

**REPORT TO THE EUROPEAN CLIMATE FOUNDATION**

***"Identifying Best Practice Energy Efficiency  
Policies in the EU-15"***

prepared by

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## **Identifying Best Practice Energy Efficiency Policies in the EU-15**

### **Executive Summary**

This report identifies “Best Practice” energy policies used by Member States in the original EU-15 aimed at the residential and tertiary (also known as service) sectors. Previous studies have identified those elements that need to be present in order to make a policy work effectively. This study has taken a different approach and uses the basis of identification of Best Practice policies as those which are expected by the European Member States to make significant reduction in the consumption of their final energy in these two sectors i.e. a few “big hit” policies.

The key information source for this has been the first National Energy Efficiency Action Plans (NEEAPs) required under the EU Directive on Energy End-use Efficiency and Energy Services. These plans define how the Member States are planning to meet their nominal energy saving target of 9% of final end use consumption by 2016. In particular, some of the Member States have actually estimated in their NEEAPs the energy savings that will be expected from particular policies. It is from these data that the report’s observations and conclusions follow. The information from the NEEAPs, particularly for those which have not attempted quantification of the savings from their policies, have been supplemented by information from the IEA country energy studies and other relevant sources as they relate to energy efficiency in the two sectors considered here.

Although the original scope of the report was not to cover appliance energy labelling & standards or energy performance in buildings, for completeness quantification of the expected savings from these policies within the NEEAPs is included. All eighteen NEEAPs (Belgium has one at the federal level and three at the regional level) have been examined. The study focuses on specific policies which go beyond public awareness and statistical information to focus on active intervention policies to promote energy savings. From the nine NEEAPs which provide quantitative information, the policies have been ranked into a series of bands to show the relative importance of the individual policy elements for both the residential and tertiary sectors. There are five bands in deciles with the top band meaning that that policy would account for more than half of the contribution to the total energy saving expected within that sector. Comments are made on policies for all Member State policies including those with no quantification of the expected energy savings.

A significant energy policy is defined as one which is expected to save more than 10% of the quantified expectation of energy savings in the residential or tertiary sectors and to do so in more than one Member State. There are six key policies in the residential sector and six key policies in the tertiary sector which satisfy this criterion of best practice policy. Furthermore, five of the policies are common to both the residential and tertiary sectors.

Without doubt building regulations is the most popular best practice policy with significant energy and carbon dioxide saving potential in every Member State. The policies of Government grants or subsidies and appliance energy labelling & performance standards are also widespread and expected to make significant contributions throughout the EU-15.

Other key policies present in both the residential and tertiary sectors are not so widespread but where they have been introduced, Member States expect considerable energy saving from them. For example, energy efficiency obligations on energy utilities to save energy and/or carbon dioxide in their customers' homes and premises are expected to contribute at least half the energy savings by 2016 in those countries that have enacted this policy. Germany is the only country in the EU-15 with wide experience of a large scale, energy efficiency investment bank to stimulate energy efficiency investment. However, given the significance of the savings in Germany, coupled with the intention of Greece to follow suit and the use in the new Member States and South East Europe, then this policy option holds considerable promise for the future in tackling the significant need for financing energy efficiency investments without resource to significant Government expenditure.

Finally, for best practice policies in the residential sector, those countries which have introduced tax breaks are expecting significant energy savings.

It is also informative to look at those policies which although fairly widespread in their use by EU-15 Governments, do not feature strongly when it comes to quantification of the energy saving values. In the residential sector, these include lower VAT for energy efficiency measures, environmental taxation, subsidies for going beyond existing building regulations for new build properties, energy performance regulation on existing homes (outside of building regulations and appliance labelling & standards) and behavioural measures. In particular, countries appear to have been cautious about the extent to which they have factored in energy savings by 2016 arising from behavioural measures. Looking longer term, it is clear that this is a topic which will have to be addressed in order to really change our attitudes to energy use and climate change as without such a commitment, it is going to be very difficult to achieve the ambitious goals of carbon dioxide reduction by 2050.

In the tertiary sector the policies which do not appear to contribute much to the quantified energy savings are lower VAT for energy efficiency measures (limited impact for commercial organisations), environmental taxation, setting energy savings or carbon dioxide targets for the public sector, and an accelerated depreciation for energy efficiency equipment.

The final section looks at what barriers to the deployment of energy efficiency measures are tackled by the policies. The conclusion is that regulation, (e.g. building codes and product standards) and grants & fiscal incentives (e.g. energy efficiency obligations, tax breaks, subsidies, energy efficiency investment bank) tackle both a wide range of barriers and feature strongly in the Best Practice policies identified in this report.

While recognising that energy efficiency is a diverse subject and needs to be tackled at many levels, it is clear that there are some important policy measures which will deliver most of the expected savings by 2016 and which are not widespread across all Member States. **It is recommended that ECF in its work programme focuses on spreading these best practices across the rest of the Member States.** This should encompass not just the EU-15 states which have not adopted such policies but whether the best practice policies are relevant or can be adapted to the specific situations of the new Member States and ultimately those in South East Europe. In the future more resources should be given to these best practice policies across the whole of Europe as we move to delivering a significant step change in energy efficiency investment.

## 1. Introduction

This report reviews current and past energy efficiency policy initiatives operated at a Member State level in the original EU-15 and aimed at the residential and tertiary (also known as service) sectors.<sup>1</sup> It then identifies “best practice” policies used by Member States on the basis of the expected potential to make a significant reduction in the consumption of final energy in these two sectors.

It is recognised that claiming a best practice single policy is over simplistic in a complex subject like energy efficiency with a range of market failures which need to be overcome. But since the oil shocks in the 1970s, there have been many information campaigns with limited success in stimulating energy efficiency investments in the residential and sector to match the economic energy saving potential. It is clear that more than information on energy saving and awareness of climate change is required; in effect information is clearly necessary but not sufficient to drive the essential energy efficiency investment in these two sectors. This report assumes that these information and awareness activities are largely in place (as is the case) and seeks to identify the further policies which will drive energy efficiency investment in these two sectors.

There have been earlier studies which have attempted to identify best practice policies, but they had a different approach from the present. For example, the AID-EE project<sup>2</sup> in 2006 shared experiences on key elements for successful policy implementation and how to monitor and evaluate the implementation process. However as well as the passage of nearly three years of more information since that report, of particular significance is the first National Energy Efficiency Action Plans required under the EU Directive on Energy End-Use Efficiency and Energy Services (hereafter Energy Services Directive). This Directive requires Member States to produce a plan on how they are going to meet their nominal energy saving target of 9% of final end use consumption<sup>3</sup> by 2016. Of particular relevance is the fact that some of the Member States have actually estimated in their first National Energy Efficient Action Plans (NEEAPs) the energy savings expected from particular policies.

Of course, energy efficiency is a complicated subject and historically because of the barriers to energy efficiency (see section 7), governmental policy has tended to result in many initiatives to try to tackle energy efficiency. However prices in recent years with the much increased awareness of the importance of end use energy efficiency in tackling climate change, improving energy security and lowering the impact of rising energy, energy efficiency measures are more “front of the mind” than they ever have been. Thus the challenge in the immediate future is to identify a few key energy efficiency policies which will make a significant impact on the uptake of energy efficiency measures and which will do so quickly. Most countries have a suite of energy efficiency initiatives but they are not necessarily all as effective or capable of delivering “quick, big hits”. This review attempts to identify a few such “big hit” policies.

It is becoming clear that there is political appetite for identifying a few key policies which should be implemented widely across the European Union. For example, in February, Claude Turmes, MEP, complained that the 85 measures listed in the EU

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<sup>1</sup> The tertiary sector encompasses both the commercial and public sectors.

<sup>2</sup> [www.aid-ee.org](http://www.aid-ee.org)

<sup>3</sup> Note this excludes energy consumed by those organisations covered by the EU Emissions Trading Directive.

Commission's 2006 Action Plan were too many. He argued that the revised Commission plan by the end of 2009 should focus on five to six key policy areas which could make a significant and rapid impact on energy efficiency and reducing carbon dioxide emissions. This is a sentiment entirely shared by this work.

As the purpose of the report is to identify the best practice policies currently in place in the EU which lead to significant energy and carbon dioxide savings, then the focus of this report is on short term deployment and so does not cover R&D. This does not downplay in any way the fact that new technologies and techniques will be crucial to the long term vision of sustainable energy. It merely reflects the fact that there is a lot of existing technology and techniques which can be deployed now and which can make a significant impact on the EU's emissions of carbon dioxide.

The report classifies the best practice policies on the basis of the following classifications:

- financial/economic
- regulatory
- linked to energy utilities
- education and information

ECF already has significant work programmes in the areas of standards and labels for appliances and energy performance in buildings. Consequently, they do not form a major part of the best practice identification in the analysis that follows although their importance is highlighted in the analysis of the NEEAPs.

After identifying the key policy tools in the residential and tertiary sectors, a study of the success or expectations of policies within each of the sub areas is identified for the main energy consumption end uses in the EU-15. The analysis draws heavily on the Member States' National Energy Efficiency Action Plans as submitted to the EU as required under the Energy Services Directive. Energy Efficiency Watch has published a screening of the NEEAP in 2007 and a final report in July 2009<sup>4</sup>. This first report was a wide ranging document with its main focus to understand how the individual Member States in the EU had fulfilled their legal obligations under the Energy Services Directive. The final report updated and repeated the summary of the initial report but in addition compared the energy savings expected under the NEEAPs with the energy model PRIMES. This provides a baseline scenario in which current trends and policies are simulated for the EU and each of its 27 Member States at the level of final energy consumption. The final report concluded that there was a lack of standardised reporting format resulting in the NEEAPs differing significantly regarding the content and level of information provided. This is a conclusion with which the present author completely agrees and which has restricted the quantified best practice policy analysis to half of the NEEAPs.

To date, the Energy Efficiency Watch has not attempted an analysis of what are the key energy efficiency policies which can deliver the quickest and most significant energy savings across the EU.

This report uses those quantified NEEAPS to identify where the Member State expects most of its energy saving to come from. By adopting such approach, it is then possible to look across the various Member States with quantified plans to attempt to draw out

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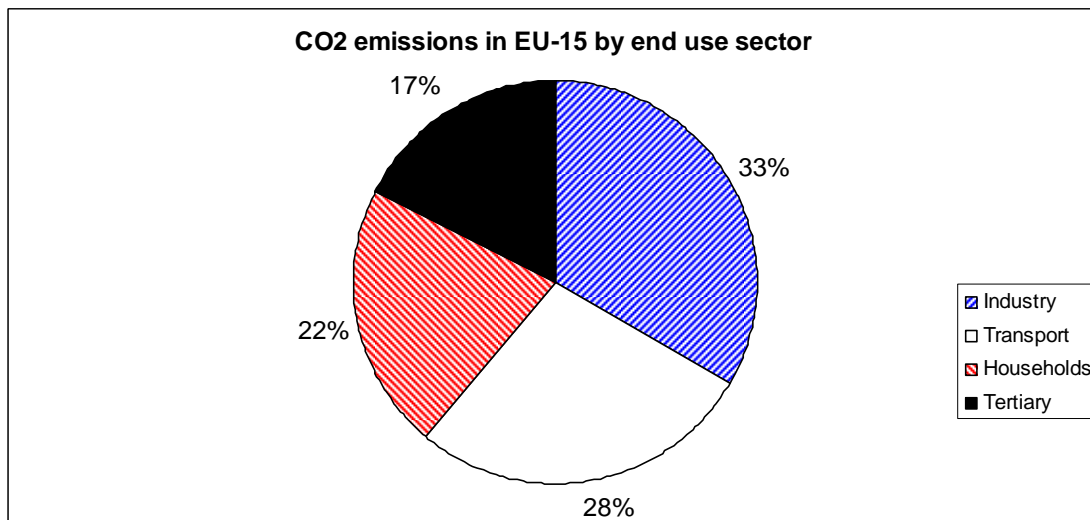
<sup>4</sup> [www.energy-efficiency-watch.org](http://www.energy-efficiency-watch.org)

the key best practice policies which Member States believe will deliver most of their energy savings to 2016.

## 2. Key Policy Areas in the Residential and Tertiary Sectors

It is necessary to make some groupings of policies in order to keep the number of areas examined at a finite number even though the implementation in different Member States might be slightly different. In drawing up the following tables, use has been made of the Member States' NEEAPs as submitted to the EU Commission as required by the Energy Services Directive requirement, Energy Efficiency Watch's evaluations of them, the IEA's key policy initiatives identified as their contribution to the Gleneagles G8 process<sup>5</sup> and various evaluations of specific policy initiatives.

It is also important to realise the importance of these 2 sectors in terms of CO<sub>2</sub> emissions from the EU-15. Figure 2.1 shows the breakdown in 2006 for the EU-15. For the EU -27, annual emissions of CO<sub>2</sub> were approaching 4 Gt in 2006 (source Eurostat).



**Figure 2.1: CO<sub>2</sub> emissions by end use sector for the EU-15 in 2006. (Derived from Eurostat and European Environmental Agency data).**

In terms of energy end use, the residential sector is more dominant than the tertiary – more like 3 to 1. This arises because the commercial sector has proportionately more electricity usage which on an EU basis has a higher CO<sub>2</sub> content per unit of energy.

### 2.1 IEA G8 Recommendations

The IEA drew up its criteria for the key energy efficiency policies based on the following criteria:

- Likely to save a large amount of energy at low cost
- Addresses existing market imperfections or barriers
- Addresses a significant gap in existing policy
- Supported by a degree of international consensus

<sup>5</sup> "Energy Efficiency Policy Recommendations in Support of the G8 Plan of Action", IEA 2008

The IEA recommendations were split in seven headings and included transport and industry. These latter two areas are omitted from this analysis as it focuses on the residential and tertiary sectors. Table 2.1 shows the IEA five recommended areas which are a mixture of energy policies, end uses and using energy utilities.

Key area	Recommended Policy
Cross sector policies	Increased investment in energy efficiency Coherent national energy efficiency strategy and goals Compliance, monitoring, enforcement and evaluation of energy efficiency measures Energy efficiency indicators Monitoring and reporting progress with IEA energy efficiency recommendations
Buildings	Building codes for new buildings Passive energy houses and zero energy buildings Policy packages to promote energy efficiency in existing buildings Building certification schemes Energy efficiency improvements in glazed areas
Appliances and equipment	Mandatory energy performance requirements and/or labelling Low power modes for electronic and networked equipment Energy efficient televisions and set top boxes Agreed global protocols on energy performance test standards and measurement
Lighting	Promotion of best practice lighting and the phase out of incandescent bulbs Least cost lighting in non-residential buildings
Energy utilities	Energy utility end use energy efficiency programmes

**Table 2.1: IEA G8 Recommendations as they apply to the residential and tertiary sector<sup>6</sup>**

The IEA estimates that if all of the policies in Table 2.1 were implemented promptly, then this could save around 5 Gtons carbon dioxide per year by 2030 or about 25% of current energy consumption in these areas. However many of the IEA recommendations (particularly for the cross sector policies) are more in the form of guidelines or recommendations on establishing national energy efficiency strategies and monitoring progress; there is no discussion of fiscal or taxation incentives, appropriate subsidy levels, etc.

## **2.2 Classification of Policy Levers in the Residential Sector**

To identify the specific energy policies and the relevant market actors, it is necessary to complement the IEA approach with an approach which is more sector based and one which links into the kind of policy measures that any EU Member State could adopt. In what follows, the thrust of the IEA recommendations is translated under the four broad policy headings of financial or economic; regulatory; energy utilities; education and information. In reality these four headings are a mix of three governmental policy levers plus one market actor driven by regulation viz. energy utilities is a hybrid of a

<sup>6</sup> The IEA recommendations on transport and industry are not included in the above table.

government policy (usually regulation) and a market actor with close links to the end user. As will be shown later, there are good reasons, particularly at the present time, for believing that energy efficiency obligations will be an important policy option going forwards.

Table 2.2 identifies the range of these potential policy measures for the residential sector classified under the four broad headings of financial or economic; regulatory; energy utilities; education and information. The individual policies shown have been derived from looking at what is actually active or planned in the near future across the EU-15. Inevitably, there has been some amalgamation of policy options and also recognition of the fact that similar policy measures have different titles in different EU Member States.

### Key policy areas in the residential sector

Nature of the policy	Description
<b>Economic or financial</b>	Government grants (including low income households) lower VAT for energy efficiency measures Government grants for feasibility studies (community) tax breaks for buying/installing energy saving measures tax to penalise "bad" products environmental taxation low interest loans for energy efficiency investments local taxes linked to energy efficiency property sales tax linked to energy performance certificate subsidised energy audits financial incentives for going beyond existing building regulations Fees for architects & engineers for EE solutions
<b>Regulatory</b>	minimum energy efficiency standards for existing homes mandated advice (e.g. utilities local authorities etc) compliance, monitoring & enforcement of energy efficiency regulations planning & spatial policy to encourage energy efficiency & sustainable energy
<b>Energy Utilities</b> (regulatory+ market actor)	obligations on energy utilities to save energy and/or CO2 using regulated energy utilities as a source of funds for energy efficiency home energy audits tariffs to encourage peak shifting
<b>Education &amp; Information</b>	public awareness campaigns tailored advice for householders online CO2 calculators energy and/or CO2 information on bills and/or through smart meters centres of expertise on energy efficiency including national energy agencies

**Table 2.2: Key policy areas in the residential sector (N.B. the table excludes appliance minimum performance standards & labelling and any covered by the EU Energy Performance in Buildings Directive).**

Note that in Table 2.2, policy measures linked to either appliance minimum performance standards and labelling or energy performance in buildings have not been included in line with the current report's scope except when such an initiative is a national rather

than an EU driven policy. For example, the UK has specified a minimum energy efficiency performance which is required for a property to be considered a “Decent Homes” and social landlords have deadlines to meet for improving their properties to this minimum standard. This aspect is not related to the Energy Performance in Buildings Directive.

### ***2.3 Classification of Policy Levers in the Tertiary Sector***

A similar approach has been followed for the tertiary sector to produce an EU wide relevant set of policies as shown in Table 2.3. Although there are many similar approaches between the two sectors, there are some additional specific ones for the commercial sector.

The next step is to identify for each of these sectors which policies are currently in place, or planned, in each of the individual Member States of the EU-15 and this is discussed in the next section.

<b>Key policy areas in the tertiary sector</b>	
<b>Nature of the policy</b>	<b>Description</b>
<b>Economic or financial</b>	Government grants and/or guarantees
	Lower VAT for energy efficiency measures
	Government grants for feasibility studies
	tax breaks
	tax breaks for buying/installing energy saving measures
	tax to penalise "bad" products
	national trading schemes
	climate change agreements with specific end using sector
	accelerated depreciation for energy efficiency equipment
	low interest loans for energy efficiency investment
	support for third party financing/energy service companies
	local taxes linked to energy efficiency
	property sales tax linked to energy performance certificate
	subsidised energy efficiency audits
	financial incentives for going beyond existing building regulations
Fees for architects & engineers for EE solutions	
<b>Regulatory</b>	Minimum energy efficiency standards for existing buildings
	mandated advice (e.g. utilities local authorities etc)
	public procurement for energy efficiency measures
	setting energy saving or CO2 targets for the public sector
	compliance, monitoring & enforcement of energy efficiency regulations
	planning & spatial policy to encourage energy efficiency & sustainable energy
<b>Energy Utilities</b> (regulatory+ market actor)	obligations on energy utilities to save energy and/or CO2
	using regulated energy utilities as a source of funds for energy efficiency
	premises energy audits
	tariffs to encourage peak shifting
<b>Education and Information</b>	public awareness campaigns
	tailored advice for building users
	online CO2 calculators
	energy and CO2 information on bills and through smart meters
	centres of expertise on energy efficiency including national energy agencies
	voluntary initiatives with manufacturers, retailers etc

**Table 2.3: Key policy areas in the tertiary sector (N.B. the table excludes appliance minimum performance standards & labelling and any covered by the EU Energy Performance in Buildings Directive).**

### 3. Efficiency Policies in the EU-15

It is clear from Tables 2.2 and 2.3 that there are still a large number of policy options. In order to keep the task manageable, it is necessary to narrow down some of the policy options in a meaningful way. The first cut is to remove policy options which depend on local culture for their implementation, e.g. public awareness campaign. National Energy Agencies<sup>7</sup> and conducting research into how energy is used by consumers were also removed as these have already got good networks (EnR for National Energy Agencies<sup>8</sup>) or clearly established requirements under the Energy Services Directive. For this reduced set of energy policy options, the individual National Energy Efficiency Action Plans from the original EU-15 Member States was then analysed to see which policies were either in place or whose implementation was in the near future.

The results of this are shown in Table 3.1 for the residential sector and Table 3.2 for the tertiary sector. In the Tables, the entry of an **X** is used to indicate an active policy by the Member State in this area and an entry of **(X)** for a policy which was listed by the Member State in the NEEAP as a policy measure to be implemented. In all cases, a cross check was made with the report by Energy Efficiency Watch to ensure that there was reasonable consistency in interpretation.

Tables 3.1 and 3.2 still represent a large number of policy options, especially when it is remembered that proven best practice policies such as minimum appliance energy performance standards and building regulations, etc are not included in these tables.

Because of Belgians' federal structure, there are in fact four Energy Efficiency Action Plans from that country including one each from the three federal administrations of Flanders (FL), Walonia (WL) and Brussels Capital (CAP). Additionally tax incentives, low interest loans and support for third party financing are active policies pursued by the Belgian national government and this is shown in Tables 3.1 and 3.2 by the purple bars cross cutting all three of the Belgian individual regional activities.

The intention of the present report was to look at the individual Energy Efficiency Action Plans in terms of their projected energy savings to 2016 and from that deduce which are the key energy efficiency policies in each of the Member States. As others have previously commented (e.g. Energy Efficiency Watch), there is tremendous variability between the quality and particularly the quantification of the energy savings by the individual Member States. Consequently, by requiring a quantification of the importance of the individual policies considerably reduces the number of Member States which can be used in the Best Practice Programme analysis.

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<sup>7</sup> In Belgium, the National Energy Agency does not exist but there are three federal energy agencies which promote energy efficiency and research how energy is used by consumers.

<sup>8</sup> However the National Energy Agencies are not necessarily as strong in the new Member States of the EU-27 as the long established ones. There is an argument for looking at how the financial support and influence of these National Energy agencies can be increased in some of the new Member States.

Table 3.1: Existing policies in the EU 15 in the residential sector

Description	AT	BE fl	BE wl	BE cap	DK	DE	ES	FI	FR	GR	IE	IT	LU	NL	PT	SE	UK
<b>Economic or financial</b>																	
Government grants/subsidies (including low income households)	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
lower VAT for energy efficiency measures									X	(X)							X
Government grants for feasibility studies (community)				X													X
tax breaks					X				X	(X)		X		X	X		
tax to penalise "bad" products					X						X				(X)		
environmental taxation (eco or energy)	X				X	X								X		X	
low interest loans for energy efficiency investments	X					X			X	(X)				X	(X)		
local taxes linked to energy efficiency															(X)		
property sales tax linked to energy performance certificate																	
subsidised energy audits			X					X					X				
financial incentives for going beyond existing building regulations																	
Fees for architects & engineers for EE solutions						X											
<b>Regulatory</b>																	
minimum energy efficiency standards for existing homes																	X
mandated advice (e.g. utilities local authorities etc)																X	X
compliance, monitoring & enforcement of energy efficiency regulations																	
planning & spatial policy to encourage energy efficiency & sustainable energy	X										X						X
<b>Energy Utilities</b>																	
obligations on energy utilities to save energy and/or CO2		X		X	X				X			X	(X)				X
using regulated energy utilities as a source of funds for energy efficiency			X		X		X								X		
home energy audits		X															
tariffs to encourage peak shifting											X						
<b>Education &amp; Information</b>																	
tailored advice for householders		X	X	X		X			X					X			X
online CO2 calculators																	X
energy and/or CO2 information on bills and/or through smart meters			X		X					(X)	(X)			X		X	X
voluntary initiatives with manufacturers, retailers building owners etc								X						X			X

Federal level initiative

(X) new initiative (2008 onwards implementation)

Table 3.2: Existing policies in the EU 15 in the tertiary sector

Description	AT	BEfl	BEwl	BEcap	DK	DE	ES	FI	FR	GR	IE	IT	LU	NL	PT	SE	UK
<b>Economic or financial</b>																	
Government grants/subsidies and/or guarantees	X	X	X	X	X		X	X		X				X		X	
Lower VAT for energy efficiency measures									X	(X)							X
Government grants for feasibility studies			X	X							X						(X)
tax breaks									X			X		X	(X)		
environmental taxation (eco or energy)	X				X	X						X?		X		X	X
national trading schemes																	(X)
climate change agreements with specific end using sector														X			X
accelerated depreciation for energy efficiency equipment													X		(X)		X
low interest loans for energy efficiency investment	X					X			X								X
support for third party financing/energy service companies		X								(X)						X	
subsidised energy efficiency audits			X	X		X		X					X				X
financial incentives for going beyond existing building regulations				X								X					
Fees for architects & engineers for EE solutions						X											
<b>Regulatory</b>																	
Minimum energy efficiency standards for existing buildings																	
mandated advice (e.g. utilities local authorities etc)																	
public procurement for energy efficiency measures	X	X		(X)	X	X			X	(X)	X			X	(X)	X	X
setting energy saving or CO2 targets for the public sector										X	X						X
planning & spatial policy to encourage energy eff.& sust.energy	X																X
<b>Energy Utilities</b>																	
obligations on energy utilities to save energy and/or CO2		X		X	X				X			X	(X)				
using regulated energy utilities as a source of funds for energy effi.			X		X		X										
premises energy audits		X															
tariffs to encourage peak shifting											X						
<b>Education &amp; Information</b>																	
tailored advice	X		(X)	X		X					X						X
online CO2 calculators (for SMEs)																	X
energy and CO2 information on bills and through smart meters						(X)					X					X	
voluntary initiatives with manufacturers, retailers building owners etc								(X)	X	(X)			X	X			
subsidy to create energy accounting/monitoring systems			X	X							X						
Government/public sector exemplary behaviour	X		X		X	X		X	X		X		X				

Federal level initiative

(X) new initiative (2008 onwards implementation)

#### 4. Key Energy Efficiency Policies in the Energy Efficiency Action Plans

Only nine of the eighteen NEEAPs covering the EU-15 actually contain specific estimates of the energy saving potential. Additionally, Austria has attempted to give a feel for the more important policy measures through a one to three star rating where three stars are the more important policies. These have been included for completeness in the tables that follow.

Inevitably, there are complications in translating the information in the NEEAPs to a single entry in a table. For example, some countries tackle significant energy savings by two or more measures, e.g. Italy proposes to improve heating efficiency through a mixture of financial incentives, White Certificates arising from an obligation on energy distributors and a series of tax breaks in the residential sector. Italy does not attempt to break these savings down between the three different policy instruments.

In other cases, sometimes building regulation figures are provided covering several sectors and an informed judgement has to be made as to how these split out. Consequently, although the precise figures have been evaluated wherever possible, it is thought more prudent to show the relative importance in a series of broad ranges. This avoids any spurious precision but does not detract from making easy identification of those policies which the individual Member States expect to make the most significant contribution to achieving their 2016 energy saving goals.

Instead, five broad bands of deciles have been adopted in terms of that particular policy measures contribution to the overall NEEAP energy saving quantified target by 2016:

- Less than 10% of the total sector target
- Between 10-20% of the total sector target
- Between 20-30% of the total sector target
- Between 40-50% of the total sector target
- Accounting for more than half of the contribution to the total sector target

In all cases, the sector target refers to either the residential or the tertiary sector target and not the sum of all the individual sector targets.

Where several policy measures contribute jointly to energy saving in that sector and which have not been separately identified by the Member State, these are shown by the use of asterisks. For example, in Table 4.1 the Italian entry for the residential sector shows that more than half the energy savings are expected to come from the three key policies of Government grants, tax breaks and energy efficiency obligations; to indicate that these policies are not separated out and that the energy savings relates to all three policies, the use of a single asterisk is used on all 3 entries. When one of the policy measures is Building Regulations and contributes along with other policies to the energy saving range shown, then this is indicated by the use of double asterisks. For example in Table 4.2 for the tertiary sector, for Belgium Flanders more than half the energy savings in this sector are expected to come from the mixture of policies of Government grants, energy efficiency obligations and Building Regulations. It is also worth pointing out that for Portugal, the national plan for energy efficiency to 2015 has been used as the source for the analysis as this is sufficiently close to 2016.<sup>9</sup>

For completeness, the contributions from building regulations and appliance labelling and standards are also shown as these are important considerations in most of the NEEAPs.

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<sup>9</sup> The Spanish Energy Efficiency Plans only covered the period to 2012 and these have not been included in the quantification although comments are made in Section 4.1.5 as the plans are quantified out to 2012.

#### 4.1 Key Policies in the Residential Sector

For those countries that have attempted some form of quantification of their policy measures<sup>10</sup>, Table 4.1 shows a series of ranges ranging from less than 10% to greater than 50%; in all cases the percentage figure refers to the expected contribution to the energy savings arising in the residential sector. Table 4.1 is a complex table but immediately it is clear how under populated the table is.

It is also clear that that the two policies expected to make the greatest contributions in most countries are subsidies or grants to householders and building regulations. It is a bit surprising that appliance labelling and standards is not quantified in the Irish proposals as they certainly will be enacted as part of the EU Ecodesign Directive.<sup>11</sup> The next two most widespread policies in the residential sector making a high impact in those countries with active policies are tax breaks and obligations on energy utilities to save energy and/or carbon dioxide<sup>12</sup>. It is also worth noting the importance of low interest loans for Germany which has considerable experience in this area and which Greece hopes to replicate.

The following sections look at the key policy measures in turn for each of the countries.

##### 4.1.1 Austria

**The three star policy areas are Government subsidies, building regulations and appliance labelling and standards.** There are a great deal of policies related to the household sector but these three are the key ones.

##### 4.1.2 Belgium

Federal tax breaks have been in place since 2003 for a 40% reduction in tax (up to a maximum of €2,600 per dwelling) for the installation of double glazing, thermostatically controlled valves or thermostats, roof insulation and replacement of boilers. There is also a mixture of subsidies and soft loans (2% interest rate) aimed at low income households; the maximum amount per dwelling is €10,000. These two measures are rated moderate and high respectively in terms of their effectiveness. Another measure which is rated high in the residential sector is the establishment of Minimum Energy Performance Standards for stand by consumption.

In Wallonia there are subsidies from the regional government to support the federal tax breaks. There are also public service obligations on the energy companies through allowing high efficiency cogeneration to be awarded “Green Certificates”. This is in addition to the levy raised on the electricity and gas customers to promote end use energy efficiency.

Brussels Capital also operates a regional subsidy scheme for the same measures as are eligible for federal tax rebates. There are also subsidies available for the best performing refrigeration products (A++) (€200). Since 2006 the electricity and gas distribution companies have had public service obligations to promote the rational use of electricity through information, demonstrations and supply of equipment, services and financial aid for the benefit of the municipalities and other end customers.

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<sup>10</sup> Note that for Sweden the NEEAP did not distinguish between the residential and tertiary sector and the quantification is shown in Table 4.2 for the tertiary sector as technology procurement is not usually a residential policy.

<sup>11</sup> For the Flanders region of Belgium, there is no entry under appliance labelling standards as these are the responsibility of the national Belgian Government whose NEEAP did not quantify energy savings from any policies including taxation.

<sup>12</sup> For a detailed explanation of how energy efficiency obligations (also known as white Certificates) in the EU-15 operate and their effectiveness, see WEC Ademe project on energy efficiency policies:

[http://www.worldenergy.org/documents/white\\_certificate.pdf](http://www.worldenergy.org/documents/white_certificate.pdf)

Table 4.1: Quantified policies in the EU 15 residential sector

Description	AT	BEfl	DE	FI	GR	IE	IT	LU	PT	UK
<b>Economic or financial</b>										
Government grants/subsidies (including low income households)	***			>50%*	>50%*	20-30%	>50%*	10-20%	>50%*	<10%
lower VAT for energy efficiency measures					<10%**					
Government grants for feasibility studies (community)										
tax breaks				>50%*	>50%*		>50%*		10-20%	
tax to penalise "bad" products										
environmental taxation (eco or energy)										
low interest loans for energy efficiency investments			>50%		>50%*					
local taxes linked to energy efficiency										
property sales tax linked to energy performance certificate										
subsidised energy audits				>50%*						
financial incentives for going beyond existing building regulations										
Fees for architects & engineers for EE solutions										
<b>Regulatory</b>										
minimum energy efficiency standards for existing homes										
mandated advice (e.g. utilities local authorities etc)										
compliance, monitoring & enforcement of energy eff regulations										
planning & spatial policy to encourage energy eff & sust energy										
<b>Energy Utilities</b>										
obligations on energy utilities to save energy and/or CO2		>50%					>50%*	10-20%		40-50%
using regulated energy utilities as a source of funds for en eff									40-50%*	
home energy audits										
tariffs to encourage peak shifting										
<b>Education &amp; Information</b>										
tailored advice for householders			20-30%							
online CO2 calculators										
energy and/or CO2 information on bills/through smart meters					<10%	<10%				<10%
voluntary initiatives with manufacturers, retailers building owners etc										
Building Regulations	***	40-50%	Lander	20-30%	20-30%**	>50%		>50%	30-40%	40-50%
Appliance Labelling & Standards	***		10-20%	<10%	10-20%		20-30%	<10%	20-30%*	<10%

**Notes**

\* policies are not separated individually

\*\* policies not separated individually including building regulations

N.B. Portuguese Action Plan savings are to 2015

**Quantified policies in the EU 15 tertiary sector**

Description	AT	BEfl	DE	FI	GR	IE	IT	LU	PT	SE &	UK
<b>Economic or financial</b>											
Government grants/subsidies and/or guarantees	***	>50%**		<10%*	20-30%*		>50%**			30-40%	
Lower VAT for energy efficiency measures											
Government grants for feasibility studies						30-40%					
tax breaks							20-30%*		>50%**		
environmental taxation (eco or energy)											
national trading schemes											<10%
climate change agreements with specific end using sector											
accelerated depreciation for energy efficiency equipment									10-20%		
low interest loans for energy efficiency investment			30-40%*								<10%
support for third party financing/energy service companies		<10%					>50%**				
subsidised energy efficiency audits				<10%*							10-20%*
<b>Regulatory</b>											
public procurement for energy efficiency measures	***								<1%	10-20%	
mandatory energy management systems in tertiary sector					10-20%*						
setting energy saving or CO2 targets for the public sector											
planning & spatial policy to encourage energy efficiency & sustainable energ	** / ***										
<b>Energy Utilities</b>											
obligations on energy utilities to save energy and/or CO2		>50%**					>50%**	20-30%			
using regulated energy utilities as a source of funds for energy efficiency											
premises energy audits											
tariffs to encourage peak shifting											
<b>Education &amp; Information</b>											
tailored advice	***		30-40%*								10-20%*
energy and CO2 information on bills and through smart meters			<10%		<10%						<10%
voluntary initiatives with manufacturers, retailers building owners etc				30-40%							<10%
subsidy to create energy accounting/monitoring systems						30-40%					
Government/public sector exemplary behaviour	***		<10%	<10%	10-20%						<10%
Building Regulations	***	>50%**	40-50%	40-50%	20-30%	30-40%	>50%**	>50%	>50%**	40-50%	40-50%
Appliance Labelling & Standards	**	Belgium	10-20%	in 2011	20-30%		10-20%			<10%	10-20%

**Notes**

\* policies are not separated individually

\*\* policies not separated including building regulations

& covers both the residential and service sectors in Sweden

N.B. Portuguese Action Plan savings are to 2015

Within Belgium, Flanders has had the longest running energy efficiency obligations on electricity distributors since the beginning of 2003. The target has been increased regularly and has now reached such a magnitude that **more than half of the energy savings achieved by 2016 in the Flemish region are likely to come from these obligations.**

Energy efficiency obligations are placed on 16 regional electricity distributors. The obligation is expressed in annual savings of primary energy. Compliance with the energy saving targets is subject to strict monitoring and reporting. Individual targets are defined annually based on 2% of the amount of electricity supplied to household customers in the previous two years and 1.5% for the non residential sector. In 2008 the combined target amounted to 0.58 TWh primary energy per year. Eligible actions cover residential, non energy intensive industry and tertiary sectors and can involve saving fuel from any sources. The Flemish obligation has no trading option of any type (see the reference in footnote 12 for more details).

#### 4.1.3 Denmark

Denmark used their 2005 plan covering the period from 2006-13 as their submission for their NEEAP. Excluding transport, it intends to save 7.5 PJ<sup>13</sup> per year average energy saving. The IEA country review of Denmark in 2006 contains a table<sup>14</sup> which indicates how the total of 7.5 PJ per year saving is expected to come from. **The two most important policies (covering all end use sectors except transport) are the obligations on the electricity, gas, oil and district heating companies to save energy of around 40% and improvements to the existing building stock of around 25% from tighter regulations on renovations or replacement equipment and greater promotion of building energy labels.**

In Denmark, electricity and gas distributors as well as heat distributors are subject to annual energy saving targets in the period 2006-2013. The targets are expressed in final energy and only first year savings from projects are taken into consideration. The annual obligation is currently 2.95 PJ or 0.82 TWh (as of 2010 the target will be increased to 5.4 PJ/y). In Denmark, the targets are set as an agreement between the Minister of Energy & Climate Change and the Danish Energy Association, the Danish Petroleum Industry Association, Dong Energy, Naturgas Midt Nord/HNG and Naturgas Fyn. In the case of district heating, there is no voluntary agreement; and every single DH follows an executive order and has an individual target to meet.

Targets are set based on the average market share of electricity or gas distribution in the three preceding years. Savings in all end-use sectors apart from transport are allowed; no supply side and network-related measures are allowed at present and fuel switching is only eligible if it reduces consumption. Transport-related projects are not allowed, unless they concern internal transport consumption of a company. From a very low level of activity, the energy savings from the residential sector have grown to currently 42% of the total savings.

#### 4.1.4 Germany

Germany's building stock is already relatively efficient primarily because it is comparatively new and many buildings in the east have been abandoned because of the migration of the population from the east to the west. **The existing building codes are strong and so most of the energy saving is envisaged as coming from the existing housing stock.**

**The main energy savings from Germany in the residential sector are expected to come from a continuation of the successful low interest loans for energy efficiency investments run by the**

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<sup>13</sup> 1PJ = 1 Petajoule =  $1 \times 10^{15}$  joules = 0.278TWh

<sup>14</sup> Table 11 IEA Energy Policies of the IEA Countries: Denmark 2006

**KfW bank.** These are often coupled with tailored advice for householders, particularly from the Federation of German Consumer Organisations. The loans are provided by the KfW Förderbank bank which was established as a promotional bank in 1948 and is 80% owned by the German Government and 20% owned by the federal states. It has developed one of the largest European financing programmes to reduce the impact on climate of the residential sector: the “Energy Efficient Construction and Rehabilitation” programme. It is divided in four sub-programmes: “CO2 building rehabilitation” addressed to buildings constructed before 1983, “Housing modernisation”, “Ecological construction” and the “Infrastructure programme” for municipal investments.

Nearly all of the KfW loan interest funding is directed at redeveloping and improving the existing residential buildings. Loans are available to all individuals, public or private organisations investing in owner-occupied or rented residential buildings. The terms and conditions of the loans are very attractive: low and fixed interest rates, long-term loans, possibility of prepayment of outstanding loan amounts at any time and at no extra charge, high ceiling of the loan (up to 100% of the investment), no commitment fee, unlimited possibilities to combine the loan with other public funds.

The types of energy efficient projects eligible vary from one program to another but requirements of the Energy Conservation Ordinance must always be met. For example, the ecological construction programme provides loans for construction, set up and first acquisition of a house whose annual needs in primary energy do not exceed 40 kWh per m<sup>2</sup> per year. Under the carbon dioxide building rehabilitation programme, a major activity is improving heating in existing residential buildings including replacing direct electrically central heated systems (storage radiators). Financing the installations of new heating technology on the basis of renewable energies, combined heat and power and local and district heating are also possible. In new build properties, the financial support from KfW is targeted at promoting passive houses and energy saving houses with an energy consumption of less than 60 or 40 kWh per m<sup>2</sup> per year.

However, although KfW undertakes nationwide promotion of the availability of the loan schemes, all lending is done through existing financial institutions at the local level. To obtain a loan from KfW, applicants can go to any commercial bank (usually their regular bank) which will lend the money after the usual credit checks. The bank then transmits the request to KfW. In making the loan application, the applicant must include a certification by an energy expert ensuring that the measures will indeed permit to reach the level of energy savings required by the terms of the loan.

The carbon dioxide building rehabilitation programme by May 2006 had lent over €5 billion in energy related programmes<sup>15</sup> and in 2008, €5.6 billion was committed by KfW for energy efficiency construction and rehabilitation in the residential sector<sup>16</sup>. This helped over 230,000 households and was estimated to generate a total investment of over €11 billion and create employment equivalent to 183,000 jobs. The KfW programme claims that since 2006, they have achieved a reduction in CO<sub>2</sub> emissions by approx. 2.2 million tons per year and at the same time saved energy for householders worth approximately EUR 188 million per year.

More recently, the carbon dioxide building rehabilitation programme now offers subsidies for energy saving investments as well as the loan variants. The grants vary from between 5 and 17.5 %

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<sup>15</sup> The IEA Country Energy Study: Germany 2007

<sup>16</sup> Presentation by Monika Beck September 2009

[http://re.jrc.ec.europa.eu/energyefficiency/pdf/Proceedings\\_Istanbul\\_2009/9\\_BECK.pdf](http://re.jrc.ec.europa.eu/energyefficiency/pdf/Proceedings_Istanbul_2009/9_BECK.pdf)

depending on circumstances and the energy saving measures. The interest rate is fixed for the first ten years and is reduced compared to normal commercial rates. There are further incentives to improve the energy performance of the property during refurbishment as the better the subsequent performance, the more the “bonus” that is taken off against the loan value – this can up to be 12.5% if the resultant property is 30% below the current new building standard.

#### 4.1.5 Spain

The Spanish have a saving and energy efficiency strategy (E4) in place covering progress with energy efficiency from 2004 to 2012. In July 2007 the E4 action plan for the five years from 2008 to 2012 inclusive was updated and this went into detail about the energy saving measures. However it has not been included in the current analysis because it is four years away from the target date of 2016. It is worth noting that more than half of the expected energy savings by 2012 will arise from the transport sector – probably a higher fraction than most other countries would expect from this sector.

Nevertheless the quantification to 2012 is important to understanding the Spanish key policies. **The major source of funding will come from a levy on the electricity tariffs which is expected to generate around 58% of the money available for investment subsidies and promotion of energy efficiency.** There is also around 12% of the funding coming from a levy on the gas tariffs. The remaining 30% is made up of the European regional development funds (20%) with public and municipal funding providing the balance. The electricity and gas tariffs are the equivalent of around 1.5% of the gas and electricity bills.

**In terms of where the expected savings by 2012 in buildings are likely to come from (includes residential and tertiary), over 40% will come from lighting with improving the existing envelope and improving the thermal insulation of existing buildings, each contributing around 20%. A separate policy, aimed at promoting the construction of new buildings and the rehabilitation of existing buildings with current poor energy performance, delivers nearly 20%. Finally improvements in building regulations are only expected to deliver around 2%.**

It is worth remembering that the energy use is very different between the residential and the tertiary sector in buildings. In the residential sector, 58% of final energy consumption is associated with heating and hot water with appliances and lighting together accounting for 21%. In contrast in the tertiary sector, cooling, heating and lighting are all around the 30% mark. For the biggest single carbon dioxide saving initiative (lighting), the main focus will be to replace 34 million incandescent light bulbs in the residential sector.

To encourage buildings going beyond existing building regulations and rehabilitation of existing buildings with poor energy performance, a mixture of promotion and financial support will ensure that they have a high energy classification (A or B).

For residential and office equipment, these are investment aid supports. In the residential sector, the objective is to replace 2.5 million electrical appliances per year with those of an energy label A or higher. Nearly 90% of the savings in this action will arise from the residential sector.

#### 4.1.6 Finland

**The keystone of the Finnish activity is subsidised energy audits but in practice they are coupled with other policies, either financial incentives or as part of voluntary agreements with businesses.** Building Regulations are also expected to play a major part in achieving their energy saving goals in the residential sector by 2016. There are significant household tax deductions available (60% of the labour costs) for replacing, upgrading and repairing the heating system of small residential houses.

Furthermore since 2006, both the household tax deduction and an energy subsidy are available for upgrading the heating system. The maximum subsidy for energy audits is 40%.

There are also separate long running programmes (Hoyla I and II) to decrease the specific consumption of oil heating systems aimed at detached houses and linked small houses. The programme is a holistic mix of consumer information, training the installers, integrating renewable energies with oil heating and reconditioning of old oil heating systems. As well as the household tax deductions, energy subsidies are available for equipment purchases provided the new system also utilises solar energy. There is also a substantial programme aimed at the promotion of heat pumps in small residential buildings. Again the heat pump costs are subsidised through direct subsidy and household tax deductions.

**These two heating initiatives account for over 60% of the residential energy savings expected by 2016.**

The labelling savings are associated with introducing and promoting an energy label for windows.

#### *4.1.7 France*

The French NEEAP focuses on a “top down” approach rather than the “bottom up” approach. This is less helpful in quantifying the actual policy measures which deliver the main energy savings in the residential sector by 2016. However the recent policy instrument used by the French, the White Certificates (an obligation on energy suppliers of all forms of energy), is very much a bottom up approach. In the first phase of the White Certificates, which finished in July 2009, nearly 60% of the savings target will come from savings of electricity which have limited impact on carbon dioxide emissions because of the dominance of nuclear and hydropower in the generation mix. However, the French White Certificates system has been judged a success as evidenced by the current discussions on extending the scheme from January 2010 by widening the obligated parties to include petrol and diesel retailers and also increasing the target by at least a factor of 5.

Building regulations for new build are regularly improved but as the building renewal rate is less than 1% per year, the priority lies in improving the energy efficiency of existing buildings in order to drive down carbon dioxide emissions by a factor of four before 2050. The French Government, from the end of 2007, has in place an “elemental” approach on replacement equipment for existing buildings.

Since January 2005 a tax credit is available for the costs associated with improving the energy efficiency of the main residence and using renewable energy sources. Tax credits of between 40 to 50% are available for heat pumps and between 25 to 40% for condensing boilers and insulation materials. There is also a reduced VAT rate for heating networks or from heat produced from at least 60% biomass, geothermal energy or waste sources.

Another new financial incentive has been in operation since January 2007. Known as the Sustainable Development Account, it is a tax free savings account for consumers with an upper limit of €6,000 and a 2.75% interest rate free of tax. Individual householders can benefit from the loans for carrying out energy saving work in existing dwellings using funds generated by the tax free Sustainable Development Account.

#### *4.1.8 Greece*

It should be noted that most of the savings to be delivered by 2016 are from recent or new initiatives. In the residential, they are proposing a series of measures which are all linked and are not separated in terms of their individual contributions. **However improvements to the building fabric and heating systems, through a mixture of tax breaks and subsidies, is expected to deliver about half**

**their residential energy savings by 2016.** Nearly 10% further savings are expected to come from further promotion of solar water heating by a mixture of regulation for new build, lower VAT rate and subsidies.

#### 4.1.9 Ireland

**The Irish energy saving plans to 2016 in the residential sector depend heavily on building regulations to meet their target.** Much of the savings from building regulations comes from the existing 2002 and 2007 regulations although the proposed 2010 regulations contribute a quarter by 2016.

The Home Energy Saving scheme provides grants to homeowners who improve the energy efficiency of their home through either improving the insulation of the walls or loft or installing new efficient boilers and control systems. There are also grants for householders who choose to get a Building Energy Certificate assessment undertaken before and after the work is completed although this is not mandatory.

Although not part of the Irish NEEAP, an energy efficiency obligation scheme (similar to that operating in Northern Ireland) is under consideration as part of the framework of the emerging all island energy market<sup>17</sup> and separately being promoted by the Regulatory Assistance Project.

#### 4.1.10 Italy

**The main policy tools to deliver most of the energy savings expected in the residential sector by 2016 are related to Government subsidies, tax breaks and energy efficiency obligations (the Italian White Certificates).**

The tax incentives are significant and allow gross tax deductions equal to 55% of the amounts paid by the tax payer (residential or commercial) up to a maximum of €100,000. Payment is conditional on measures which result in an improvement to the existing building which are better than various values set out in legislation. The verification has to be carried out by an independent expert capable of issuing energy certificates. The measures cover insulation, windows, solar panels and condensing boilers.

In new build, the tax regime is similar but with lower maximum credits and covers the extra costs of achieving an energy requirement which is beyond existing Building Regulations. The reason for the phrase “the amounts remaining payable by the tax payer” is because it is expected that subsidies may be forthcoming from either the energy distributors who are obliged to save energy in their customer premises through the White Certificate mechanism or regional initiatives etc..

**In terms of energy saving measures, the biggest saving by 2016 in the residential sector is likely to come from improving the heating efficiency (around half) and these will be supported by a mixture of incentives, tax breaks and White Certificates.** The same three policy measures are expected to deliver about a quarter of the energy savings in 2016 from insulating walls and roofs and more efficient glazing. Nearly a quarter of the expected energy savings by 2016 will come from appliance standards and labelling including the phase out of incandescent light bulbs.

The Italian white certificate scheme (2005-2009), formally began in January 2005, with a target to achieve annual energy savings of 3.2 million toe in 2009. At the end of 2007, new targets were set for the 2010 – 2012 period (annual saving targets from end use energy efficiency by 2012 of 3.5 million toe in the electricity distribution sector and 2.5 million toe in the natural gas distribution

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<sup>17</sup> Sustainable Energy Ireland – private communication.

sector); by 2012 this means that cumulative savings of 22.4 Mtoe per year will have been attained. This obligation applies to electricity and gas distributors supplying more than 50,000 customers. Aside from these obliged energy companies, some organisations, registered with the Italian energy regulator as 'eligible' bodies can participate in the program: this covers energy service companies (ESCOs) and some industrial (e.g. installers of insulation and heating equipment) and non-industrial organisations. Such eligible bodies can obtain verified energy savings (White Certificates) in their own right from the Italian energy regulator.

To comply with this obligation, the energy distributors may choose one of the 4 following options: develop energy efficiency projects within their company, develop joint projects with third parties, purchase energy efficiency certificates on the market or through negotiable bilateral contracts with a third party (other obligated or eligible organisations) or pay a penalty due to failing to meet the obligation. Projects can be put in place in all sectors consuming final energy, although the savings to date have been dominated by the buildings sector (80%). The program contains additionality criteria e.g. only savings made above market norms or legislative demands can lead to a certificate being issued.

The annual target set for designated distributors in 2005, 2006 and 2007 was exceeded by 43% and the extra savings were banked for the next period. This led to the increase in targets from 2009 as well as revision of the energy saving estimates and cost recovery allowance by the Italian regulator. From a slow start, increasingly White Certificates have been traded in the spot market – in 2007 trades represented 48% of the saving target.<sup>18</sup>

#### 4.1.11 Luxembourg

**Nearly three quarters of the energy savings expected in the residential sector by 2016 will come from building regulations.** It is interesting to note that most of this is from energy savings from the 1995 and 2001 building regulations under the allowance of early actions being counted. There also have been subsidies for going beyond building regulations but these are only expected to produce around 15% of the residential sector savings in 2016.

There are plans from January 2010 to introduce obligations on energy companies to offer energy saving to their residential customers and possibly to introduce a White Certificate scheme at the same time. The alternative of voluntary agreements with the energy companies or an energy efficiency fund via an energy levy will be decided in the interim.

#### 4.1.12 Netherlands

The Netherlands' NEEAP does not give any breakdown beyond total savings by 2016 in the five end use sectors of residential, tertiary, industry (non ETS), transport and agricultural. The largest saving is expected to come from the residential sector of over 40%. Within the residential sector the following cross sectoral measures are expected to apply: energy taxation, building regulations and a temporary subsidy scheme providing up to 15% of the investment costs for technical measures in existing buildings to reduce energy consumption. Measures covered include cavity, roof and wall insulation, solar water heating, heat pumps and CHP installations.

There is also a low income scheme (TELI) aimed at overcoming the information and monetary barriers to energy saving measures in low income households. The scheme subsidises projects carried out by local authorities, energy companies and housing corporations. The measures covered include water saving, shower heads, CFLs and insulating of pipes.

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<sup>18</sup> AEEG Private communication 2009

The main initiative in the residential building sector is the “More with Less” plan. This is a voluntary agreement between the Government, energy companies, housing associations and the construction sector. It has ambitious targets but has not yet progressed beyond the pilot status. Indeed concerns are being raised as to whether the voluntary nature, and in particular the lack of resources, will be a major barrier to the success of the initiative outside of the social housing sector. It would appear as if a reappraisal of options is being conducted including looking again at obligations on energy companies, but the outcome at the time of writing is unclear.

#### 4.1.13 Portugal

The Portuguese National Action Plan on Energy Efficiency has been used as equivalent to a NEEAP as it covers the period to 2015. **The largest energy saving expectation is from Building Regulations at around one third of the total residential savings by 2015.** In particular, Portugal currently has a levy on electricity companies which is used by the National Energy Agency, ADENE, to provide incentives in the form of subsidies for energy efficient appliances and lights as well as insulation and microgeneration installations. The incentives/disincentives are cash subsidies for superior performing equipment (e.g. €100 for A++ and €50 for A+), subsidies for installed insulation and microgeneration measures and a tax on inefficient lighting. This is also accompanied by regulation on Minimum Energy Performance Standards.

It has been hard to separate the sources of the incentive funding. However it would appear that the largest source of subsidies for use in the residential sector is coming from the energy efficiency levy on energy distributors (about €16 million per year additional expenditure). Low interest credit (€250 million per year) is available for investments in energy efficiency focussing on urban rehabilitation. Of potential interest in the future is the creation of an energy efficiency fund which will provide in agreement with banks annual funding of up to €250M/year for personal low interest credit for financing energy efficiency measures. The proposed reduction in interest rate is 4% for guaranteed loans; without guarantees the interest rate will be up to 8%.

Another interesting initiative for future evaluation is in the field of behaviour change. An energy efficiency bonus will be available to householders which is dependent on sustained reduction in electricity consumption over two years. An energy efficiency cheque will be sent at the end of the second year equivalent to either 10% of their electricity costs if they have saved 10% of their electricity bill or 20% if they have saved 20%. The energy efficiency cheque can then be spent on energy efficiency measures. This programme is only starting so it is not clear what success it will have.

#### 4.1.14 Sweden

Sweden has a long history of stringent building standards and, along with its Danish and Norwegian neighbours, has the highest standards for insulation components in the world<sup>19</sup>. The main challenge for Sweden is to refurbish around one million apartments which were built in the 1960s. Outside of the extensive district heating networks in Sweden, heat pumps have become a common solution with most being of the ground sourced heat pump variety. These are supported by subsidies as part of a move away from direct electric heating in family houses and apartments. The same grant also covers extending district heating and biomass boilers.

Although the Swedish NEEAP outlines measures that will give rise to energy savings in the building sector, it does not split them by residential or tertiary sector end use. The combined quantitative assessment is listed in the tertiary sector (Table 4.2) as there is one policy measure which applies uniquely to the tertiary sector. Nevertheless **it is clear that building regulations are the dominant**

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<sup>19</sup> IEA Country Energy Study: Sweden 2008

**player**, nearly 50%, and that subsidy schemes to help move away from direct electric heating to either district heating or heat pumps or solar water heating are significant.

For many years Sweden has had a requirement for local authorities to provide objective and impartial information and advice on energy efficiency improvements to householders. This is going to continue and it is likely that its remit will be widened to include more efficient energy use in the transport field.

#### 4.1.15 United Kingdom

**The UK NEEAP shows clearly that most of the expected savings will come from two main policy measures, viz. building regulations and the obligations on energy utilities to save energy and carbon dioxide in their residential customers' homes.** Of particular interest in the building regulations is the requirement since 2005 for all replacement boilers to be condensing except in certain cases<sup>20</sup>. This turns out to be the **single most important building regulation as it applies to existing as well as new buildings.**

The UK has the longest running energy efficiency obligations and this has grown in magnitude to currently nearly €1 billion a year being spent by energy suppliers on energy efficiency measures in the residential sector. Although a large figure, it still only represents around 3.4% of gas and electricity bills in the UK for the average householder. There have been detailed evaluations of all the phases of the obligations till 2008 and these are available from the present author<sup>21</sup>.

### 4.2 Key Policies in the Tertiary Sector

For those countries that have attempted some form of quantification of their policy measures, Table 4.2 shows a series of ranges from less than 10% to greater than 50%. In all cases the percentage figure refers to the expected contribution to the energy savings arising in the tertiary sector. Again Table 4.2 is complex and while it is still under populated, it is more diverse than the corresponding Table 4.1 for the residential sector. It is clear that the policy expected to make the greatest contribution in most countries is building regulations. The next two policies expected to make a significant contribution are government grants/subsidies and appliance labelling & standards. The only other policy expected to make a significant contribution in more than two countries is obligations on energy utilities to save energy and/or carbon dioxide. Although not so widespread, two other policies worthy of note are tax breaks and low interest loans, particularly if accompanied with tailored advice. The following sections look at the key policy measures in turn for each of the countries:

#### 4.2.1 Austria

There are several three star policy measures within the activities planned by Austria for the tertiary sector. For example, within the heading of improving the thermal quality of the building shell in new build, there are six sub policy activities all rated as three star. Although no precise quantification is given, the impression from reading the action plan is that building regulations and government grants or subsidies will be important in achieving their targets by 2016.

#### 4.2.2 Belgium

At the federal level, those measures described as having high effectiveness are minimum equipment performance standards, energy labelling schemes, tax rebates and soft loans. Within the public sector, public procurement and greater use of third party financing/energy services are also judged to be important.

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<sup>20</sup> In reality, the exemptions from installing a condensing boiler in special cases have turned out to be less than 5% and the market swapped rapidly to the efficient solution since 2005.

<sup>21</sup> The evaluations have been "misplaced" in the transition from one government Department (Defra) to DECC.

In the Brussels Capital region, the tertiary sector accounts for an unusually high 39% of energy consumption. Although not quantified, the Brussels region policies include subsidies through the public service obligation of the gas and electricity network operator covering energy audits, feasibility studies, energy design during the planning of new buildings, energy management systems, cogeneration, renewable energy systems and improving heating, insulation and lighting systems.

In Wallonia, it is not possible to identify the policies expected to have a high effectiveness. The usual mix of policy measures is present: building regulations, information campaign, appliance labelling and standards, energy audits, subsidies/ grants for improving the energy efficiency performance of insulation, heating, etc.

In Flanders, the three key policies of building regulations, energy efficiency obligations on the electricity distribution companies and subsidies for health and welfare facilities are not separated individually. **It would be reasonable to expect that it is the building regulations and energy efficiency obligations which contribute to most of the anticipated savings in the tertiary sector by 2016.** See section 4.1.2 for more discussion of the annual 1.5% primary energy saving target set for the non residential, non energy intensive sector.

#### 4.2.3 Denmark

Denmark used their 2005 plan covering the period from 2006-13 as their submission for their NEEAP. Excluding transport, it intends to save 7.5 PJ per year average energy saving. The IEA country review of Denmark in 2006 contains a table<sup>22</sup> which indicates how the total of 7.5 PJ per year saving is expected. **The two most important policies (covering all end use sectors except transport) are the obligations on the electricity, gas, oil and district heating companies to save energy of around 40% and improvements to the existing building stock of around 25% from tighter regulations on renovations or replacement equipment and greater promotion of building energy labels.**

See section 4.1.3 for more discussion of the annual delivered energy saving target set for the non transport sector. Currently, the industrial and commercial sectors account for 50% of the annual 0.82 TWh target and the public sector accounts for 8%.

#### 4.2.4 Germany

**In Germany, the energy savings in the tertiary sector by 2016 arise mainly from building regulations (just over 40%) and from advice coupled with the availability of low interest loans (around 35%).**

As discussed in more detail in section 4.1.4, the KfW bank plays an important role in driving energy efficiency investments as part of its refurbishment of buildings activities. In the small business sector, KfW launched a new scheme in February 2008 entitled “Special Fund for Energy Efficiency in SMEs”. This provides both subsidised audits of premises as well as low interest loans. There are 2 types of audits: the “initial” to highlight potential savings with the audit fee subsidised up to 80% up to a maximum of 2 days. The second audit, the “detailed” is an in-depth energy analysis to prepare a strategy for energy-saving measures; subsidies available are up to a maximum of 10 person-days and up to 60% of daily fee.

By the end of 2008, more than 1,800 initial audits and more than 400 detailed consulting audits had been undertaken. The audits cover both commercial and industrial sites. Typical energy efficiency

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<sup>22</sup> Table 11 IEA Energy Policies of the IEA Countries: Denmark 2006

measures identified include heating, air conditioning, lighting, ventilation, hot water and upgrade of buildings according to Energy Conservation Directive<sup>23</sup>.

In the public sector, the most significant contributions come from modernising street lighting, improvement to federal government properties and energy efficient traffic lights.

In the trade and services sector, the key policy activities are tailored advice and financial support in the form of low interest loans and appliance labelling and standards.

#### 4.2.5 Spain

The Spanish have a saving and energy efficiency strategy (E4) in place covering the progress with energy efficiency from 2004 to 2012. In July 2007 the action plan for the five years from 2008 to 2012 inclusive was updated and this went into some considerable detail about the energy saving measures. However it has not been included in the current analysis because it is four years away from the target date of 2016. It is worth noting that more than half of the expected energy savings by 2012 will arise from the transport sector – probably a higher fraction than most other countries would expect from this sector.

Nevertheless the quantification is important to understanding the Spanish key policies. The major source of funding will come from a levy on the electricity tariffs which is expected to generate around 58% of the money available for investment subsidies and promotion of energy efficiency. There is also around 12% of the funding coming from a levy on the gas tariffs. The remaining 30% of funding is made up of the European regional development funds (20%) with public and municipal funding providing the balance. The electricity and gas tariffs are the equivalent of around 1.5% of the gas and electricity bills.

**In terms of where the expected savings by 2012 are likely to come from in buildings (includes residential and tertiary), over 40% will come from lighting with improving the existing envelope and improving the thermal insulation of existing buildings, each contributing around 20%. A separate policy, aimed at promoting the construction of new buildings and the rehabilitation of existing buildings with current poor energy performance, delivers nearly 20%. Finally improvements in building regulations are only expected to deliver around 2%.**

It is worth remembering that the energy use is very different between the residential and the tertiary sector in buildings. In the residential sector, 58% of final energy consumption is associated with heating and hot water and appliances and lighting together account for 21%. In contrast in the tertiary sector, cooling, heating and lighting are all around the 30% mark. For the biggest single carbon dioxide saving initiative (lighting), the main focus will be to take action on 30% of the lit surface area in the tertiary sector. To achieve the promotion of buildings beyond existing building regulations and rehabilitation of existing buildings with poor energy performance, the objective is to have a high energy classification (A or B) by a mixture of promotion and financial support.

For the activities linked to the residential and office equipment, these are investment aid supports. In the public sector, the focus will be on energy management in buildings and ensuring that energy efficiency purchasing criteria are energy efficient – there is no subsidy envisaged in these actions.

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<sup>23</sup> Presentation by Monika Beck September 2009

[http://re.jrc.ec.europa.eu/energyefficiency/pdf/Proceedings\\_Istanbul\\_2009/9\\_BECK.pdf](http://re.jrc.ec.europa.eu/energyefficiency/pdf/Proceedings_Istanbul_2009/9_BECK.pdf)

The public services sector activities focus on public lighting and public water supply. In terms of carbon dioxide savings, most of the quantified activity is expected to arise from improvements in public lighting.

#### 4.2.6 Finland

The keystone of the Finnish activity is subsidised energy audits but in practice they are coupled with other policies, either financial incentives or as part of voluntary agreements with businesses. **The two big ticket items in the tertiary sector are building regulations and voluntary agreement with the real estate and construction industries.** The anticipated savings from the audits of municipal and private sector buildings is only ~2% of the expected savings in this sector by 2016.

Voluntary agreements in energy efficiency have been an integral part of Finnish energy policy since 1992. In 2008 a new agreement regarding energy efficiency in industry and trade (PUSO) was signed between the Finnish Ministry of Employment and Economy (MEE) and eight industrial and tertiary branches represented by the Finnish Confederation of Industries. The main agreement provides clarification regarding terminology, areas covered, the obligations of contracted parties, monitoring and assessment, management and agreement duration. The main agreement is then split into 10 separate branch agreements each with a defined action plan associated with energy saving objectives.

For example, one of these concerns the leisure sector: hotels, spas, theme parks and ski stations. It was signed with the Finnish Leisure Association. The agreement outlines a coverage target for the sector (at least 62% of association members have to join the project in 2010), an energy saving target (9% by 2016, similar to the EU ESD) and operational goals. These include: reinforcement of communication and training actions for employees, inclusion of energy efficiency in purchase decisions and investment policies, improvement of logistical energy performances with specific focus on supply transport, use of renewable energies and their assessment.

The MEE provides financial support for energy audit and analysis as well as for energy management investments. It also allocates resources to the Motiva Oy energy agency, responsible for energy efficiency promotion. In collaboration with partners, Motiva is in charge of preparing and introducing agreements by supplying the necessary tools and services. It provides annual sector reports and communication and training material to businesses.

#### 4.2.7 France

The French NEEAP focuses on a “top down” approach than the “bottom up” approach. This is less helpful in quantifying the actual policy measures which deliver the main energy savings in then tertiary sector by 2016.

As discussed in Section 4.1.7, the White Certificates’ policy mechanism is intending to be extended from January 2010, with widening of the obligated parties to include petrol and diesel retailers and also increasing the target by at least a factor of over 5.

In the tertiary sector, there a wide range of proposed methods affecting new build, e.g. from 2010 all must comply with low consumption or positive energy standards and a ban on incandescent light bulbs and single glazing from 2010. Within the public services there is a commitment to thermally renovate all public buildings within the next five years and to provide financial incentives for thermal renovation of private buildings.

#### 4.2.8 Greece

It should be noted that most of the savings to be delivered by 2016 are from recent or new initiatives. In the tertiary sector **the two most important single measures are expected to be building regulations and appliance labelling & standards.**

The mandatory energy management systems proposed for the tertiary sector and the use of government grants or subsidies are important but the energy saving by 2016 is not split between the two policies (just under 20%) as they are envisaged as a package. The expectations in percentage terms from the exemplary behaviour in the public sector are higher than in the rest of the EU, but they do include fuel switching to natural gas.

#### 4.2.9 Ireland

**The Irish energy saving plans to 2016 in the tertiary sector are roughly evenly split between subsidising the creation of energy accounting or monitoring systems, building regulations and government grants or subsidies.**

In the public sector, challenging targets (33% energy efficiency improvement) have been set for all public sector bodies to be achieved by 2020 and the government will be requiring these bodies to produce annual reports showing progress towards that target. Financial support is available for hiring external consultants to undertake feasibility studies for improving energy efficiency as well as support for implementation of these energy efficient solutions and for outsourcing energy management to third parties. Other important initiatives include the green public procurement (including energy efficient lighting) and energy rating of public buildings as required by the Energy Services Directive.

In the business sector, there is key support for the introduction of energy management systems in companies. Additionally, there are free assessments and advice to small businesses on their current energy use and opportunities for savings, promotion of the energy star initiative, building energy rating as required under the Energy Services Directive and increased awareness campaigns. Additionally, the Irish electricity company (ESB) have demand side management initiatives which cover the tertiary and large industry sectors and are expected to contribute a significant energy saving which unfortunately is not broken down into the different end use sector components.

As discussed in section 4.1.9, although not part of the Irish NEEAP, an energy efficiency obligation scheme (similar to that operating in Northern Ireland) is under consideration as part of the framework of the emerging all island energy market and separately being promoted by the Regulatory Assistance Project.

#### 4.2.10 Italy

The main energy efficient activities targeted in the tertiary sector are efficient heating, efficient air conditioning, improved internal lighting and public lighting. The single biggest area for improvement (about two thirds of the expected savings by 2016) is the adoption of efficient heating. Several policies contribute to this including information programmes, incentives for replacing inefficient boilers, tighter constraints in new or restructured buildings, energy certification of buildings, White Certificates to provide incentives and promoting ESCOs to deliver heating energy services. The next major contributor at just over 20% of expected savings is as a result of improving the efficiency of lighting. **Again the major policy elements are the use of White Certificates to provide financial incentives, reductions in VAT and tax credits for modernisation of lighting installations, promotion of ESCOs to run public lighting services and minimum energy efficiency standards.** However the Italian White Certificates to date have been dominated by energy savings in the residential sector with public lighting (14%) being the dominant tertiary sector beneficiary. (See section 4.1.10 for fuller description of the Italian white Certificate scheme).

In improving the efficiency of public lighting, the policy actions are expected to be incentives via White Certificates, information programmes, taxing of mercury vapour lamps and encouraging the use of ESCOs to run public lighting.

#### 4.2.11 Luxembourg

As in the residential sector, **most of the energy savings to be achieved in the tertiary sector by 2016 will come from building regulations (around three quarters). Again, as in the residential sector, a considerable part of this saving arises from early actions.**

Just over 20% of the expected energy savings in 2016 will come from realising electricity saving potential in this sector. There are a variety of policy options being considered for introduction in 2010, most notable of the new options are subsidies, energy services and obligations on energy companies/energy efficiency funds.

#### 4.2.12 Netherlands

The Netherlands' NEEAP does not give any breakdown beyond total savings by 2016 in the five end use sectors of residential, tertiary, industry (non ETS), transport and agricultural. The tertiary sector contribution to the total savings by 2016 (including transport) is 17%. For the tertiary sector the package contains some cross sectoral measures such as energy taxation. The main specific measures are building regulations, long term agreements and benchmarking covenants coupled with subsidies to encourage investment in energy efficiency measures. The energy investment deduction is available for those companies that pay corporation tax and permits deductions from taxable profit related to the purchase or production costs of energy efficiency equipment and sustainable energy. There is an energy list which defines what technologies and situations the tax relief is available for.

There are some long term agreements about energy efficiency which have been introduced with subsidies for some organisations in the tertiary sector, e.g. science, banks and insurers, supermarkets, etc. Many of the other initiatives are identical to that described in Section 4.1.12 including EPCs, promotional activity, temporary subsidies and appliance labelling and standards. Additionally there is task force on lighting which aims to get agreements between producers, retailers and users which will be more ambitious than the Minimum Energy Efficiency Standards under the Ecodesign Directive. The task force will cover internal lighting in the commercial and residential sectors and public lighting.

#### 4.2.13 Portugal

The Portuguese National Action Plan on Energy Efficiency has been used as being equivalent to a NEEAP as it covers the period to 2015. **The largest energy saving expectation is from a combined policy on building regulation and tax breaks at around three quarters of the total tertiary savings expected by 2015.** This is a mixture of promoting energy performance certificates, building regulations and tax incentives on energy efficiency equipment in offices as well as solar water heating and renewable microgeneration technology in schools. As well as fiscal incentives towards microproduction, it is planned to have progressive alignment of taxes with the energy certification system for buildings.

Some of the money raised via the energy efficiency levy on energy distributors (about €8 million per year) will be targeted to encourage energy service companies. This includes an "insurance concept" whereby half the losses of the difference between the ESCO investment and the profits of the contract would be covered by funds from the energy efficiency fund. In the public sector, there is a law which requires 50-75% of the energy savings possible in the public sector to be delivered via ESCO mechanisms.

Portugal is the only country to expect significant energy savings to come from accelerated depreciation of capital expenditure on energy saving technologies – this may be linked to the fact that this is as yet an untried policy in Portugal. The Government green procurement policy is expected to deliver less than 1% of the savings in this sector by 2016.

#### 4.2.14 Sweden

As described in Section 4.1.14, Sweden has a long history of stringent building standards. Although the Swedish NEEAP outlines measures that will give rise to energy savings in the building sector, it does not split them by residential or tertiary sector end use. **Building regulations will continue to play an important role going forward and subsidy schemes are available to help move away from direct electricity heating to either district heating or heat pumps or solar water heating.**

There has been considerable use of energy services in the public sector and an evaluation of these activities since the beginning of the new millennium has shown average savings of 22% have been achieved for heating and hot water.

Another important policy for Sweden is technology procurement. It is proposed to expand the programme to encompass greater dissemination of the information on the products that are developed under the technology procurement activities. As a pioneer of this policy measure, Sweden expects around 11% of the energy savings by 2016 in the tertiary and residential sector to come from this area – considerably higher than other countries especially when it is borne in mind that this percentage figure includes energy savings in the residential sector.

#### 4.2.15 United Kingdom

Unlike the residential sector, the UK has many smaller policies to deliver the required target but **only one significant policy measure accounting for nearly half of the savings – building regulations.** The only other two which contribute more than 10% of the energy savings are related to subsidised energy efficiency audits coupled with tailored advice and appliance labelling & standards.

Central Government has set itself the challenging target to reduce carbon dioxide emissions from their activities by 30% by 2020 compared to the 2000 levels. Additionally they are proposing that Central Government's office estate will be carbon neutral by 2012 through increased use of cogeneration and renewables where appropriate or offsetting that fraction of the emissions which cannot be eliminated by other practical activities.

One novel policy being introduced from April 2010 is the Carbon Reduction Commitment (CRC). This is a mandatory emissions trading scheme for the large, non-energy intensive sector, covering both business and the public sector, which will deliver carbon savings of 4.4 Mt CO<sub>2</sub> saving per year by 2020. The CRC scheme will focus on those large organisations where the energy efficiency benefits would outweigh the administrative costs. The CRC will cover emissions from energy use by organisations with mandatory half hourly metered electricity consumption of more than 6,000 MWh/year. This would generally capture organisations with annual electricity bills above £500,000 (nearly 0.6M euro). Examples of organisations that will be covered by the CRC include universities, hotel chains, retail outlets etc.

CRC will target CO<sub>2</sub> emissions from both direct and indirect energy use (i.e. the end use of electricity) and to avoid overlap with existing measures, the CRC will not target emissions covered by Climate Change Agreements (CCAs) nor direct emissions covered by the EU ETS. In addition, organisations with over 25% of their energy use emissions in CCAs would be completely exempt.

CRC aims to be a “light touch” scheme by allowing self certification of energy use and emissions, backed by an independent risk based audit regime.

To further minimise administrative burdens, CRC allowances will be auctioned so participants will be able to determine their own emissions targets within the scheme. The auction revenue will then be recycled to CRC participants in proportion to average annual emissions since the start of the scheme, with a bonus/penalty depending on position in a CRC league table. This way, the scheme will be broadly neutral to the Exchequer.

## **5. Identifying those Best Practice Policies which will Deliver Significant Savings**

As governments do spend a considerable time evaluating their policy initiatives, then if their policies are continuing or being expanded in the future, it is reasonable to assume that they must be delivering the policy objectives in a cost effective manner. Published information and independent evaluation is not so widely available and often the evaluation is carried out within a different framework from those of other policy measures; for example, the concept of additionality or free riders (those that would have done the investment without the policy initiative) is often not addressed in such evaluations. Consequently in this section the level of independent verification of the Best Practice policies does vary.

Tables 5.1 and 5.2 show those policies which were identified in section 4 as making more than a 10% contribution to the expected energy savings in 2016 in either the residential or tertiary sector as appropriate. The considerable reduction in numbers is noticeable, particularly in the residential sector. Best practice policies have been identified as those policies which are expected to make more than 10% energy savings in the residential or tertiary sector by 2016 and which are expected to do so in more than one country. These are discussed further in sections 5.1 to 5.3.

All the EU-15 countries are expecting to rapidly expand the rate at which energy efficiency improvements are occurring in the residential and tertiary sectors. As well as an aware public, trained and sufficient installers/retailers of energy efficiency solutions, there needs to be drivers which ensure that someone has a real need to promote energy efficiency solutions to these 2 end use sectors and also that finance is available to fund the up front costs of the energy efficiency measures.

Regulation policies clearly provide the drivers in appliances and buildings but historically, governments have been less forthcoming in terms of regulating for existing buildings. To a more limited extent, energy efficiency obligations on energy utilities have provided drivers for them to implement energy efficiency in their customers’ premises and households, but the coverage is far from universal compared to that from regulation. However, as the skilled base of energy efficiency professionals to install such measures is frequently limited, energy efficiency obligations can offer a way of matching (a growing) demand with skilled capacity.

The availability of finance is an area where there appears to be no consensus in the EU-15. Options include tax breaks, national energy efficiency banks, raising money from energy customers and government subsidies. Each option has advantages and disadvantages.

### *5.1 Policies which are significant in both the tertiary and residential sectors*

**Building regulations** are without doubt the most widespread Best Practice policy with significant energy and carbon dioxide saving potential in both the residential and the tertiary sectors. As they are low cost options for government and because of the historic reluctance of the building industry to advance significantly, then there is a well enshrined process in most countries to demonstrate that the proposed building regulation changes are indeed cost effective when viewed from a national

perspective. Consequently they are a “relatively” easy measure to enact and after many years there is a set process as to how to go about this in every country in the EU-15. As such policies are already part of ECF’s work, they will not be considered further here.

Another popular policy in both the residential and tertiary sectors is the use of **government grants or subsidies** to bring about investment in energy efficiency. This is an area where the issue of free riders/additionality/deadweight is more of a concern and is not always addressed. However if the policy is successful in bringing about a dramatic step change in the installation or purchase rate of energy efficient solutions, then clearly such problems are of less concern. As is well known in both the residential and tertiary sectors, recipients react much more positively to Government grants than the “rational economist” would credit from the improved financial appraisal. In the UK, a variety of programmes have been analysed since the 1980s looking at why government grants have a disproportionate effect to the actual value of the grants in encouraging the uptake of energy efficiency measures. For example, in the Energy Efficiency Demonstration scheme which ran in the 1980s, companies were encouraged to try out novel technology for grants typically offering typically 15-20% of the capital cost. This made little difference to the internal rate of return of the project but the fact that the government was willing to support it gave confidence to the company to invest in the new technology. Similar studies in the residential sector have established that the implied “Government confidence” in supporting energy efficiency measures is important as well as the improved financial case for the investment.

The next widespread policy measure in both the residential and tertiary sector in **appliance labelling and standards** expected to typically save between 10 to 20% of energy savings by 2016 in both the residential and tertiary sector. Again this is already being covered in more detail by CLASP Europe and ECF and so is not discussed further here.

The policy of using **obligations on energy utilities to save energy and/or carbon dioxide** is very significant in both the residential and tertiary sectors. Although not as widespread in country coverage across the EU-15, where it has been adopted, it is expected to make at least half the energy saving by 2016 in those countries which have enacted this policy.<sup>24</sup> To date most of the energy savings from such policies in France and Italy have been realised in the residential sector and public lighting. The non residential activities are expected to expand in the future.

In contrast to government subsidy programmes, there have been considerable analyses both by government and independently which have been published (see footnote 12 for more information). This may be because of the greater need to justify the imposition of the costs of the energy efficiency measures on the end customers or merely they follow the USA where such DSM programmes have always been analysed quite rigorously. Whatever the reason, the programmes in the UK, Flanders, France and Italy have been widely published and shown to be highly cost effective despite the variation in approaches and end use sector coverage. The latest evaluation of the UK energy efficiency obligations has addressed the issue of deadweight and has shown that it is around 20% for the programme as a whole though in some activities, the deadweight can be as high as 100% if simple rules are not introduced over the subsidy of energy efficient appliances through such programmes.

A further advantage of energy efficiency obligations on energy utilities is that they can be designed to be outside public expenditure – important with the expected downturn of Government expenditure in the next few years following the recent financial crises. In effect, they follow a “polluter pays” principle in that the end user pays more for the amount of energy they waste.

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<sup>24</sup> Luxembourg is considering introducing energy efficiency obligations on energy utilities from 2010.

Table 5.1 Most significant policies in the EU 15 in the residential sector

Description	BEfl	DE	FI	GR	IE	IT	LU	PT	UK
<i>Economic or financial</i>									
Government grants/subsidies			>50%*	>50%*	20-30%	>50%*	10-20%	>50%*	<10%
tax breaks			>50%*	>50%*		>50%*		10-20%	
low interest loans for EE		>50%		>50%*					
subsidised energy audits			>50%*						
<i>Energy Utilities</i>									
obligations on energy utilities	>50%					>50%*	10-20%		40-50%
Energy utilities as a source of funds								40-50%*	
<i>Education &amp; Information</i>									
tailored advice for householders		20-30%							
Building Regulations	40-50%	Lander	20-30%	20-30%**	>50%	Local	>50%	30-40%	40-50%
Appliance Labelling & Standards	Belgium	10-20%	<10%	10-20%		10-20%	<10%	20-30%*	<10%

**Notes**

\* policies are not separated individually

\*\* policies are not separated individually (including building regulations)

N.B. Portuguese Action Plan savings are to 2015

Table 5.2 Most significant policies in the EU 15 in the **tertiary sector**

Description	BEfl	DE	FI	GR	IE	IT	LU	PT	SE&	UK
<b><i>Economic or financial</i></b>										
Government grants/subsidies and/or guarantees	>50%**		<10%*	20-30%*		>50%**			30-40%	
Government grants for feasibility studies					30-40%					
tax breaks						20-30%*		>50%		
accelerated depreciation for energy efficiency equipment								10-20%		
low interest loans for energy efficiency investment		30-40%*								<10%
support for third party financing/energy service companies	<10%					>50%**				
subsidised energy efficiency audits			<10%*							10-20%*
<b><i>Regulatory</i></b>										
public procurement for energy efficiency measures								<1%	10-20%	
mandatory energy management systems in tertiary sector				10-20%*						
<b><i>Energy Utilities</i></b>										
obligations on energy utilities to save energy and/or CO2	>50%**					>50%**	20-30%			
<b><i>Education &amp; Information</i></b>										
tailored advice		30-40%*								10-20%*
voluntary initiatives with manufacturers, retailers building owners etc			30-40%							<10%
subsidy to create energy accounting/ monitoring systems					30-40%					
Government/public sector exemplary behaviour		<10%	<10%	10-20%						<10%
Building Regulations	>50%**	40-50%	40-50%	20-30%	30-40%	>50%**	>50%	>50%**	40-50%	40-50%
Appliance Labelling & Standards	Belgium	10-20%	in 2011	20-30%		10-20%			<10%	10-20%

**Notes**

\* policies are not separated individually

\*\* policies not separated including building regulations

&amp; covers both the residential and tertiary sectors in Sweden

N.B. Portuguese Action Plan savings are to 2015

It is also worth noting that an alternative approach of using the energy company as source of funds for supporting energy efficiency investments has proved very popular in Spain and Portugal.

Finally, a policy which is expected to achieve significant energy savings by 2016 in both the residential and the tertiary sectors is the **energy efficiency investment bank providing low interest loans, particularly if accompanied with tailored advice**. Although not widely adopted yet across Europe, the experience of Germany has been particularly encouraging and Greece seems to be set to follow. In view of the rapidly expanding scale of the German loan budgets (over 5 billion euro per year), any concerns about the additionality of the loan funds would appear to be diminishing.

Other attractive features about the KfW loan fund are the single brand across Germany when marketing the availability and attractiveness of the loans on offer and the fact that they use the normal, local banks and financial institutions to actually transact the loans to consumers and small businesses. As it is believed to be a cheaper option to Government expenditure than significant subsidies, the German Government has decided to continue and expand the programme. The KfW bank has extended its operations to south east Europe with 221 million euro being made available to 8 countries by 2008 (see reference in footnote 16). Some of the new Member States have introduced similar pilots with funding from International Financial Institutions whereby the money is again loaned through the normal, local financial institutions but attention is also paid to lowering the perceived risk of loan default by the local lending institution.<sup>25</sup>

### *5.2 Policies which are significant only in the residential sector*

In the residential sector, those countries which have introduced **tax breaks are expecting significant energy savings**, not least because of the popularity with householders. Again this is an area where deadweight is important and not always estimated.

The public's desire to avoid tax in many areas of human activity is legendary and requires little further justification here. In the residential sector, UK focus groups in the early 2000s, when discussing climate change, always gave the same message, i.e. the fact that the government was not doing very much on tackling climate change meant that it could not be important, otherwise "the government or the local authorities would be doing something about it". The comparison was usually made with waste recycling where the local authorities were particularly active with publicity and practical action plans<sup>26</sup>. Another message that comes through from the UK focus group work is that householders like getting tax deductions from government and hence do tend to act more than the economic logic might dictate.

In view of the increasing tax burden that all major economies are facing, then tax breaks at a time of rising taxes are likely to be even more attractive. However, the question of whether the government can afford to forego those taxes is a separate but relevant issue.

It is interesting to note that different countries do have very different approaches in terms of the other minor contributions with significant expectations in Italy and Portugal for tax breaks but nowhere else.

### *5.3 Policies which are significant only in the tertiary sector*

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<sup>25</sup> Aniko Dobi-Rozsa, "RESULTS OF SUSTAINABLE FINANCING AND DELIVERABLE MECHANISMS FOR ENERGY EFFICIENCY PROJECTS IN BUILDINGS IN CEE"

[http://re.jrc.ec.europa.eu/energyefficiency/pdf/Proceedings\\_Istanbul\\_2009/16\\_DOBI-ROZSA.pdf](http://re.jrc.ec.europa.eu/energyefficiency/pdf/Proceedings_Istanbul_2009/16_DOBI-ROZSA.pdf)

<sup>26</sup> In reality, the government was tackling energy efficiency in households through the energy efficiency obligations on energy suppliers but this was not visible to the householder; nor was the fact that the consumers were contributing towards the costs of the energy company activity in subsidising energy efficiency measures visible.

Tailored advice is the only policy measure (not already discussed in section 5.1) which meets the requirement of >10% expected energy saving by 2016 and expected to do so in more than 1 country. However, it should be noted that this is in conjunction with other policy measures such as subsidised energy audits and low interest loans.

## **6. Comments on Policies which have not featured strongly in the NEEAPs**

As stressed earlier, often there is a need for some accompanying, or indeed preparatory, policies to lay the foundations for those policies which actually deliver significant energy savings. Many policies are specifically only designed to raise awareness and provide information – both of which are necessary but not always sufficient to bring about the desired investment in energy efficiency measures.

Bearing the above comments in mind, the following section examines some of the measures which did not feature significantly in the quantified energy savings by 2016 in the EU-15 NEEAPs.

### **6.1 Residential Sector**

#### *6.1.1 Lower VAT for Energy Efficiency Measures*

The UK has had lower VAT rates for some energy efficiency saving products and installations for several years but it is noticeable that the Government did not quantify any contribution from this and listed it as part of a package including the fiscal incentives for private landlords, improved enforcement of building regulations and the Low Carbon Buildings programme (Government subsidies for household and community scale renewable energy technologies). This package is expected to save less than 1% of the total residential energy savings by 2016. This would seem to accord with the anecdotal evidence from the UK insulation industry which has long argued that the reduction in VAT is not enough of an incentive for householders to invest in insulation measures.

The only other country which has quantified potential savings from lower VAT rates is Greece and this is arising from policies they are about to implement now, rather than based on past experience.

#### *6.1.2 Tax to Penalise Bad Products*

Again from the quantitative analysis this would appear to be a method of raising taxes rather than being expected to bring about significant reductions in energy consumption.

#### *6.1.3 Environmental Taxation (Eco or Energy)*

It might appear quite surprising at first sight that the taxation of energy is not expected to deliver reduced consumption of energy or indeed the switching to greener sources as might have been expected from a rational economic appraisal.

Apart from those on the very lowest incomes, energy expenditure as a percentage of household income is sufficiently low that “politically acceptable” tax rises have little impact on energy consumption, particularly in the long run.

The low consumer response (for those not on the lowest incomes) to the energy price mechanism is well established in all EU-15 countries and particularly noticeable in the area of the prices of road transport fuel where the recent major increases in fuel prices once again demonstrated the relatively low elasticity of demand with energy prices.

#### *6.1.4 Subsidies for Going Beyond Existing Building Regulations*

Again this might seem surprising that this does not feature as a major quantification. However, it should be remembered that existing building regulations are quite stringent compared to most of the historical housing stock and so marginal improvements, although important, are not going to make a

large contribution by 2016 compared to the potential for saving energy from the existing housing stock. It should be borne in mind that the drive to very low energy or zero carbon homes will need innovation and demonstration and so short term support may be required in this area to meet longer term objectives (and larger energy and carbon dioxide savings).

#### *6.1.5 Regulatory*

There would appear to be (outside of building regulations and appliance labelling & standards) a preference for either economic or financial or energy utility involvement to deliver energy savings in the residential sector. Regulation as it affects individual existing homes, particularly for those that are occupied by their owners, has to date proven to be politically difficult, although there are clearly significant energy and carbon dioxide savings to be achieved.

#### *6.1.6 Behavioural Measures*

All countries appear to have been cautious about the extent of which they have factored in energy savings in 2016 arising from behavioural measures, e.g. smart meters always rated less than a 10% contribution to energy savings in 2016; similarly, on line carbon dioxide calculators, etc. Looking longer term, it is clear that this is a topic which will have to be addressed in order to really change our attitudes to energy use and climate change to achieve the ambitious goals of carbon dioxide reduction by 2050.

### **6.2 Tertiary Sector**

#### *6.2.1 Lower VAT for Energy Efficiency Measures*

This of course will only help those non-commercial organisations and as the energy use in the commercial sector tends to be about three times larger than in the public sector, then the overall impact will be rather limited – see also the discussion in the residential sector (Section 6.1.1).

#### *6.2.2 Environment Taxation (Eco or Energy)*

Again see the earlier discussion in the residential sector (Section 6.1.3)

#### *6.2.3 Setting Energy Saving or Carbon Dioxide Targets for the Public Sector*

Again this appears not to have been quantified by the Member States in their NEEAPs. For example, both Ireland and the UK have set 30% energy efficiency improvements from the public sector and yet neither provide an expected saving for 2016<sup>27</sup>. This omission of course may be rectified in the next NEEAP that these countries produce.

#### *6.2.4 Accelerated Depreciation for Energy Efficiency Equipment*

Only for Portugal was this quantified as an item having a 10-20% impact on savings in 2015. It should also be noted that this is for a planned project rather than based on experience to date. The UK has been running such a scheme for a considerable time now and the energy savings to be expected by 2016 were not separately identified. It is known that there was an evaluation of this programme which could be subject to a considerable deadweight but the report has not been publicly made available. No further comment can therefore be made.<sup>28</sup>

## **7. How Well do the Best Practice Policies Tackle the Barriers to Energy Efficiency?**

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<sup>27</sup> Ireland expects the SEI public Sector Support Programme to produce a saving of 0.16 TWh primary energy by 2016 through the use financial incentives to the public sector to produce better designs, services and technologies in new and retrofit projects.

<sup>28</sup> One can speculate that if the report had been a positive, then it would have been widely publicised.

This section explores how well those policies which have been identified as making the largest contributions towards the energy and carbon dioxide saving targets also directly tackle the main barriers to energy efficiency investment. This section is not intended to be an exhaustive analysis of the many divergent barriers as to why the “market” does not necessarily deliver the energy efficiency investment that the classical rational economic models would predict.

Historically, Member States have developed a large number of policy interventions because there are a large number of different actors who make decisions about different elements of both household and tertiary energy usage. For example, householders generally choose the products and appliances that they install in their homes and how they are used themselves; however appliance manufacturers and retailers determine the energy saving standards of the appliances and how they are promoted. In contrast, the dominant influence on the choice of replacement boiler is the installer of the equipment. All of these have differing responses to the signals and incentives.

This leads to a variety of policy interventions to tackle the varying barriers such as hidden costs including transaction costs, limited access to capital market failures, split incentives (commonly called the landlord/tenant barrier), lack of awareness, perceived riskiness of energy efficiency technologies/investments, the environmental externalities not being priced in fuel price consistently and need for public leadership.

Table 7.1 shows, for the various policy instruments, some examples of the key policies that have been identified in the present study and the final column shows the barriers to energy efficiency investment that are tackled.

Policy Instrument	Examples of Policies	Barrier Tackled
Regulation	Building codes and product standards	Hidden costs, environmental externalities, imperfect knowledge
Grants and fiscal incentives	Energy efficiency obligations, direct Government grants, tax breaks, low interest loans, loan risk sharing with commercial banks	Environmental externalities, inertia and lack of consumer interest, split incentives, savings not material, access to capital, high interest rates
Information and awareness raising	Energy labelling of products, building energy performance certificates, smart meters	Lack of awareness, misinformation about costs and benefits
Voluntary agreements (tertiary sector only)	Agreements with the real estate and construction industry	A faster alternative to introducing legal requirements
Public sector leadership	Public sector energy and carbon saving targets, public sector procurement	Proof that Government takes the issue seriously, accelerated introduction of new products thus lowering capital costs

**Table 7.1 Examples of the Barriers that are Tackled by the Various Policies Identified in this Study**

It is interesting in looking at Table 7.1 that the current analysis of the NEEAPs has shown that **most impact is expected from policies lying in the the regulation and grants & fiscal incentives activities.** This is not to say that the other polices are not important but simply that **more resources and promotional activities should be placed on these two in the future.**

## 8. Conclusions

This study has shown that from all the possible policy options that are under consideration or employed in the EU-15, some are clearly more important in delivering energy savings in the residential and tertiary sectors by 2016. An analysis was undertaken using quantifications deduced from the NEEAPs of the EU-15 Member States where possible. A significant energy policy is defined as one which is expected to save more than 10% of the quantified expectation of energy savings in the residential or tertiary sectors and is expected to do so in more than one Member State. There are six key policies in the residential sector and six key policies in the tertiary sector which satisfy this criterion of best practice policies. Furthermore, five of the policies are common to both the residential and tertiary sectors.

Without doubt **building regulations is the most popular best practice policy with significant energy and carbon dioxide saving potential in every Member State. The policies of Government grants or subsidies and appliance labelling and standards are also widespread and expected to make significant contributions throughout the EU-15.**

Other key policies present in both the residential and tertiary sectors are not so widespread but where they have been introduced, Member States expect considerable energy saving from them. For example **energy efficiency obligations on energy utilities to save energy and/or carbon dioxide in their customers' homes and premises are expected to contribute at least half the energy savings by 2016 in those countries that have enacted this policy.** Germany is the only country in the EU-15 with wide experience of large scale, **energy efficiency investment bank to stimulate energy efficiency investment. However, given the significance of the savings in Germany, coupled with the intention of Greece to follow suit and the use in the new Member States and South East Europe, then this policy option holds considerable promise for the future in tackling the significant need for financing energy efficiency investments** without resource to significant Government expenditure. It is also worth noting that some of the new Member States have introduced similar pilots with funding from International Financial Institutions but attention is also paid to lowering the perceived risk of loan default by the local lending institutions.

Finally, for best practice policies in the residential sector, those countries which have introduced tax breaks are expecting significant energy savings.

There are six policies measures in the residential sector and four in the tertiary sector which are not expected by Member States to make a significant energy saving contribution by 2016. In particular, countries appear to have been cautious about the extent to which they have factored in energy savings by 2016 arising from behavioural measures. Looking longer term, it is clear that this is a topic which will have to be addressed in order to really change our attitudes to energy use and climate change as without such a commitment, it is going to be very difficult to achieve the ambitious goals of carbon dioxide reduction by 2050.

While recognising that energy efficiency is a diverse subject and needs to be tackled at many levels, it is clear that **there are some important policy measures which will deliver most of the expected savings by 2016 and which are not necessarily widespread across all Member States.** It is recommended that ECF in its work programme focuses on spreading these best practices across the rest of the Member States. This should encompass not just the EU-15 states which have not adopted such policies but whether these are relevant or can be adapted to the specific situations of the new Member States and ultimately those in South East Europe.

In the future more resources should be given to these best practice policies across the whole of Europe as we move to delivering a significant step change in energy efficiency investment.