8.5: Policy instruments targeting stakeholders in the built environment**

Since there are stakeholders in the built environment that are targeted by a combination of instruments it is methodologically challenging to allocate a specific part of the energy savings to an individual instrument. However the risk of double counting would be avoided.

The way in which any corrections of the deemed savings for non-additionality will be accounted for, strongly depends on the interpretation of the additionality concept.

- I. Policy additionality; the extent to which the energy savings of a certain action could only be achieved by the use of this single instrument,
- II. Technical additionality; the extent to which certain energy savings technologies are applied that perform better than the current state of the art (high degree of innovation),
- III. Norm-based additionality; closely resembles technical additionality, but generally stipulates a minimum technical performance and does not necessarily promote the use of more innovative technologies,
- IV. Economic additionality; relates to whether or not an energy savings investment would have been made without the use of the instrument. This requires a more thorough understanding of macro-economic developments, and financial-economic position of targeted stakeholders

The issue of ‘policy non-additionality’ resembles the double-counting issue, and can be largely solved by considering deemed saving per policy package instead of per individual instrument.

The issue of 'technical non-additionality' can be tackled by frequently updating the list of eligible (more innovative) technologies. This requires the public bodies to closely monitor technological advancements and innovations in multiple sectors.

'Norm-based non-additionality' can be ensured by setting minimum performance norms or standards (or effectiveness norms or ranges, such as EUR invested per MJ energy saved), also this requires careful monitoring of the developments regarding the latest technologies and technology options.

'Economic additionality' can be ensured by looking more closely at the financial-economic position of the (group of) stakeholder(s) who is making the investment.

Further issues can be discussed in the implementation process in the Netherlands as also demonstrated by Ricardo AEA (2015) [15] and Coalition of Energy Savings [16] in terms of calculations of energy savings targets, methodologies applied, and monitoring and control regime. More specifically, in the baselines calculations the transport is excluded without being stated the exact figures, and there were remarks for the use of non-verifiable corrections for energy production for energy use. Nevertheless, in terms of calculating of cumulative savings target the Netherlands has provided one of the best practices. Concerning the eligible categories of actions and the measurement methodologies there is not a sufficient level of information reported in the notifications. Another point that is interpreted in these reports as weak is the materiality and the way it is addressed and same with the lifetime of savings. Double counting of the policy instruments is stated that it will be corrected but there is lack of information on the method, which is the case for most countries as well with taxation measures. Moreover, the monitoring, verification, control and compliance mechanism together with the auditing process for all policy instruments is not reported adequately. Finally, given the types of policy instruments there are no penalties for non-implementation foreseen.



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## 9.1 Classification of alternative policy measures

The UK originally submitted a list of 19 policies which are intended to deliver the savings required in Article 7 of the Energy Efficiency Directive (HM Government, 2013). This was increased by one in the revised submission of June 2014, giving a total of 20 policies (HM Government, 2014). Three of these are supplier obligations, which leaves 17 ‘alternative’ policy measures. The seven policies described in more detail here are policies in the domestic and non-domestic buildings and industry sectors which are expected to deliver most savings (based on the original submission), and in some cases which are new policy approaches. Between them, they are expected to deliver 85% of the savings from these sectors in the qualifying period (this was 91% in the original submission).

The ten alternative policies which will also contribute to savings, and which are not described further in the main body of this document, are: Home Energy Efficiency programme (Scotland); private and social sector regulation (Scotland); Sustainable Energy programme (Northern Ireland); Climate Change Levy; Climate Change Agreements; Salix public sector finance; Greening Government Commitment; Re-Fit; rail electrification; low emission vehicle policies. These policies and their expected savings are described briefly in Appendix 1.

**Table 9.1: Summary of key UK alternative policy measures**

Policy measure	Type of measure	Principal objective
<b>PI1: Green Deal – household</b>	Financing and incentives	To encourage uptake of additional energy efficiency and renewable energy measures.
<b>PI2: Building regulations – household</b>	Regulation and agreements	To reduce energy consumption in and carbon emissions from the housing stock.
<b>PI3: Green Deal – non-domestic</b>	Financing and incentives	To encourage uptake of additional energy efficiency and renewable energy measures.
<b>PI4: Building regulations – non-domestic</b>	Regulation and agreements	To reduce energy consumption in and carbon emissions from the non-domestic building stock.
<b>PI5: Smart metering (non-domestic)</b>		Multiple objectives, including enabling customers to make energy savings through

		behaviour change.
<b>PI6: Carbon Reduction Commitment Energy Efficiency Scheme</b>	Taxes	To improve energy efficiency and cut emissions in large public and private sector organisations. The purchase of allowances puts a cost on carbon emissions and should therefore encourage participants to invest in energy efficiency.
<b>PI7: Energy Savings Opportunity Scheme</b>	Regulation and agreements	To provide large enterprises with enterprise-specific information about how they can make energy savings; to stimulate the take-up of cost-effective energy efficiency measures.

## 9.2 Analysis of design and implementation features of alternative policy measures

### 9.2.1 Activity coverage

Table 9.2: Sectoral coverage, technologies and obligated parties, UK

Policy measure	Sectoral Coverage	Eligible technologies	Eligible / obligated parties
<b>PI1: Green Deal – household</b>	Residential	Energy efficient building measures, equipment and household-level renewables	Voluntary scheme. Households are eligible for this policy, whether owners or renters with landlord permission.
<b>PI2: Building regulations – household</b>	Residential	Sets requirements on building characteristics and some uses of energy (including for heating, hot water and fixed lighting)	The person carrying out the building work and, if they are not the same person, the owner of the building.
<b>PI3: Green Deal – non-domestic</b>	Commercial & tertiary	Energy efficient building measures & equipment.	Voluntary scheme. Commercial and tertiary organisations are eligible. The policy is not yet fully active.*
<b>PI4: Building regulations – non-domestic</b>	Cross-cutting measure	Sets requirements on building characteristics and some uses of energy.	The person carrying out the building work and, if they are not the same person, the owner of the building.

<b>PI5: Smart metering (non-domestic)</b>	Cross-cutting measure	Policy is meant to influence behaviour through providing better information – no technology-specific components (beyond the smart meter itself).	Gas and electricity retailers, operators, network distribution networks.
<b>PI6: Carbon Reduction Commitment Energy Efficiency Scheme</b>	Cross-cutting measure	By increasing the price of carbon, the policy aims to increase the take-up rates of energy efficiency potential (technological and behavioural). However, there are no provisions to support any particular technologies.	Based on electricity usage. For Phase 2, organizations will qualify if, during the qualification year (1 April 2012 to 31 March 2013), they consumed over 6,000 MWh of qualifying electricity.
<b>PI7: Energy Savings Opportunity Scheme</b>	Cross-cutting measure	All energy-saving options identified in the audit.	Private and non-profit organizations which are not SMEs. Does not apply to public sector.

\* Green Deal Assessments are available for non-domestic buildings but there are no companies currently offering Green Deal loans for these properties.

## 9.2.2 Target setting

**Table 9.3: UK target setting, participation principles, calculation method and flexibility**

Policy measure	Target setting – Energy savings 2014-2020 (TWh)	Participation principles	Calculation method savings	Flexibility
<b>PI1: Green Deal – household</b>	4	Voluntary	Deemed savings	n/a
<b>PI2: Building regulations – household</b>	131	Mandatory	Deemed savings (see below)	None
<b>PI3: Green Deal – non-domestic</b>	3	Voluntary	Deemed savings	n/a
<b>PI4: Building regulations – non-domestic</b>	64	Mandatory	Deemed savings (see below)	None
<b>PI5: Smart metering (non-domestic)</b>	14	Mandatory for suppliers to offer smart meters. SMEs do not	Deemed savings (more evidence being collected to see if current assumptions are	None

		have to accept them.	correct).	
<b>PI6: Carbon Reduction Commitment Energy Efficiency Scheme</b>	26	Mandatory	Deemed savings. Modelled using economic model with assumptions about price response and the number of behaviour and technological options adopted.	No transfer of allowances between phases.
<b>PI7: Energy Savings Opportunity Scheme</b>	15	Mandatory	Deemed savings (assumed percentage savings for energy use not covered already by other policy instruments).	None

*Source: Energy savings from (HM Government, 2014)*

## **PI2 & PI4 – building regulations**

Calculation of overall building energy performance are undertaken using the UK National Calculation Methodology approved for use in transposition of Article 3 of Directive 2010/31/EU. This considers the range of criteria set out within Annex 1 of that Directive and is applied for new dwellings through the UK Government’s Standard Assessment Procedure (SAP) and, for new non-domestic buildings, the Simplified Building Energy Model (SBEM). Calculation of the performance of building elements is demonstrated through reference to the relevant CEN standards (HM Government, 2013).

### **9.2.3 Implementation specifics**

#### **PI1: Green Deal household & PI3 Green Deal non-domestic**

Administrator / institutional set up: Administration on behalf of the Department of Energy and Climate Change (DECC) is run by the Green Deal Oversight and Registration Body (GD ORB) and the UK Accreditation Service (UKAS) (in relation to the Publicly Available Specification (PAS) 2030 and 2031 concerning installing energy efficiency measures and assessments).

Verification and monitoring / Control and compliance: This is a voluntary and not mandatory scheme – there are no targets for uptake which have to be met and so no verification / monitoring / control / compliance arrangements in that sense. There are, however, quality controls on the work which can be funded under Green Deal. The Green Deal Oversight and Registration Body (GD ORB), manages the authorization scheme for participants in the Green

Deal and is responsible for a number of functions aimed at providing effective administration and oversight of the scheme.

The ambitions for domestic sector Green Deal have changed over time, and are becoming harder to discern. In 2013, a government minister mentioned a target of '10,000 Green Deals by the end of the year', but more recently the government has only expressed targets for a combination of the Energy Company Obligation (a supplier obligation) and Green Deal together (with a savings target of 4.5 mtCO<sub>2</sub> (lifetime) from both policies by 2020). A parliamentary committee has called for the government to set out a robust framework through which the Green Deal can be assessed (House of Commons Energy and Climate Change Committee, 2014). Others have also noted this lack of clarity about aims. One well-informed NGO has said "DECC's stated aims and objectives for the Green Deal and ECO variously ...are in a constant state of flux; or are highly opaque and unknown." (Association for the Conservation of Energy, 2014)

**Additionality requirements:** The government argues that without access to Green Deal Finance, the measures funded would not have been installed. Therefore all funded measures are additional. Green Deal Finance is not subsidized, so there should not be a 'free rider' effect.

#### **PI2: Building regulations – household & PI4 Building regulations – non-domestic**

**Administrator / institutional set up:** Building Regulations are set and administered by the Department for Communities & Local Government in England and from 2012 by the Welsh Government in Wales. In Northern Ireland Building Regulations are made and maintained by the NI Department of Finance and Personnel. Building Regulations in Scotland are set and administered, on behalf of Scottish Ministers, by the Building Standards Division of the Scottish Government.

**Verification and monitoring:** Building control bodies check that building work has been carried out according to the building regulations. Building control bodies can either be from the local council or the private sector (called 'approved inspectors').

**Control and compliance:**

**Additionality requirements:** The UK government argues that because building regulation requirements due to Part L 2002, 2006, 2010 and 2013 pre-date the EU Energy Performance of Buildings Directive they are all additional for the purposes of EED. Others dispute this interpretation of additionality, e.g. (The Coalition for Energy Savings, 2014).

#### **PI5: Smart metering (non-domestic)**

**Administrator / institutional set up:** Ofgem - the gas and electricity market regulator (once licence conditions are in force). The Office of Fair Trading also has enforcement powers in

respect of consumer protection.

Verification and monitoring & Control and compliance: These controls are not yet in place, preliminary consultation on options has occurred.

Additionality requirements: In its Impact Assessment the government suggests that for non-domestic customers, the provision of smart metering is already established at larger sites and is increasingly being installed at smaller sites (DECC, 2014d) (p34). For its Article 7 submission the government assumes that without this policy, only 50% of the non-domestic sector would have meters installed by 2030 (HM Government, 2013).

#### **PI6: Carbon Reduction Commitment Energy Efficiency Scheme**

This scheme covers approximately 2000 organizations, together responsible for around 10% of the UK's greenhouse gas emissions.

Administrator / institutional set up: The CRC scheme is administered by the Environment Agency, the Scottish Environment Protection Agency (SEPA), the Northern Ireland Environment Agency (NIEA) and Natural Resources Wales.

Verification and monitoring: Organizations must keep records to validate any information they have submitted about the organization, energy supplies and use. This must be kept in an evidence pack that the regulators can examine during an audit. They must also carry out an internal audit of their records at least once a year. The evidence pack must include an audit certificate signed by a senior officer.

Control and compliance: There are compliance audits, which are carried out by the regulator or their contractors. There are financial penalties for non-compliance, and publication of non-compliance for most offences.

Organizations affected by CRC have to register with the Environment Agency at the start of a phase, for the whole phase. In each compliance year, an organization that has registered for CRC needs to do the following:

- collate information about its energy supplies
- submit a report about its energy supplies
- buy and surrender allowances equal to the CO2 emissions it generated
- tell the Environment Agency about changes to its organization that could affect its registration (designated changes)
- keep records about its energy supplies and organization in an evidence pack

Additionality requirements: In its modelling of uptake of options, the government removes any efficiency improvements which would have happened as a result of other policies which would have overlapped with CRC.

## PI7: Energy Savings Opportunity Scheme

This scheme is estimated to cover 7,300 organizations.

Administrator / institutional set up: The Environment Agency is the scheme administrator for the whole of the UK. The compliance bodies are Environment Agency - England, Scottish Environment Protection Agency - Scotland, Natural Resources Wales - Wales, Northern Ireland Environment Agency - Northern Ireland.

Verification and monitoring: ESOS participants need to provide a notification to the Environment Agency, that they have complied with the requirements of ESOS on or before the compliance date of each phase, through an online notification system. This ESOS Assessment has to be signed off by a company director or equivalent senior manager.

Control and compliance: The scheme compliance bodies will have the authority to apply civil penalties. These include fixed fines, increasing fines per day of non-compliance, recovery of audit costs and publication of details of non-compliant organizations.

Additionality requirements: This scheme is meeting the requirements of Article 8 of the Energy Efficiency Directive, so it seems unlikely to be additional under the terms of EED.

### 9.2.4 Adaptation of policy measures

Table 9.4: UK policies, vintage and re-design

Policy Measure	Vintage of policy measures	Frequency of re-design	Drivers for re-design
<b>PI1: Green Deal – household</b>	Policy introduced in 2013	No major re-designs as yet. However, additional grant funding has been made available periodically (see section 1.3).	Additional grant funding has been used to drive interest in and take up of Green Deal loans (in addition to the grants offered).
<b>PI2: Building regulations – household &amp; PI4 Building regulations – non-domestic</b>	The first set of national building standards were introduced in 1965. Energy standards are set out in the 'Part L' approved document.	Part L was first set out in 1985, and updated in 1995, 2002, 2006, 2010, 2013.	To set higher standards for energy efficiency and carbon saving.
<b>PI3: Green Deal – non-domestic</b>	Policy introduced in 2013 – but not yet fully operational	No major re-designs as yet.	n/a



<b>PI5: Smart metering (non-domestic)</b>	Foundation stage began 2011, mass roll-out stage was to begin end of 2015, recently put back to October 2016.	No major re-designs as yet.	n/a
<b>PI6: Carbon Reduction Commitment Energy Efficiency Scheme</b>	Introduced in April 2010. Phase 1 April 2010 – March 2014. Phase 2 April 2014 – March 2019.	Major redesign in October 2010. Second redesign for Phase 2.	October 2010 re-design was due to concern about over-complicated policy design. The redesign in Phase 2 has simplified the administrative burden for business and reduced costs.
<b>PI7: Energy Savings Opportunity Scheme</b>	New policy, first compliance date is 5 December 2015.	No major re-designs as yet.	n/a

### 9.3 Estimated results of alternative measures

#### PI1: Green Deal – household

Costs Green Deal is an unsubsidized loan programme, so is designed to have low running costs to the public purse. However, there are setting-up costs for a new and complex policy such as this. At present these are unknown, as there are no published figures available on the cost to government and its agents of initiating and running the Green Deal programme.

There have been some additional costs in terms of incentives to take part in Green Deal. DECC has spent £120m on incentives to increase uptake of Green Deal in England and Wales - the Green Deal Home Improvement Fund. This money was quickly taken up by the public, and the fund, which launched on 1st May 2014, closed on 24th July 2014. (<http://gdorb.decc.gov.uk/installers/green-deal-home-improvement-fund>). Another slice of funding of £24m for solid wall insulation was exhausted within 24 hours. In total another £100m will be spent on the Green Deal Home Improvement Fund. <http://www.theguardian.com/environment/2014/dec/11/24m-green-deal-fund-exhausted-in-a-day>

Benefits:

In terms of activity, between May 2013 and October 2014, there have been 390,000 Green Deal Assessments (a household audit) and 7,200 Green Deal Plans (agreement to install efficiency measures using Green Deal finance) (DECC, 2014a). Savings as a result of measures

installed with Green Deal plans have not been separately calculated, but will be minor given the small numbers involved. In addition to this, by end October 2014, around 20,000 vouchers to help pay for measures have been issued from the Green Deal Home Improvement Fund. The government argues that having a Green Deal Assessment may prompt investment in energy efficiency without participants taking up Green Deal finance. Thus far, there is insufficient evidence to estimate savings delivered (if any) from Green Deal Assessments.

#### Cost-effectiveness

Given the low levels of loans taken out under Green Deal, cost effectiveness is likely to be very low at present, but as explained above there is insufficient evidence to make this calculation.

#### **PI2 & PI4: Building regulations – household & non-domestic sectors**

The UK government is counting savings 2014-2020 which have been delivered from three different revisions of 'part L' of the building regulations in 2002, 2006 & 2010, compared with a counter-factual baseline where these regulations were not introduced. This makes assessing costs, benefits and cost effectiveness complex. At the time the regulations were introduced, regulatory impact assessments were carried out for each revision showing a positive cost-benefit analysis (e.g. (ODPM, 2006)). Building regulations are generally recognized as an efficient, equitable and effective policy tool.

#### **PI3: Green Deal – non-domestic**

This policy is not yet fully active – so details are not available.

#### **PI5: Smart metering (non-domestic)**

The expected costs and benefits of smart metering are constantly under review. Both expected costs and benefits have reduced over time, as reported in the five assessments between March 2011 and January 2014 (National Audit Office, 2014). The costs and benefits below are for the whole non-domestic sector, not just the 50% of cases which the UK government is counting as additional for the purposes of Article 7, and are for the period 2013 – 2030.

**Costs:** Total costs of non-domestic smart meter installation are expected to be £0.46bn (central estimate) (DECC, 2014d).

**Benefits:** It is assumed that smart/advanced meters, together with provision of data, reduce energy consumption by 2.8% (electricity) and 4.5% (gas) per meter in central scenarios. (HM Government, 2013). Total benefits are expected to be £2.33bn (central estimate) made up of £1.44bn consumer benefits, £0.46bn business benefits and £0.44bn UK-wide benefits (DECC,

2014d).

The expected carbon savings in the central scenario are 10.28 MtCO<sub>2</sub>. Of these savings 2.30MtCO<sub>2</sub> are in the traded sector – i.e. are included within EUETS - (electricity) and 7.98 MtCO<sub>2</sub> in the non-traded sector (gas) (DECC, 2014d).

Cost-effectiveness: The ratio of benefits: costs for the whole smart metering programme (domestic and non-domestic) has remained fairly constant between the March 2011 and January 2014 estimates, and was assessed at 1.6 in January 2014 (National Audit Office, 2014). The benefit: cost ratio for the non-domestic sector is expected to be much higher, at 5.1. However, care needs to be taken in interpreting this figure, as some of the costs of the smart meter programme are allocated exclusively to the domestic sector, due to the difficulties of splitting costs across the sectors.

Energy saving figures of 18TWh are given in the UK's Article 7 submission for 2014-2020. Costs per kWh can't be accurately calculated, as the cost estimates are given over a different period (2013 – 2030). If costs and energy savings are spread uniformly over these periods, the resulting cost would be 9.9p / kWh (combined for gas and electricity savings).

#### **PI6: Carbon Reduction Commitment Energy Efficiency Scheme**

Costs: Administration costs in 2010-2011: Environment Agency = £3.3 million spent on staff time and IT and other set-up costs (£1.8 million of which came from fees charged to participants, the remainder came from central government), Department for Energy and Climate Change = £1.2 million for policy design and development costs (National Audit Office, 2012).

Costs to organizations: In Phase 1, the allowance price was set by government at £12 per tonne of CO<sub>2</sub>. The value of allowances surrendered was: 2011/12 - £666m; 2012/13 - £670m; 2013/14 - £571m. Some allowance surrenders are still outstanding in the figures for 2013/14 (Environment Agency, 2014).

Benefits: From 2012/13 to 2013/14 there has been a reduction of 5.1% in carbon emissions from obligated organizations (these are actual figures, not weather-corrected). However, there is no evidence as yet that this is as a result of CRC – this will be addressed by the evaluation currently underway (see next paragraph).

Cost-effectiveness: There is currently an evaluation of the CRC underway which will assess the extent to which CRC has delivered reductions in emissions by the take-up of energy efficiency, the barriers and drivers to energy efficiency and the extent to which CRC has addressed these, and whether CRC has delivered abatement in a cost effective manner. The results of the evaluation are expected in 2015 (Environment Agency, 2014).

## PI7: Energy Savings Opportunity Scheme

Costs: The most significant elements of the costs of the policy are the capital and hassle costs of implementing assessment recommendations (£700m over the period) (DECC, 2014b).

Benefits: ESOS could generate annual savings of around 3.0 TWh per year, of which 2.3TWh from buildings and industrial processes and 0.7TWh from transport (which is equivalent to an average energy saving per enterprise of 0.7%). These energy savings are estimated to generate a net benefit to the UK of between £0.7bn and £2.8bn over the period 2015 to 2030 (DECC, 2014b). DECC Guide to ESOS June 2014 suggests that ESOS is estimated to lead to £1.6bn net benefits to the UK , with the majority of these being directly felt by businesses as a result of energy savings (DECC, 2014c).

Cost-effectiveness: These projections suggest a benefit to cost ratio of (1600 +700 ):700 (total benefits = net benefits of £1.6bn (1600m) plus costs of 700m, compared with costs of 700m) or 3.3:1.

## 9.4 Observed or Potential Implementation Barriers/Risks

Table 9.5: Risks and barriers, UK

Policy measure	Broader feasibility risks and implementation barriers	Double-counting, materiality and/or eligibility risks
<b>PI1: Green Deal – household</b>	There has been much lower than expected uptake of Green Deal Loans to date. This means expected savings are over-estimated.	Green Deal has links with the Supplier Obligation ‘Energy Company Obligation’ – need to ensure savings, which arise from a combination of these policies, are only counted once.
<b>PI2: Building regulations – household &amp; PI4: Building regulations – non-domestic</b>	Insufficient monitoring and compliance may mean that expected savings are not delivered in reality. There is some research to back up this concern -	The UK government includes “all the financial, energy and carbon savings ... due to Part L 2002, 2006, 2010 and 2013”. It suggests these are additional for the purposes of this Directive because these regulations predate EPBD. This interpretation of additionality may well be incorrect.
<b>PI3: Green Deal – non-domestic</b>	This policy is not yet active. Experience with domestic sector Green Deal is not encouraging –	

	and it may be hard to deliver expected savings.	
<b>PI5: Smart metering (non-domestic)</b>	There is a risk that roll-out will be further delayed. Before December 2014, it was expected that large scale installations would begin at the end of 2015 (National Audit Office, 2014). This date has now been put back to October 2016 due to IT problems.	
<b>PI6: Carbon Reduction Commitment Energy Efficiency Scheme</b>	CRC is among the most criticized policies and is considered a drag on rather than a driver of, clean investment. Key concerns are its lack of a clear purpose; frequent, unexpected changes to design; and its high administrative burden. (Bassi et al 2013). It therefore may not meet its goals.	
<b>PI7: Energy Savings Opportunity Scheme</b>		This policy is in response to Article 8 of the Directive. It seems unlikely to be additional.

## 9.5 Conclusions

The UK has calculated its saving target as 324 TWh, and the Article 7 policies are expected together to deliver 501 TWh of savings.

The UK has not introduced new policies specifically in response to Article 7, but is instead relying on existing policies, or new policies introduced for other reasons, to deliver savings. The policy expected to deliver around 40% of total savings, building regulations, has a long record of cost-effective energy saving. Most of the other policies are either yet to be fully introduced (ESOS, Green Deal non-domestic, smart metering) or yet to be evaluated (CRC).

There are several areas of concern about UK policies:

- Savings from building regulations in the domestic and non-domestic sector make up almost 40% of the UK's expected savings. However, the case for additionality made by the UK Government is problematic and needs further investigation.
- Savings from Green Deal are likely to be considerably lower than anticipated given the under-performance of the policy to date.
- Smart metering roll-out has been delayed since the calculation of savings expected by 2020, meaning that savings are likely to be lower than presented in the latest UK

Article 7 submission.

- The Energy Savings Opportunity Scheme (ESOS) is in response to Article 8 of the Directive. It seems unlikely to be additional.

Of these, the primary area for concern is building regulations – if this policy is judged not to be additional, UK would not be able to meet its target. Lower than expected savings from Green Deal and smart metering would have much less impact on meeting the target. Similarly, if ESOS savings are judged as non-additional, this too has a relatively small impact on meeting the target. As a matter of urgency then, the status of savings from building regulations needs to be confirmed. If they are not allowable, then the UK needs to introduce additional policies, or raise the ambition level of existing policies, in order to meet its target.

## Appendix 1:

### Brief description of UK measures not included in this report

**Table 9.6: Brief description of UK measures not included in detail in this report**

Policy Measure	Brief description	Expected savings 2014 – 2020 (TWh)
<b>Home Energy Efficiency programme (Scotland)</b>	This policy, launched in April 2013, will help to refit or refurbish existing homes to make them more energy efficient. The core of the programme will be local authority developed, area-based strategies, aimed initially at fuel poor areas. It is estimated that more than 300,000 poorer households will be eligible for free or heavily discounted insulation from 1 April 2013.	5
<b>Private and social sector regulation (Scotland)</b>	This is a proposal to introduce a new energy efficiency standard for social housing in 2014 setting initial targets to be met by 2020.	2
<b>Sustainable Energy programme (Northern Ireland)</b>	This policy has some similarity with an EEO. Money is gathered from energy companies and spent on efficiency measures. Priority is given to vulnerable/low-income households. An EEO scheme in Northern Ireland may replace this policy in 2016.	1
<b>Climate Change Levy*</b>	The Climate Change Levy is charged on energy products used by business consumers including consumers in, industry, commerce, agriculture, public administration, and other services. Organisations within a range of sectors can claim partial exemption from the CCL if they have a Climate Change Agreement (CCA).	31
<b>Climate Change Agreements*</b>	CCAs set the terms under which eligible energy-intensive industries can claim a discount on the Climate Change Levy (CCL), provided they set and meet an overall sector target for improving their energy efficiency or reducing their carbon emissions. There are 51 umbrella CCAs with trade bodies representing energy-intensive business sectors. CCA targets are aimed at achieving the same level of energy savings that would have occurred if CCA sectors were subject to the full CCL.	20

<b>Salix public sector finance</b>	The Salix Finance energy efficiency loan scheme is funded by DECC, and the Welsh and Scottish Governments and provides interest-free loans to Public Sector bodies (excluding central government) to fund energy efficiency improvement projects.	6
<b>Greening Government Commitment</b>	The Greening Government Commitments (GGCs) are targets for reducing the environmental impact, including greenhouse gases, of the central government estate and operations in the United Kingdom.	1
<b>Re-Fit</b>	RE: FIT provides a procurement framework to allow public sector bodies to procure energy efficiency improvements to their buildings from Energy Service Companies (ESCOs).	1
<b>Rail electrification</b>	Electrification schemes are supported via government funding. The savings are based on plans to upgrade particular sections of the UK rail infrastructure over this period.	4
<b>Low emission vehicle policies</b>	Two schemes run to incentivise low-emission light vehicles (one for vans and one for cars). These cover new cars and vans, with type approval and meeting certain performance criteria, with CO2 emissions below 75g/km.	4

*Source: (HM Government, 2014)*

\* The estimated savings for the Climate Change Levy were 7TWh and for the Climate Change Agreements 5TWh in the UK Government's first Article 7 submission document (HM Government 2013), which is why these policies were not prioritized for full description.



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