

Status Review of Renewable and Energy Efficiency Support Schemes in EU

**Ref: C08-SDE-05-03
10 December 2008**

Table of Contents

1. EXECUTIVE SUMMARY	5
2. INTRODUCTION	8
2.1. OBJECTIVE OF THE REPORT	8
2.2. METHODOLOGY OF THE REPORT	9
2.3. STRUCTURE OF THE REPORT	9
3. LEGISLATIVE FRAMEWORK	10
3.1. SUMMARY OF EU DIRECTIVE ON THE PROMOTION OF ELECTRICITY PRODUCED FROM RENEWABLE ENERGY, 2001/77/EC	10
3.2. THE GREEN PACKAGE	11
3.3. THE PROPOSED DIRECTIVE ON THE PROMOTION OF THE USE OF ENERGY FROM RENEWABLE SOURCES	12
3.4. SUMMARY OF EU DIRECTIVE ON ENERGY END-USER EFFICIENCY AND ENERGY SERVICES, 2006/32/EC	14
4. RENEWABLE SUPPORT SCHEMES	16
4.1. OVERVIEW	16
4.2. DESCRIPTION OF RENEWABLE SUPPORT SCHEMES IN EACH MEMBER STATE	18
4.3. SUCCESS OF SUPPORT SCHEMES	22
4.4. SUPPORT SCHEMES FOR HEAT	23
4.5. POSSIBLE HARMONISATION OF RENEWABLE SUPPORT SCHEMES ACROSS EUROPE	24
5. STATUS OF RENEWABLE ENERGY SOURCES	26
5.1. INSTALLED RENEWABLE ELECTRICITY CAPACITY AND ELECTRICITY PRODUCTION IN EACH MEMBER STATE	26
5.2. RENEWABLE TARGETS	30
6. ENERGY EFFICIENCY SUPPORT SCHEMES	33
6.1. OVERVIEW OF ENERGY EFFICIENCY SUPPORT SCHEMES	34
6.2. DESCRIPTION OF ENERGY EFFICIENCY SUPPORT SCHEMES IN MEMBER STATES	36

6.3. NRAS' ROLE IN END USER ENERGY EFFICIENCY	38
6.4. DIRECTIVE ON END-USE ENERGY EFFICIENCY AND ENERGY SERVICES, 2006/32/EC	40
7. MARKET DISTORTIONS – RENEWABLE AND ENERGY EFFICIENCY	43
7.1. RENEWABLE ELECTRICITY	43
7.2. ENERGY EFFICIENCY	44
7.3. GENERAL MARKET DISTORTIONS	44
8. BARRIERS TO RENEWABLE ENERGY	45
8.1. TECHNICAL AND FINANCIAL BARRIERS	45
8.2. ENVIRONMENTAL AND SOCIAL BARRIERS	46
9. BARRIERS TO ENERGY EFFICIENCY	46
10. CONCLUSION	47
ANNEX 1 – RENEWABLE SUPPORT SCHEMES IN EACH MEMBER STATE	49
ANNEX 2 - EU DIRECTIVE ON THE PROMOTION OF ELECTRICITY PRODUCED FROM RENEWABLE ENERGY, 2001/77/EC	57
ANNEX 3 - ENERGY END-USER EFFICIENCY AND ENERGY SERVICES, 2006/32/EC	59
ANNEX 4 - DEFINITIONS	63
ANNEX 5 – MEMBER STATES REPRESENTED IN THIS REPORT	65

Figures

Figure 1 – Costs and associated effectiveness of support schemes across Europe	23
Figure 2 – Share of installed renewable electricity to total installed electricity	30
Figure 3 – Share of renewable electricity production to total electricity production	30
Figure 4 – Global cost curve for greenhouse gas abatement measures	33

Tables

Table 1 – Advantages and disadvantages of feed-in tariffs versus tradable green certificates	17
Table 2 – Installed capacity and electricity production by Member State and technology	29
Table 3 – 2020 National targets proposed by the EC	32
Table 4 – 2010 Existing national targets for renewable electricity deployment	32
Table 5 – Role of NRAs' in end user energy efficiency	40

1. Executive Summary

In March 2007, the European Union (EU) Heads of State agreed to a binding target of a 20% reduction in Greenhouse Gas (GHG) emissions, as compared with 1990 levels, by 2020. To facilitate the achievement of this target, the European Commission published the “Climate action and renewable energy package” (Green Package)¹ on 23 January 2008.

One of the key elements of the Green Package is the proposed Directive on the Promotion of Energy Produced from Renewable Energy (hereafter the proposed Renewables Directive)², which sets a binding EU target of sourcing 20% of energy from renewable energy sources by 2020. Furthermore, the European Commission also proposed that Member States (MS) extend their required energy efficiency target from 9% by 2016 under the Directive on Energy End-use Efficiency and Energy Services (2006/32/EC, hereafter Energy Efficiency Directive) to 20% by 2020³.

In light of the significant changes in the legislative framework surrounding renewables and end-use energy efficiency (hereafter energy efficiency), the main purpose of the report is to assess the current support schemes in place to encourage the further deployment of renewable energy and energy efficiency.

The report was informed by responses received to questionnaires circulated to members of the CEER.

Legislative Framework

Over the last several years, there has been an increasing focus on sustainability issues, including measures to address climate change. The existing legislative framework underpinning these areas sets out various targets to reduce GHG emissions as well as to increase the level of renewable energy and energy efficiency. The proposed targets within the Green Package are even more challenging. The 3rd Package⁴, which sets out measures to liberalise the EU gas and electricity market, will assist in achieving the ambitious environmental targets. Moreover, the support schemes in place in each Member State will play a vital role.

Renewable support schemes

It is clear from our assessment that the most popular type of support scheme to encourage renewable energy is the feed-in tariff. A quota system with tradable certificates is used to a

¹ Climate Action Proposals, http://ec.europa.eu/environment/climat/climate_action.htm

² COM(2008)19 final

³ COM(2008) 11 final: Communication from the European Commission on a first assessment of National Energy Efficiency Action Plans as required by the Directive 2006/32/EC on energy end-use efficiency and energy services moving forward together on energy efficiency, http://ec.europa.eu/energy/climate_actions/doc/2008_ee_comm_en.pdf

⁴ The Third Energy Liberalisation Package (19 September 2007), http://ec.europa.eu/energy/gas_electricity/third_legislative_package_en.htm

lesser extent. Analysis undertaken by Intelligent Energy Europe⁵ demonstrates that feed-in tariffs are more successful, in terms of deployment of renewable technologies at lower costs, than quota systems with tradable certificates. Fiscal incentives such as tax reductions or exemptions are often used as a complement to the main support scheme of either a feed-in tariff or quota obligation system.

End use energy efficiency support schemes

Energy efficiency is one of the most cost-effective ways to reduce GHG emissions and is gaining prominence. Member States have adopted various support schemes which include providing grants for energy efficiency improvements in the residential and business sectors, putting in place technical standards and codes to ensure buildings are energy efficient, placing obligation systems on suppliers with tradable white certificates, etc. Furthermore, the majority of Member States have implemented or have plans to implement smart metering.

The role of National Regulatory Authorities (NRAs) in energy efficiency is limited, with major responsibility resting with national governments.

Market distortions

The large increase in renewables for generating electricity implied by the proposed Renewables Directive carries substantial implications for balancing arrangements, given the intermittent nature of some forms of renewable generation such as wind. It is important that the proposals to increase renewable energy are considered alongside the wider EU objectives for energy policy including those related to security of supply, competitive markets, sustainability, cost, network security and interconnection. It can be argued that the increase in renewables may have a positive impact on security of supply as it increases diversity and reduces the EU's dependence on imported fuels. However, the increase in intermittency of generation may lead to a negative impact on security of supply.

Less cost-effective technologies that are highly subsidised are crowding out energy efficiency measures. However, as an effective carbon price, delivered through the EU Emissions Trading Scheme (EU ETS), begins to feed into the electricity price, consumers should become motivated to undertake measures to reduce their electricity consumption. Furthermore, energy efficiency support schemes will help energy efficiency measures to compete more effectively with other technologies.

Barriers to renewable energy and energy efficiency

Support schemes are one tool to encourage renewable energy and energy efficiency but there are barriers that, if overcome, could further improve the deployment of renewable energy and energy efficiency.

Barriers to renewable energy include issues associated with financing, grid access and planning delays. Although there are steps being taken to address these issues, it will take

⁵ Assessment and optimisation of renewable energy support schemes in the European electricity market: Final Report, OPTRES, February 2007, http://www.optres.fhg.de/OPTRES_FINAL_REPORT.pdf

time. In addition, there exist environmental and social barriers. For example, ideal locations for wind turbines are often in 'areas of outstanding beauty' which are protected or conserved.

The main barrier to energy efficiency is related to the lack of information that some consumers have with respect to the money they could save from undertaking energy efficiency measures. However, even when this information is known, it is often difficult to change the behaviour of individuals as they could find that their energy costs are not high enough to justify the effort and expense involved in putting in place energy efficiency measures.

Conclusion

A range of support schemes for renewable energy and energy efficiency have been implemented across the EU, with varying degrees of success. Member States are benefiting from sharing experiences and learning from each other, and thirteen countries have either changed or adapted their support schemes since 2004⁶. If and when harmonisation does come into effect, this will assist in selecting a support scheme that is both effective and efficient. Furthermore, the harmonisation of support schemes within Member States is needed to facilitate consistency, transparency and reduce regulatory burden for consumers and industry.

⁶ See footnote 5.

2. Introduction

2.1. Objective of the report

In 2004, the CEER published a report entitled “Current Experience with Renewable Support Schemes in Europe⁷”. The aim was to analyse the current developments in the field of Renewable Energy Sources (RES), including the possible market distortions in the internal energy market caused by the increasing volumes of subsidised renewable energy in the EU.

Since then, the political and legislative landscape has changed significantly. In March 2007, the EU Heads of State agreed to a binding target of a 20% reduction in carbon emissions, as compared with 1990 levels by 2020. To facilitate the achievement of this target, the European Commission published the Green Package on 23 January 2008.

One of the key elements of the Green Package is the proposed Renewables Directive which sets a binding EU target of 20% of energy from RES by 2020. Furthermore, the European Commission also proposed that Member States extend their required energy efficiency from the existing target of 9% by 2016 under the Energy Efficiency Directive to 20% by 2020⁸.

In light of the significant changes in the legislative framework surrounding renewables and energy efficiency, it is appropriate to reassess the current support schemes in place to encourage their further deployment. In contrast to the 2004 report, we have also focussed on support schemes for energy efficiency. In particular, the main purpose of this report is to:

- Discuss changes to the legislative arrangements;
- Assess the support schemes in place in each Member State for renewables and energy efficiency;
- Identify the possible market distortions caused by a greater share of renewables as well as the implementation of energy efficiency support schemes alongside renewable support schemes; and
- Identify barriers to the further deployment of renewables and energy efficiency.

Please note that this report is based on the status of renewable and energy efficiency support schemes through autumn 2008.

In addition to the above, the 2004 report discussed the technical aspects to connecting renewables to the electricity grid system in some detail. As the political and legislative environment has changed significantly since the last report, we have focussed in this report on the policies in place to support renewables and energy efficiency in the context of the Green and 3rd Packages rather than repeating the good work that is already well-documented.

⁷ http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_ERGEG_PAPERS/Electricity/2004

⁸ See footnote 3.

2.2. Methodology of the report

The starting point was the development of two questionnaires, which were circulated to CEER Members; one on renewables and another on energy efficiency. The original renewables questionnaire for the 2004 report was used as the basis of the 2008 renewables questionnaire. The Energy Efficiency Directive was used as the starting point for the energy efficiency questionnaire.

Information was also taken from various reports and sources which are referenced accordingly.

2.3. Structure of the report

The rest of the report is structured as follows:

- Section 3: Legislative framework;
- Section 4: Renewable support schemes;
- Section 5: Status of renewable energy sources;
- Section 6: Energy efficiency support schemes;
- Section 7: Market distortions – Renewable and energy efficiency;
- Section 8: Barriers to renewable energy;
- Section 9: Barriers to energy efficiency;
- Section 10: Conclusion; and

Furthermore, Annex 1 includes a table listing the renewable support schemes in place in each Member State that participated in the questionnaires. Annex 2 and 3 set out the detailed requirements of the existing Renewables Directive and the Energy Efficiency Directive respectively. Finally, Annex 4 includes a list of definitions of the terms and acronyms used in the report and Annex 5 contains a list of the Member States that have been represented in this report.

3. Legislative framework

Over the last several years, there has been an increasing focus on sustainability issues including measures to address climate change. The existing legislative framework underpinning these areas set out various targets to reduce GHG emissions as well as increase the level of renewable energy and energy efficiency. As part of its Green Package, the European Commission recently announced its proposals to introduce ever more challenging targets.

Overall, it is important to consider the Green Package in the context of EU energy policy. Explicit reference to the three pillars of EU energy policy - competitive markets, security of supply and sustainability - will help to ensure that this can then be accounted for in implementation measures at Member State level. Furthermore, the 3rd Package, which sets out measures to liberalise the EU gas and electricity market, will assist in achieving these ambitious environmental targets.

Section 3.1 discusses the existing Renewables Directive (2001/77/EC). This is followed by a review of the Green Package in sections 3.2 to 3.3 which includes the European Commission's proposed Renewables Directive. Finally, section 3.4 outlines the Energy Efficiency Directive.

3.1. Summary of EU Directive on the promotion of electricity produced from renewable energy, 2001/77/EC

3.1.1. Background

In 1997, the European Commission produced a White Paper on RES⁹ which contained a Community Strategy and Action Plan for doubling the share of electricity produced from RES to 12% of EU energy consumption by 2010.

To facilitate the growth of RES, the EU adopted the Renewables Directive (RES-E Directive) in 2001¹⁰. The RES-E Directive concerns electricity and sets the fundamental legislative basis for actual support schemes in Europe and sets indicative targets for each Member State.

3.1.2. Purpose of the Directive

The overall aim of the RES-E Directive is to ensure that generating stations based on RES are not disadvantaged in terms of construction of the generating station, connection to the

⁹ COM(97) 599 final of 26 November 1997: White Paper for a Community Strategy and Action Plan or 'Energy for the future: renewable sources of energy', http://ec.europa.eu/energy/library/599fi_en.pdf

¹⁰ Directive 2001/77/EC on the promotion of the electricity produced from renewable energy source in the internal electricity market, http://europa.eu/eur-lex/pri/en/oj/dat/2001/l_283/l_28320011027en00330040.pdf

grid and access to the transmission and distribution network.

The Directive sets an indicative target that RES should contribute 22.1% to overall electricity consumption by 2010. The Directive does not prescribe a harmonised European support scheme. Member States are responsible to fulfil their own clearly specified indicative national targets, which vary greatly.

3.1.3. Scope of the Directive

The Directive defines RES as renewable non-fossil energy sources which include: wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogas. It seeks to achieve the targets on the share of electricity from renewables through obligations on Member States to:

- produce periodic reports outlining the measures to be taken, and their subsequent success, in meeting the national indicative targets;
- create a system to provide guarantees of origin so that producers can demonstrate electricity is generated using RES (Article 5);
- review their existing legislative and regulatory frameworks in order to speed up lengthy and difficult authorisation procedures (Article 6); and
- take the necessary measures to grant guaranteed access to the transmission and distribution of electricity from renewable energy sources (Article 7).

3.1.4. Grid system issues

The connection and transmission of RES will, for many network operators, result in increased costs due to required technical adaptations and strengthening of the grid. The existing Directive seeks to ensure that this will not result in any undue disadvantage for RES.

Therefore, the Directive requires that Member States **shall** ensure that Transmission System Operators (TSOs) and Distribution System Operators (DSOs) guarantee the transmission and distribution of RES and that access may only be refused where it risks the reliability and security of the grid. In addition, they **may** also give priority to renewable generating stations when dispatching generating stations¹¹.

3.2. The Green Package

On 23 January 2008, the European Commission unveiled the Green Package as a framework to implement the European 2020 targets of:

¹¹ Appendix 1 provides a more detailed overview of the provisions of the existing Directive as well as some related reports that have been published on this issue.

- 20% reduction in greenhouse gases;
- 20% increase in energy efficiency; and
- 20% renewable energy use in total energy consumption.

The Green Package includes proposed directives on:

- the geological storage of carbon dioxide;
- the improvement and extension of the emissions trading scheme of the community;
- the allocation of GHG not covered by the EU ETS (e.g. buildings, transport and waste); and
- the promotion and use of energy from renewable sources.

The proposed measures include:

- an improved EU ETS;
- an emissions reduction target for industries not covered by EU ETS;
- legally enforceable targets for increasing the share of renewables; and
- new rules on carbon capture and storage and on environmental subsidies.

3.3. The proposed Directive on the promotion of the use of energy from renewable sources

3.3.1. Scope of the Directive

The proposed Renewables Directive sets overall binding targets for the share of energy produced from RES in final energy consumption. It establishes rules relating to administrative procedures, electricity grid connections, guarantees of origin and support schemes for the promotion of renewables. The proposed Renewables Directive also sets binding targets for the consumption of renewables in transport and establishes sustainability criteria for biofuels.

3.3.2. National targets for renewables

The proposed Renewables Directive sets legally-binding targets for the percentage share of energy produced from renewables in final energy consumption to be achieved by individual Member States by 2020. Interim indicative targets are also set. The proposal does state that, while the indicative targets are not binding, the European Commission may pursue legal action where a Member State is a considerable distance from meeting an interim target.

The proposal also requires Member States to commit to sourcing at least 10% of final energy consumption in the transport sector from renewables by 2020¹² and states that at least 65% of this target must be met by 2012.

¹² An amendment of Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport.

The proposed Renewables Directive also specifies that Member States shall adopt binding national targets for renewables and energy from renewables in heating and cooling for 2020.

3.3.3. Guarantees of origin

The proposed Renewables Directive sets out that Guarantees of Origin (GoO) will be issued to verify the origin of electricity and heat produced from renewable generation facilities where those facilities have a capacity of at least 5 MW_{th}. The GoO must be accurate, reliable and fraud resistant.

The inclusion of the following minimum information on each GoO, as set out in the proposed Renewables Directive, is intended to make the GoO more robust:

- (a) the energy source from which the electricity or heat was produced, and the dates and places of production;
- (b) whether the guarantee of origin relates to electricity or heat;
- (c) the name, location, type, capacity and date of construction and operation of the installation where the energy was produced;
- (d) the date and country of issue and a unique identification number; and
- (e) whether the production has received financial support, such as from a feed-in-tariff, feed-in premium or tender system.

The proposed Renewables Directive states that Member States shall designate an independent body responsible for issuing, identifying, cancelling and tracking transfers of GoO. It also says that Member States should post GoOs on a publicly available registry to account for all GoOs that are issued, held, transferred and cancelled.

To facilitate trade between Member States and allow new entrants into the market, the proposed Renewables Directive requires that standardised criteria for the design and trading of guarantees of origin are adopted.

To track inter-Member State trade and ensure accountability of the GoO system across the EU, the proposed Renewables Directive requires that the European Commission establish a central administrator to maintain an independent log for all transactions of GoOs.

3.3.4. Reporting

It is proposed that Member States submit a report to the European Commission on progress in the promotion and use of renewable energy by 30 June 2011 at the latest, and every two years thereafter. The reports will provide details of progress made towards achieving the targets as well as the schemes and measures in place to facilitate this. In addition, the report will also provide an overview of any schemes and measures in place, as well as an estimation of the GHGs that have abated as a result of the uptake of renewables.

On the basis of the reports submitted by Member States, the proposed Renewables Directive requires that the European Commission report biennially to the European Parliament and the Council.

3.4. Summary of EU Directive on energy end-user efficiency and energy services, 2006/32/EC

3.4.1. Background

In its 2005 Green Paper on energy efficiency¹³, the European Commission found that the EU could reduce energy consumption by 20% in a cost effective way through the implementation of energy efficiency measures. In order to support better integration of energy efficiency measures into national legislation, the European Commission proposed several directives which have now been adopted, including those related to energy efficiency in buildings and energy labelling¹⁴.

These Directives included the Energy Efficiency Directive (2006/32/EC)¹⁵, which was formally adopted in April 2006.

The European Commission published its Second Strategic Energy Review¹⁶ in November of this year. The Review sets out the European Commission's thinking for the long-term future of the EU energy market, to ensure the objectives of security, sustainability and competitiveness are appropriately achieved. In conjunction with the Second Strategic Energy Review, the European Commission published a new 2008 Energy Efficiency Package which argued that the current set of measures can only achieve energy efficiency savings of 13-15%, short of the 20% target for 2020. The European Commission is now seeking endorsement from the Council and the European Parliament (and relevant stakeholders) on their proposed priorities and will be following up on the various initiatives over the next few years. We look forward to working with the European Commission in developing the most appropriate framework for the support of renewable energy.

3.4.2. Purpose of the Directive

The Directive sets an indicative, non-binding, target for Member States to achieve an additional 1% reduction of their final energy consumption each year for the next nine years from January 2008. All forms of commercially available energy such as electricity, natural gas, urban heating, biomass and other energy products including transport fuels are included in this target.

¹³ COM(2005) 265 final of 22 June 2005: Green Paper on Energy Efficiency or Doing More with Less, http://ec.europa.eu/energy/efficiency/doc/2005_06_green_paper_book_en.pdf

¹⁴ Appendix 1 provides details of the relevant associated directives and communications

¹⁵ Directive 2006/32/EC of the European Parliament and of the Council of April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:114:0064:0085:EN:PDF>

¹⁶ http://ec.europa.eu/energy/strategies/2008/2008_11_ser2_en.htm

3.4.3. Scope of the Directive

The Directive seeks to achieve this through obligations on:

- Member States to produce national Energy Efficiency Action Plans (EEAPs);
- the public sector to take energy efficiency into account in procurement of energy services, equipment and buildings;
- energy distributors, distribution system operators and retail energy companies (referred to as *energy suppliers*) to offer energy services or energy improvement measures and information on the availability of these to their customers;
- Member States to ensure the availability of energy audit schemes to all final consumers; and
- energy suppliers to provide final customers of electricity, natural gas and domestic hot water with better consumer information and improved metering and billing.

In addition, the Directive allows Member States to establish funds to promote the development of a market for energy efficiency improvement measures by providing grants, loans or financial guarantees to all providers of energy efficiency improvement measures for final customers.

3.4.4. National energy savings targets

The Directive specifies that each Member State shall aim to achieve an overall indicative energy savings target of 9% for the ninth year of the Directive, calculated in accordance with the methodology set out in the annex of the Directive.

Member States shall assign to one or more new or existing authorities the responsibility for establishing a framework to meet the 9% target. This includes a requirement to produce periodic EEAPs and establish an interim indicative energy savings target for the third year of the Directive as part of the first EEAP. The first EEAPs were to be submitted not later than 30 June 2007 for review by the European Commission.

3.4.5. First assessment of National EEAPs

On 23 January 2008, the European Commission issued a Communication to the Council and European Parliament on its first assessment of national EEAPs¹⁷. The EEAPs set out national strategies on how each Member State intended to achieve the indicative target of 9% improved energy efficiency by 2016.

The aim of the EEAPs was twofold:

1. they represent a practical demonstration of the commitment of Member States to energy efficiency; and

¹⁷ See footnote 3.

2. they provide a means for the sharing of best practices among Member States and the various players in the energy efficiency market, as well as for developing synergies among the strategies and measures adopted.

As a number of countries failed to submit EEAPs, or submitted them late, the Communication offers an initial assessment and will be followed by more comprehensive reports. Therefore the first assessment is not exhaustive and simply provides an overview of the strategies and measures being presented by Member States and a first identification of examples of good practice.

Furthermore, in the Communication, the European Commission also proposed that Member States extend their required energy efficiency from the existing target of 9% by 2016 under the Energy Efficiency Directive to 20% by 2020.

4. Renewable support schemes

4.1. Overview

There are a range of policy instruments that can be used to encourage the deployment of renewable electricity, which can be applied separately or in combination with each other. These support schemes can vary in terms of their regulatory intensity from one country to another and the level of support provided. In the European Commission Staff Working Document on the support of electricity from renewable energy sources¹⁸, support schemes are broadly classified into quantity-based and price-based policy instruments. The former sets a quantity of renewable electricity to be produced and the latter sets either the price of renewable electricity or the cost of producing renewable electricity directly or indirectly. Both types of policy instruments are discussed below.

Quantity-based instruments

There are a few Member States that use quota obligations in which government places an obligation, typically on suppliers, to source a specific percentage of electricity from renewable generation. Tradable green certificates are usually used to prove compliance with the obligation. These certificates allow the owner to claim that it has purchased electricity from a RES. Renewable generators receive the price of the electricity (from the electricity market) as well as the price of the green certificate. Suppliers have to either present green certificates (which can be bought with or without the renewable electricity) in order to prove they are meeting their obligation or pay a penalty. The certificates can be sold and traded.

Tendering is another type of quantity-based market mechanism. A tender is announced by the government for the supply of electricity from RES which is then supplied on a contractual basis at the price resulting from the tender. The tender rules are usually developed in such a way that the cheapest offer is accepted.

¹⁸ Commission Staff Working Document: The support of electricity from renewable energy sources – Accompanying document to the proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of energy from renewable sources {COM(2008) 19 final}, http://ec.europa.eu/energy/climate_actions/doc/2008_res_working_document_en.pdf

Price-based instruments

Many Member States use feed-in tariffs which are a type of price-based support scheme whereby eligible renewable generators are paid either a fixed price which is a guaranteed level irrespective of the wholesale price of electricity or a premium price which is a payment in addition to the wholesale price of electricity. These tariffs are usually set by the NRAs and guaranteed for 10 to 20 years to ensure long-term investor certainty, particularly in the case of fixed feed-in tariffs. While fixed feed-in tariffs grant long term certainty for investors with a low market risk, premium feed-in tariffs are more market-based and encourage competition between electricity producers. It is possible for recipients to be given a choice between a fixed or premium price. Both types of feed-in tariffs can be used to encourage particular technologies and reduce costs.

Another type of price-based support scheme is a fiscal incentive such as a tax exemption or reduction whereby the government reduces or exempts the amount of tax paid by a party such as an investor, generator, supplier or customer. Fiscal incentives tend to be used as a complement to the main support scheme in place (such as a feed-in tariff or a quota obligation with green certificates) to encourage the deployment of additional renewable energy. A single support scheme is often not enough to encourage more renewable electricity and therefore a range of schemes normally needs to be developed.

Investment grants are another type of fiscal incentive whereby a government body provides financial aid to particular types of projects or to purchases of particular types of renewable technologies to make them financial attractive.

In Europe, the main types of support schemes are feed-in tariffs and obligation systems with tradable green certificates. From the CEER's perspective, the advantages and disadvantages of these two types of support schemes are illustrated in the following table.

	Advantage	Disadvantage
Quota obligation with tradable green certificate	<ul style="list-style-type: none"> • Flexible and market-oriented; • Initiate technological developments and innovation; • Often more political acceptance; and • Easy to enlarge to other countries. 	<ul style="list-style-type: none"> • Higher insecurity for investors; • Volatile certificate prices; and • High transaction; and monitoring costs.
Feed-in tariff	<ul style="list-style-type: none"> • Very effective in increasing renewable energy; • Few regulatory and administrative costs; • Stable basic conditions; and • High investor certainty and planning reliability. 	<ul style="list-style-type: none"> • Non-cost efficient; • Difficult to set correct fixed price or premium; and • Non-market oriented. However premiums are more so compared to fixed tariffs.

Table 1 – Advantages and disadvantages of feed-in tariffs versus tradable green certificates

4.2. Description of renewable support schemes in each Member State

In this section, a short description is provided of the support schemes in place in each Member State¹⁹ to encourage the further deployment of electricity generation from RES.

Austria: Feed-in tariffs are available for electricity sourced from small hydro (< 10 MW), solid biomass, biogas, photovoltaic and geothermal and the level of support depends on the source. Until December 2004, feed-in tariffs were guaranteed for 13 years and from 2006 full feed-in tariffs for new renewable electricity generation are available for the first 10 years and then 75% for year 11 and 50% for year 12. The new feed-in tariffs are announced annually and support is granted on a first-come first-serve basis²⁰. Investment grants are available for large hydro (between 10 MW and 20 MW), small hydro (less than 10MW) and solid biomass plants.

Belgium: At the regional level, each of the three regions has a system of tradable green certificates, which apply to small hydro, solid biomass, biogas and photovoltaic technologies. At the federal level, the green certificates are not tradable. Moreover, at federal level and in the Flanders and Walloon regions there is a minimum guaranteed price for the green certificates. The system of minimum guaranteed price depends on the technology and is only used when either the green certificates are not tradable or the market price is below the minimum guaranteed price.

Czech Republic: Feed-in tariffs have been available for distributed generation from small hydro (up to 10 MW), offshore wind, solid biomass, biogas, photovoltaic and geothermal renewable sources since 2005. The period of support varies between renewable sources. The NRA is responsible for the scheme including the level of support. Producers can choose between a fixed or premium feed-in tariff²¹.

Estonia: For small hydro, onshore and offshore wind, solid biomass and biogas, there are two types of feed-in tariff schemes in place: one requires the purchase of power at a fixed price and the other provides direct support with a fixed price.

Finland: Investment subsidies are available for small hydro, onshore and offshore wind, solid biomass, biogas, photovoltaic and geothermal. The amount granted depends on the project in question. Electricity tax returns are also available for small hydro, onshore and offshore wind, solid biomass and biogas – the size of the return varies according to the generation type.

France: Small hydro, onshore and offshore wind, solid biomass, biogas, photovoltaic and geothermal electricity are supported through fixed feed-in tariffs with varying levels. In addition, businesses are permitted to write-off their equipments costs in the first fiscal year and deductions of up to 33% are granted for overseas investments. Finally, households can receive a tax credit of 50% for investment in renewable electricity generated from photovoltaic technologies.

¹⁹ This list is not exhaustive as it only covers Member States that responded to the renewables questionnaires.

²⁰ See footnote 18.

²¹ Idem

Germany: Feed-in tariffs and investment grants are available for large and small hydro, onshore and offshore wind, biomass, biogas, photovoltaic and geothermal, which are guaranteed for 20 years. The feed-in tariffs vary by size, date of production and technology - innovative technologies get a bonus in addition to the basic compensation. Furthermore, soft loans are available.

Greece: Feed-in tariffs are available for small hydro, onshore and offshore wind, solid biomass, biogas, photovoltaic and geothermal, which are guaranteed for 12 years with the possibility of extensions of up to 20 years. Investment grants are also available for some of these generation types of up to 40%.

Hungary: For hydro plants with an installed capacity of over 5 MW, there is an obligatory purchase at the market price. For hydro plants with an installed capacity of below 5 MW, there is an obligatory purchase at a subsidised price (premium price) until a return on investment is achieved. There are also feed-in tariffs in place for onshore wind (premium), biomass, biogas, photovoltaic, geothermal and waste. The NRA is responsible for setting the price at which the electricity is purchased as well as determining the conditions regarding return on investment and the obliged quantity of kW/h to be purchased. Finally, there are investment grants available in the form of a connection fee discount of up to 50% for small hydro, onshore wind, biomass, biogas, photovoltaic and geothermal.

Ireland: The Renewable Energy Feed in Tariff (REFIT) programme was put in place in 2006 and covers hydro (less than or equal to 5 MW), onshore wind, solid biomass and biogas. Tariffs are guaranteed for up to 15 years. The Irish Government has recently announced the inclusion of offshore wind within REFIT. A tax relief measure is also available for corporate investments in certified renewable projects until 31 December 2011.

Italy: A tradable certificates scheme is in place in Italy whereby generators and importers must either supply a portion of renewable electricity into the grid or purchase green certificates. These certificates are issued for every MWh of electricity produced and do not include the sale price of the electricity. The average price of the green certificates between 2003 and 2007 was 0.101092 €/kWh.

Fixed feed-in tariffs are also in place for plants with power of less than or equal to 1 MW including small hydro, solid biomass, biogas, geothermal and wave and for plants with power of less than 200kW for onshore and offshore wind. Photovoltaic plants with a minimum amount of power of 1 kW are entitled to receive premium feed-in tariffs.

Luxembourg: Feed-in tariffs combined with a purchase obligation are in place for small hydro, onshore wind, and biogas.

Norway: There are plans to establish a common green certificate scheme together with Sweden. Based on earlier discussions between Norway and Sweden, the common certificate scheme will be technology neutral. Currently, investment grants are available for wind power projects, which are financed through the return on the Energy Fund and a small mark-up on electricity tariffs. The amounts granted are project specific.

Poland: A tradable green certificate scheme has been in place since 2005 for large and small hydro, onshore and offshore wind, biomass, biogas, photovoltaic and geothermal generation types and there is an obligation on electricity suppliers with targets specified from 2005 to 2010 with penalties for non-compliance. The green certificates are issued by the

NRA. Renewables are also exempt from an excise tax.

Portugal: Feed-in tariffs are in place for small hydro (<30MW), onshore and offshore wind, solid biomass, biogas and photovoltaic.

Romania: Electricity produced from renewable sources is exempt from excise payments; for businesses this is equal to 0.34 €/MWh and for non-businesses this is 0.68 €/MWh. In addition, a quota system with tradable green certificates has been in place since 2005. Generators can sell the renewable electricity on the market and the difference between the selling price and the total cost of the generation is covered through the commercialisation of the green certificates (one green certificate for every MWh) either through bilateral contracts or on the green certificates market. Suppliers are obliged to purchase a specific amount of renewable electricity and their compliance is proven by holding the requisite number of green certificates. The average price of the certificates between 2005 and 2007 price was 42 €/MWh.

In July 2008, a new Governmental Decision (GD) improving the support scheme was approved and notified to the European Commission. The provisions of the new GD establish that new small hydro (capacity less than 10MW), onshore/offshore wind, solid biomass, biogas, geothermal and photovoltaic power plants are supported for 15 years and old small hydro and onshore/offshore wind power plants are supported for 5 years. The provisions also include proposals to band technologies.

Slovenia: Fixed and premium feed-in tariffs are available for qualified renewable producers including small hydro (less than or equal to 10MW), onshore and offshore wind, solid biomass, biogas, photovoltaic, geothermal and municipal waste. For plants in operation for greater than 5 years but less than 10 years, the feed-in tariff values are reduced by 5% and for plants in operation for greater than 10 years, the values are reduced by 10%.

Spain: Fixed and premium feed-in tariffs are available indefinitely but after the first 15, 20 or 25 years (depending on the technology) the level of support is reduced. There are 3 different categories for biogas and biomass each of which receives a different level of support. The level of maturity and deployment as foreseen by national policies are the parameters used for setting the tariffs.

United Kingdom: The Renewables Obligation (RO) requires suppliers to source an annually increasing percentage of their electricity sales from renewable sources²². Companies can meet their obligation by presenting Renewable Obligation Certificates (ROCs); paying into a buy-out fund or through a combination of the two. The buy-out fund is recycled back to suppliers in proportion to the number of ROCs they hold. The average price of ROCs sold through the auctions up to October 2008 was £46.79.

Under the current UK regime, 1 ROC is issued to generators for each MWh of renewable electricity produced, regardless of the source. The government has proposed to 'band' the RO to provide greater subsidy to less developed technologies such as offshore wind and wave and tidal power and to reduce the subsidy to established technologies such as landfill

²² In 2005-06, suppliers had to source 6.7% from eligible renewables rising to 15.4% by 2015-16.

gas and co-firing of biomass with fossil fuel²³. The government is also currently consulting on various reforms to the RO including extending the end-date of the RO from 2027 to 2037 or beyond and increasing or removing the current cap on the level of the obligation which is set at 20%.

In addition to the RO, exemptions from the Climate Change Levy (CCL)²⁴ are available for less-polluting sources of energy. Levy Exemption Certificates (LECs) are evidence of CCL-exempt electricity supplied by electricity suppliers to prove the amount of renewable energy supplied to non-domestic customers. Furthermore, the Low Carbon Buildings Programme provides grant funding to reduce the capital costs for early adopters of microgeneration. There are also various fiscal incentives such as a reduced value added tax rate for microgeneration technologies as well as exemption from income tax for microgenerated electricity among others. The Government is currently consulting on whether to introduce a separate incentive from the RO specifically for microgeneration electricity. Finally, the Energy Saving Trust Act on CO2 Advice service provides information to domestic consumers and small businesses on choosing and installing microgeneration and Carbon Trust Solutions provides guidance to businesses and public sector organisations on installing renewable energy technologies.

Annex 1 presents a table which lists the various renewable support schemes in place in each Member State, broken down by renewable technology.

From the discussion above, it is clear that the most commonly used support scheme to encourage the deployment of renewable electricity is the feed-in tariff and to a lesser extent quota obligation systems with tradable certificates. Of those NRAs who responded to the renewables questionnaire, 13 Member States have implemented feed-in tariffs while 5 have implemented a quota system with tradable green certificates and one more has plans to do so. Two Member States (Italy and Hungary) have both types of schemes in place. Fiscal incentives such as tax reductions or exemptions are often used as a complement to the main support scheme of either a feed-in tariff or quota obligation system.

Since the first CEER study on RES support schemes was made in 2004, some countries have adapted their systems based on the experience of operating these schemes. The Intelligent Energy Europe's final report on the assessment and optimisation of renewable energy support schemes in the European electricity market²⁵ shows that 13 countries have either changed their support scheme or adapted it since 2004.

²³ Department for Business Enterprise & Regulatory Reform UK Renewables Energy Strategy Consultation, http://renewableconsultation.berr.gov.uk/consultation/consultation_summary

²⁴ Electricity is currently (with effect from 1 April 2008) subject to the Levy at a rate of £4.56/MWh

²⁵ See footnote 5.

4.3. Success of support schemes

4.3.1. Policy Effectiveness

One way to measure the success of a support scheme is its effectiveness; that is its ability to deliver an increase in the deployment of renewable electricity. In terms of this measure, the experience throughout Europe has shown the following²⁶:

- The effectiveness of policies promoting wind energy, biogas and photovoltaic technologies has been higher in countries using feed-in tariffs as their main support scheme but not all feed-in tariffs have been equally successful;
- The development of wind energy has been higher than the development of biogas and photovoltaic;
- Low cost technologies such as sewage gas and certain types of biomass has been particularly high in countries with non-technology specific support schemes;
- The effectiveness of tendering has been uneven throughout Member States; and
- Fiscal incentives such as investment grants and tax rebates are difficult to measure as these mechanisms are usually used as additional policy tools.

It is important to note that the support scheme policy cannot be the only factor resulting in its effectiveness. Other factors that could contribute include the level of such support, non-financial barriers such as planning and grid access, long-term policy stability and natural resources²⁷.

4.3.2. Cost Efficiency

Efficiency is another measure used to assess the performance of a support scheme. In the European Commission Staff Working Document²⁸, efficiency is defined as a comparison between the level of support to the generation cost. The closer the two are to each other the more efficient a support mechanism is in terms of covering the actual cost. In 2005, half of Member States implemented a level of support that was sufficient to meet the generation costs for onshore wind and solid biomass and this has now increased to two thirds which is a notable improvement. Increased levels of support can be observed in the Czech Republic, Estonia, Greece, Portugal, Slovakia and Slovenia.

For small hydro, two thirds of Member States are considered to provide sufficient support and for biogas, the level of support is generally considered to be inadequate for more than half of the Member States. Furthermore, the level of support for photovoltaic is too low across the EU despite significant cost reductions in this technology.

²⁶ See footnote 18.

²⁷ Department for Business Enterprise & Regulatory Reform UK Renewables Energy Strategy Consultation, http://renewableconsultation.berr.gov.uk/consultation/consultation_summary

²⁸ See footnote 18.

Ideally, a support scheme should be both effective and efficient but in practice a support scheme is often effective but costly to implement or vice versa. The figure below highlights analysis undertaken by the European Commission comparing the costs and associated effectiveness of feed-in tariffs implemented in Europe with corresponding quota schemes, such as the United Kingdom's (UK) RO scheme as discussed in section 4.2. The analysis demonstrates that feed-in tariffs are more successful, in terms of deployment of renewable technologies and at lower costs, than quota schemes with green certificates such as the RO. The analysis appears to suggest that quota schemes are relatively more expensive but have facilitated less investment in renewable generation.

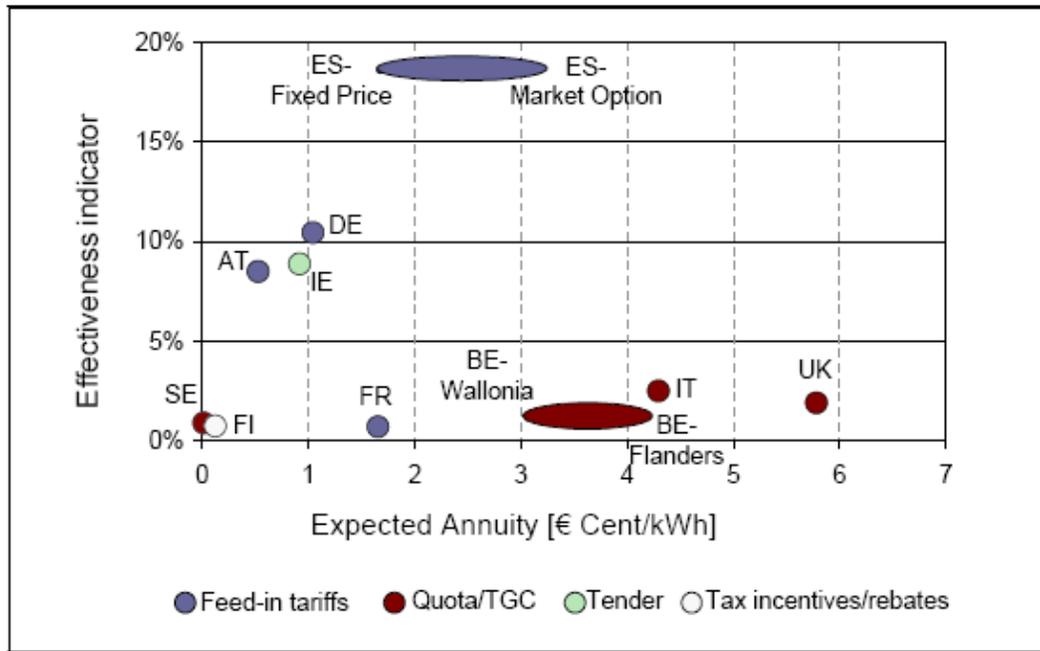


Figure 1 – Costs and associated effectiveness of support schemes across Europe

Source: Assessment and optimisation of renewable energy support schemes in the European electricity market: Final report, The European Commission

4.4. Support schemes for heat

Some Member States have implemented support schemes for heat using RES. This section briefly describes the incentives in place to encourage renewable heat in Italy, Norway, Spain and the UK²⁹:

Italy: In 2002, the Italian NRA defined a scheme for guaranteeing Combined Heat and Power (CHP) generation priority dispatch and for exempting it from obligations related to the adoption of the tradable green certificates scheme. In 2007, the Directive 2004/8/CE on the promotion of cogeneration was transposed into Italian primary legislation. Until 31 December

²⁹ These were the only CEER Member States that provided summaries of support schemes for heat.

2010 cogeneration will continue to be defined according to the previously enacted domestic dispositions and from January 2011 the new EU definition of high efficiency cogeneration will be adopted. The task of defining the technical and economic conditions for a particular form of “net metering” of the electricity produced by CHP plants with nominal capacity less than 200kW has been assigned to the NRA. Broadly speaking, the net metering mechanism consists of injecting the grid with electricity in excess of demand and then withdrawing it later when necessary. In Italy this mechanism, different from that applied to RES generation, does not prevent the CHP generator from selling the electricity produced in excess to its consumption. On matters of grid connection the NRA has recently approved some dispositions envisaging a more favourable treatment for RES and CHP plants (versus traditional plants) when regulating access to low and middle voltage networks and discounts when regulating access to high and very high voltage networks.

Norway: The publicly owned enterprise, Enova SF, provides financial support equal to 4,000 Norwegian Kroner (NOK)³⁰ of the cost of renewable heating systems (using pulp pellets) to households. Households using heat pumps can receive as much as 10,000 NOK³¹.

Spain: In Spain, the so called “special regime” (regulated by Royal Decree 661/2007) sets a support scheme for most renewables as well as CHP. The Spanish support scheme facilitates access to the grid for CHP generators and provides the opportunity to choose between a regulated feed-in-tariff or the spot market price plus a premium (just like other renewables). There are local or regional support schemes for the use of district heating fuelled using biomass, or low-temperature thermal solar collectors. The support is offered in terms of investment grants or advantageous financing for the investment.

UK: In the UK, there are a number of policies to increase energy efficiency and reduce carbon emissions which encompass the heat sector. The UK Government issued its renewable energy strategy consultation in June 2008 in which it listed various measures to increase the extent of renewable heat generation and facilitate the development of the market for renewable heating technologies and fuels. These included proposing the introduction of a new heat incentive either in the form of a renewable heat incentive (i.e. a feed-in tariff) or a renewable heat obligation, improving the regulation of biomass heating systems to ensure that wider deployment minimises the impact on air quality, providing regulatory incentives to install renewable heat technologies in new build, and providing better information to consumers, businesses and local authorities on the potential of renewable heat.

4.5. Possible harmonisation of renewable support schemes across Europe

The multitude of support schemes raises a concern from the perspective of the single market. The harmonisation of support schemes could simplify the regulatory environment and provide a clearer framework for the efficient exploitation of renewable energy across the EU.

³⁰ Equal to approximately €450 as of 28 November 2008

³¹ Equal to approximately €1,120 as of 28 November 2008

However, the harmonisation of support schemes may be premature, as the internal electricity market is still not fully liberalised, greater interconnector capacity is needed, national support to conventional electricity producers continue to distort the market and there has not been sufficient experience accumulated to determine the most effective and efficient support scheme. Member States can cooperate more and improve their existing support schemes without necessarily harmonising them. There is room for improvement in terms of legislative stability and reducing investment risk, reducing administrative barriers, addressing grid issues and encouraging technological diversity.

The European Commission and the European Parliament have both proposed (different) systems for the transfer and trading of renewable energy certificates. These could be regarded as a potential harmonisation of support schemes in Europe. Under such systems, a given unit of energy would receive only one economic support: either the price of a “certificate” in the market or other national support systems. However, given that the adoption of the schemes is uncertain, and unlikely to be adopted to the extent envisaged, it is doubtful that tradable renewable energy certificates will, at this stage, play a role in the harmonisation of national support schemes.

In its Staff working document on the support of electricity from renewable energy sources³², the European Commission lists the following reasons why fully harmonising the European support schemes may be currently inappropriate :

1. Both quantity-based and price-based instruments have the same economic efficiency and can be designed within the rules of the internal market for electricity and the free movement of goods so it is difficult to choose between them;
2. It could create uncertainty and disruption in the market for renewables as it would replace national support schemes and Member States would have to face their legal obligations on long-term support that has been already granted;
3. It might be difficult to differentiate between different costs for different technologies in different countries as each country has unique market conditions; and
4. National support schemes are often designed so that they also promote regional development or for other purposes. Harmonisation might oblige Member States to find other ways to do this.

Furthermore, there is a risk of abolishing current schemes that have proved to be effective and efficient. Diversity of support schemes allows Member States to learn from the experiences of each other and emulate and improve on successful schemes. In addition, each Member State has specific market conditions and different starting points in terms of their energy mix so, where one support scheme has been successful in one Member State, it does not necessary follow that the same scheme will be successful in another Member State. Nevertheless, there are advantages to harmonisation including the creation of economies of scale as a result of a reduction in the number of support schemes, simplification of the regulatory environment, reduction of the regulatory burden and an increase in transparency for investors, generators, suppliers, consumers and other stakeholders. In the coming years, the uncertainties should be solved and the internal energy market should work properly. At that stage, the advantages of harmonisation may be greater than the drawbacks.

³² See footnote 18.

Finally, there may also be a need to harmonise support schemes within Member States which can be viewed from two levels: namely, between domestic and EU level schemes (e.g. UK's Carbon Reduction Commitment and the EU ETS) and between domestic level schemes (e.g. UK's RO and CCL). Harmonisation of support schemes within Member States would facilitate consistency and transparency and reduce regulatory burden for consumers and industry.

5. Status of renewable energy sources

5.1. Installed renewable electricity capacity and electricity production in each Member State

Table 2 and figures 2 and 3 below present the installed capacity and electricity production in each Member State categorised into renewable technology type as provided by CEER members. The share of installed renewable to total installed electricity capacity and the share of renewable to total electricity production varies greatly across Member States with Norway having the largest shares and the Slovak Republic having the smallest shares. Large hydro and onshore wind technologies appear to have achieved the largest volume of installed renewable electricity capacity and production while offshore wind has achieved the smallest.

Total installed electricity capacity per technology in MW (2007)												
	Large hydro	Small hydro	Onshore wind	Offshore wind	Solid biomass	Biogas	Photo-voltaic	Geo-thermal	Other	Total - renewables	Total - renewables & conventional	Share of installed renewable to total installed electricity capacity
Austria	10,754	1,100	980		309	75	25	1	54	13,298	19,182	69.325%
Belgium	0	108	321	30	519	146	22	0	0	1,146	16,700	6.862%
Cyprus	0	0	0	0	0	2,325	1,409	0	0	3,734	1,121	0.333%
Czech Republic	753	274	118	0	1,716	32	3	0	0	2,895	17,561	16.486%
Estonia	0	32	69	0	6	1	0	0	0	108	2,025	5.348%
France	25,000	400	2,200	0	0	0	11	0	0	27,611	116,000	23.803%
Germany	4,700		20,622		2,740		2,581	0	0	30,643	134,300	22.817%
Greece	3,018	96	854	0		37	1	0	0	4,006	14,136	28.339%
Hungary	39	12	61	0	840	7	0	0	27	986	8,846	11.144%
Ireland	237		780	25	0	0	0	0	0	1,042	7,220	14.436%
Italy	17,022	437	2,714	0	395	347	103	711	0	21,729	97,227	22.349%
Luxembourg	0	34	35	0	0	3	24	0	0	96	584	16.404%
Norway	27,663	1,366	385	0	110	0	0	0	0	29,524	30,300	97.439%
Poland	290	264	421	0	260	53	0	0	383	1,670	35,850	4.657%
Portugal	4,582	419	2,565	0	28	12	14	28	257	7,905	13,725	57.596%

Romania	5,967	354	7	0	0	0	0	0	0	6,328	19,513	34.360%
Slovak Republic	0	96	5	0	37	2	0	0	0	139	7,508,000	0.002%
Slovenia	886	0	0	0	0	0	0	0	0	886	3,006	29.474%
Spain	16,657	1,905	14,723	0	557	527	1,085	0	282	35,736	90,722	39.391%
United Kingdom	1,359	166	2,083	394	630	1,052	14	0	1	5,700	82,951	6.871%
Net electricity production per technology in MWh (2007)												
Austria	33,350,000	4,200,000	2,100,000	1,800,000		500 000	22 000	2,400	300 000	41,452,400	63,919,000	64.851%
Belgium	0	380,649	486,216	0	1,675,135	686,119	5,600	0	0	3,233,719	84,900,000	3.809 %
Czech Republic	1,077,500	1,021,100	125,100	0	993,360	182,700	1,754,000	0	0	5,153,760	88,198,300	5.843%
Finland	13, 971, 000	0	188,000	0	3,419,000	0	0	0	1,993,000	19,571,000	78,590,000	24.903%
France	59,899,000	0	4,106,000	0	1,971,000	542,000	38,000	95,000	1,680,000	68,331,000	569,800,000	11.992%
Germany	19,876,000	0	30,710,000	0	17,627,000		2,220,000	368	0	70,433,368	636,800,000	11.061%
Greece	2,020,771	223,198	1,783,059	0	0	155,901	1,000	0	0	4,183,929	61,116,000	6.846%
Italy	31,399,500	1,415,700	4,034,400	0	3,024,900	1,447,300	57,000	5,569,100	0	46,947,900	313,888,000	14.957%
Luxembourg		103,094	64,286	0	0	36,591	20,901	0	0	224,872	3,156,512	7.124%
Norway	128,500,000	6,800,000	900,000	0	600,000	0	0	0	0	136,800,000	137,700,000	99.346%
Poland	1,120,458	963,606	472,116	0	545,765	161,768	0	0	1,965,813	5,229,526	159,453,000	3.280%
Portugal	9, 522, 000	691, 200	3, 974, 900	0	0	45, 800	20, 100	0	0	14, 254, 000	49, 510, 000	29.000%
Romania	15,334,448	598,512	7,188	0	0	0	0	0	0	15,940,148	56,374,000	28.276%
Slovak Republic		167,410	9,400	0	79,570	6,130	0	0	0	262,510	27,907,000	0.941%

Slovenia	4,817,000	4,217,600	0	0	22,000	6,700	NA	0	0	9,063,300	13,636,000	66.466%
Spain	26,381,000	4,113,000	27,319,000	0	2,095,000	3,397,000	487,000	0	0	63,792,000	286,588,000	22.259%
United Kingdom	4,554,000	534,000	4,491,000	783,000	4,097	5,194,000	11,000	0	0	15,571,097	392,597,000	3.966%

Table 2 – Installed capacity and electricity production by Member State and technology

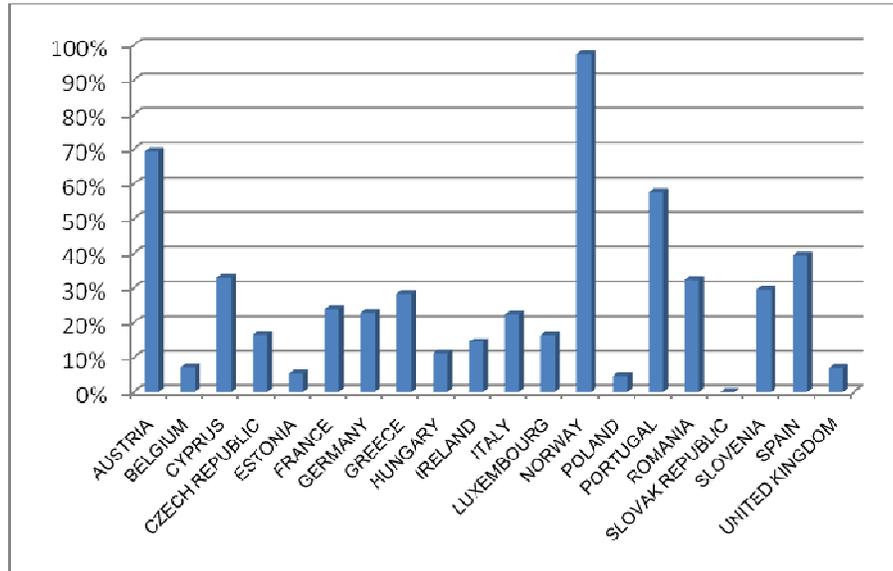


Figure 2 – Share of installed renewable electricity to total installed electricity

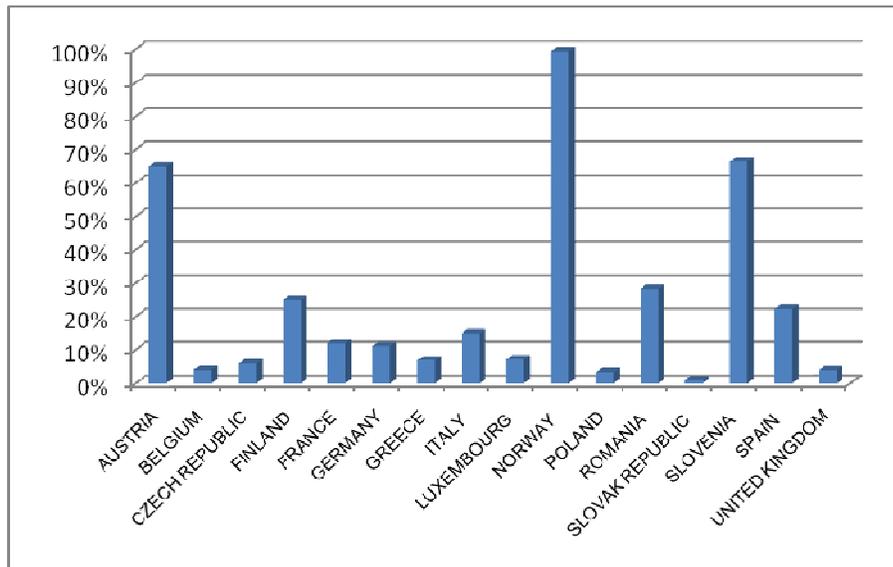


Figure 3 – Share of renewable electricity production to total electricity production

5.2. Renewable targets

The existing Renewables Directive sets a 21% indicative share of electricity produced from renewable energy sources in total Community electricity consumption by 2010. In addition, the proposed Renewables Directive has set a target of 20% of final energy (heat, transport and electricity) consumption in the EU to be sourced from renewables by 2020. This implies a much greater share of electricity produced from renewable energy sources than the 21% target in the 2001 directive and an even greater percentage of installed capacity will be

required.

Table 3 below presents the share of energy from RES in final energy consumption in 2005 as well as the EU's proposed 2020 targets. For many countries, the 2020 targets represent a significant increase in the proportion of renewables in final energy consumption. Table 4 shows the existing 2010 national targets for renewable electricity deployment as a percentage of consumption for some Member States; however these are likely to increase in light of the proposed 2020 targets. The majority of NRAs confirmed that there are no targets for specific technologies in their countries. However the exception to this was Austria, France, Italy, Norway, Portugal and Spain.

	2005 share of energy from renewable sources in final energy consumption, %	2020 target for energy from renewable sources in final energy consumption, EC proposed, %
Austria	23.3	34.0
Belgium	2.2	13.0
Bulgaria	9.4	16.0
Cyprus	2.9	13.0
Czech Rep	6.1	13.0
Denmark	17.0	30.0
Estonia	18.0	25.0
Finland	28.5	38.0
France	10.3	23.0
Germany	5.8	18.0
Greece	6.9	18.0
Hungary	4.3	13.0
Ireland	3.1	16.0
Italy	5.2	17.0
Latvia	34.9	42.0
Lithuania	15.0	23.0
Luxembourg	0.9	11.0
Malta	0.0	10.0
Netherlands	2.4	14.0
Poland	7.2	15.0
Portugal	20.5	31.0
Romania	17.8	24.0
Slovak Rep	6.7	14.0
Slovenia	16.0	25.0
Spain	8.7	20.0
Sweden	39.8	49.0

	2005 share of energy from renewable sources in final energy consumption, %	2020 target for energy from renewable sources in final energy consumption, EC proposed, %
United Kingdom	1.3	15.0

Table 3 – 2020 National targets proposed by the EC

	2010 Existing national targets for renewable electricity deployment, %
Austria	60
Belgium	6
Cyprus	6
Czech Republic	8
Estonia	5.1
Finland	31.5 ³³
France	21
Germany	12.5
Greece	20.1
Hungary	3.6
Iceland	13.2
Italy	25.0 ³⁴
Norway	90
Poland	10.4
Portugal	45
Romania	33
Slovak Republic	4
Slovenia	33.6
Spain	29.4
United Kingdom	10

Table 4 – 2010 Existing national targets for renewable electricity deployment

³³ Based on 2005 figures

³⁴ Indicative target from Directive 2001/77/CE

6. Energy efficiency support schemes

Energy efficiency measures are one of the most cost-effective means of reducing GHG emissions (as depicted in Figure 3) but are often overlooked. However, this appears to be changing as energy efficiency is gaining more prominence within the European Commission³⁵. The following sections outline the types of support schemes that can be used to encourage energy efficiency measures and a brief description of the schemes that are in place in various Member States.

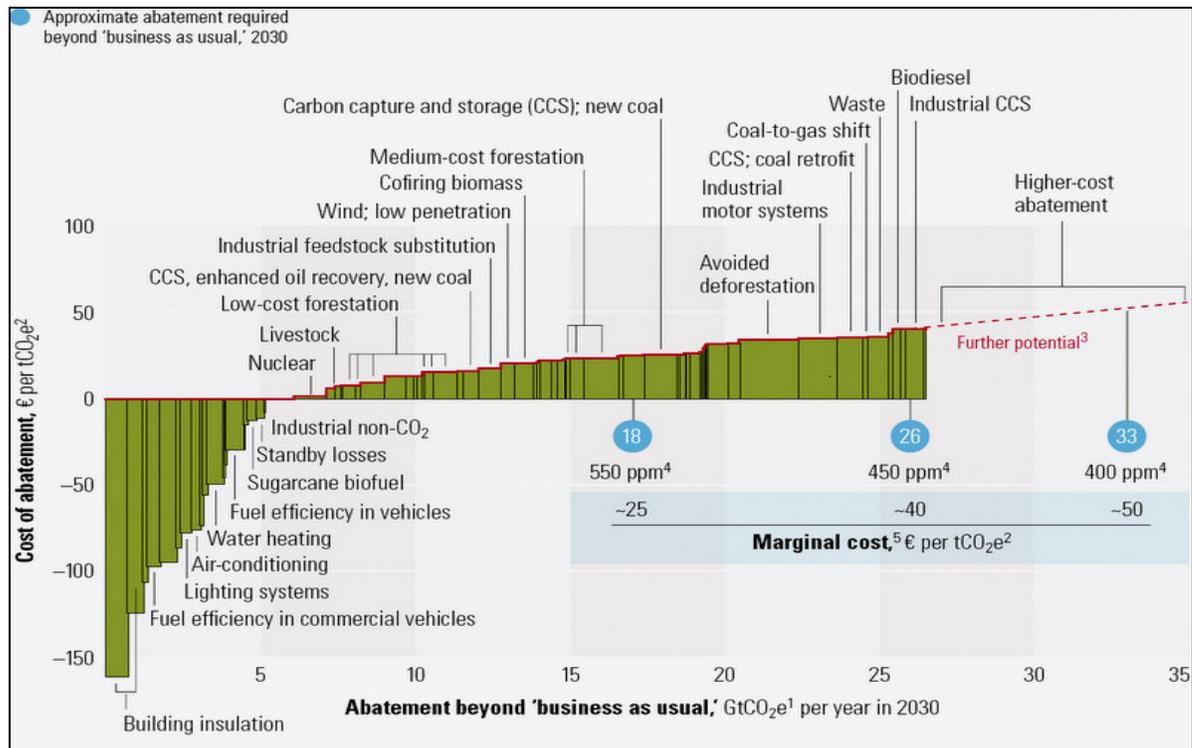


Figure 4 – Global cost curve for greenhouse gas abatement measures

³⁵ The second strategic energy review, published in November 2008, includes an energy efficiency package, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0772:FIN:EN:PDF>

6.1. Overview of energy efficiency support schemes

In this report, energy efficiency relates to end-user energy efficiency, not energy efficiency at the whole system level (e.g. electricity losses) as one of the motivations behind covering end-user energy efficiency is the Energy Efficiency Directive. As such, the support schemes discussed here have the primary aim of encouraging the reduction of energy consumption. The policy measures to encourage energy efficiency can be divided into four main categories including financial measures, legal or regulatory instruments, voluntary agreements and white certificates, each of which is discussed in turn below.

Financial measures

Financial measures include subsidies and taxes. Governments can change the cost of the use of energy using these measures. Subsidies include grants and low-interest loans while taxation policies could include energy use or pollution taxes.

Taxes and fees associated with energy use or with the emissions that result from consumption of energy are imposed on users with the goal of creating incentives to reduce wasteful energy consumption practices or of creating public programmes and funds for encouraging energy efficiency. These policies can include energy or energy-related CO₂ taxes (environmental taxes), pollution levies (e.g. disposal of hazardous waste) and public benefit charges (programmes to promote energy efficiency and assistance to low-income households usually funded by fees imposed on all distributed electricity).

Subsidies can encompass grants for investments in energy efficiency, subsidised audits and loans, tax relief for the purchase of energy-efficient equipment, and tax relief as an element of a larger energy or GHG emission tax or negotiated agreement scheme. Grants are public funds given directly to the party implementing an energy efficiency project. Subsidised audits assess the energy efficiency of a facility and provide technical and financial information about measures that can be taken with regard to energy, including reducing energy consumption, fuel switching, and load management. Public, or soft loans, are loans subsidised by public funding that are offered at interest rates below market interest rates for investments in energy efficiency. Often these loans are combined with innovative funds which involve banks and the private capital in addition to the public sector. Other fiscal measures include tax relief which can be provided either through programmes that grant special treatment for the purchase of specified technologies or through programmes that allow tax rebates to industries that meet specific targets.

Legal or regulatory instruments

Governments can set legal requirements on power companies, industry and households with financial penalties for non-compliance. Examples include appliance, vehicle and building standards (on energy use or emissions), land and other resource management codes and standards for technology.

Many legal or regulatory instruments are product specific. For example, the instrument “Minimum Efficiency Standard” consists of mandatory or voluntary regulations governing the fulfilment of minimum efficiency or maximum consumption requirements by products brought onto the market. The instrument “Product Prohibition” covers a legal ban on putting certain (particularly inefficient) products on the market. Labelling Requirements include making

correct statements concerning energy consumption of household appliances and making comprehensible information available to the consumer.

Standardisation is an instrument that is widely used in industry in order to ensure product quality and product and process safety. The standards can be either prescriptive (for example, prescribing the maximum heat transmission through walls) or are performance-based (giving requirements for the overall energy performance of the building without prescribing specific measures).

Voluntary agreements

Voluntary agreements are commitments undertaken by power producers or industries in consultation or negotiation with a public authority, and usually recognised by that agency.

Voluntary agreements can take different forms; most of them are between policy makers and industry. These voluntary agreements would almost always need to be backed up by performance indicators and exchanges of good practice.

Some forms of incentives may be necessary to encourage the industry to enter into voluntary agreements. Such incentives in general include reimbursement of certain energy and environmental taxes, promises not to increase energy taxes for industries that enter the agreement and meet their targets and subsidised energy audits.

Tradable white certificates

The white certificate scheme is one of the key new instruments that is foreseen to support energy efficiency improvements. A tradable white certificate scheme does not replace but complements existing policies and measures, and aims to contribute to achieving current or newly formulated energy efficiency targets in a cost-effective way. As a representative of a set of market-based instruments in the European internal market, it builds upon experiences with similar types of schemes such as the EU ETS and green certificate schemes.

White certificates have up to now been used in combination with an obligation scheme. Market actors (usually retail energy suppliers or distributors) are obliged to reach a certain amount of energy saving. Target compliance requires submission of a number of certificates commensurate with the energy saving target. Certificates can be created from projects that result in energy savings beyond business as usual, by target market actors or by ESCOs. The market actor receives certificates for savings achieved, which can be used for their own target compliance or can be sold to (other) obliged parties. It should be noted that a white certificate scheme does not necessarily imply introduction of the possibility of trading.

In countries where tradable white certificates are already in place it is found that justification/rationale for implementing tradable white certificates schemes (as an alternative to other energy efficiency policy instruments) typically is:

- Higher cost-effectiveness in the achievement of given saving targets;
- Creation of incentives to privately finance energy efficiency (ESCOs, etc.);
- Saving of public money (if compared with subsidies for energy efficiency);
- Avoidance of energy price distortion between sectors (if compared with energy taxes);
- Avoidance of the very high transaction costs typically caused by the introduction of energy performance standards; and

- Higher consistency with liberalised energy markets.

6.2. Description of energy efficiency support schemes in Member States

This section lists the support schemes in place to encourage end-user energy efficiency measures in each Member State³⁶.

Austria: Schemes include funding for dwelling insulation as well as investment grants to industry for undertaking energy efficiency measures.

Belgium: There are obligations on electricity distributors to save energy in the region of Flanders. There are also various regulations and standards in place for buildings and product labelling as well as energy efficiency certificates for buildings. Furthermore, there is a government drive to change people's behaviour in terms of their energy usage through providing more informative and standardised billing and by disseminating information on the rational use of energy as well as sustainable energy. Finally, there are tax rebates for certain types of investment which result in the reduction of energy consumption.

Finland: Voluntary agreements are in place between energy industry stakeholders and the Ministry of Employment and Economy.

France: There are technical standards in place, obligations on suppliers with white certificates, financial measures such as loans, subsidies, tax cuts, technical initiatives (advanced metering) and public awareness campaigns to promote energy efficiency.

Greece: Grants are available for end user energy efficiency improvements.

Hungary: The National Energy Savings Program promotes residential energy savings and assists residential take-up of renewable energy sources. The Environmental & Energy Operative Program does the same but is targeted towards the business sector.

Ireland: Powersave is a tariff offered by suppliers to incentivise registered customers to reduce electricity consumption or increase exports during peak demand periods. In return, customers receive compensation via a payment mechanism based on the kWh reductions achieved during the 'Powersave Event'. The Winter Peak Demand Reduction Scheme encourages medium and large consumers with online quarter hour meters to reduce peak winter consumption and demand. Participants are rewarded for demand reductions via payments. The Winter Demand Reduction Incentive is offered by the State's largest supplier to customers on Low Voltage Maximum Demand tariffs, which reduces their demand for electricity for specific hours during winter months. As part of the Nightsaver tariff, customers pay a higher standing charge every 2 months and in return receive cheaper electricity between 11pm and 8am (winter time) and between midnight and 9am (summer time). Finally, a smart metering pilot scheme involving 20,000 smart meters with two way communication functionality has been implemented.

³⁶ This list is not exhaustive as it only covers Member States who responded to the questionnaires.

Italy: Tax rebates are available for energy efficient improvements in buildings and for the purchase of energy efficient equipment facilities (e.g. 20% rebate for replacement of class A+ refrigerators). Local governments can issue loans, subsidies, tax rebates for energy efficiency improvements but an energy efficiency certification is needed to access these instruments. The most significant instrument adopted for energy efficiency promotion is tradable white certificates in which electricity and gas distributors, serving more than 50,000 final customers in the past 2 years³⁷, are required to achieve annual energy saving targets by carrying out projects and appropriate measures. This obligation may be met by either conducting operations directly, outsourcing to service companies or purchasing the corresponding White Certificates on the market. These certificates, each of which represents the achievement of primary energy savings of one tonne of oil equivalent (toe), are issued annually by the Electric Market Manager to each distributor after verification of results achieved. They may also be issued to companies operating in the ESCOs for projects carried out on behalf of suppliers. By the end of the first eight years of application (2005-2012), annual energy savings are expected to reach 6 Mtoe, with a total amount of energy saved ranging between 22 and 34 Mtoe.

Norway: The publicly owned enterprise, Enova SF, stimulates energy efficiency by encouraging cost-effective and environmentally sound investment decisions. Currently, Enova SF supports energy savings in new buildings by providing investment support equal to 0.2 to 0.5 NOK/kWh, with a maximum of 10% of the investment costs. Enova SF also supports energy savings in the business sector if energy consumption is reduced by 10% within 4 years. Businesses must also put in place an energy management plan to be eligible.

Portugal: Promoting Efficiency in Electricity Consumption (PPEC) is a tender mechanism to promote energy efficiency in electricity consumption whereby eligible suppliers submit energy efficiency initiatives for the industrial, services and residential sectors. Measures could either be tangible (e.g. residential lighting) or intangible (e.g. information campaign). The annual budget for 2007 and 2008 was €10 million per year and for 2009 and 2010 it is €11.5 million per year, which is financed through the Global Use of System Tariff paid for by all consumers. The measures are analysed and approved by means of a competitive process and ranked according to pre-established rules, based on a cost-benefit analysis.

In addition to the PPEC, there are various regulations in place on efficiency standards of buildings to enhance energy performance of buildings and to establish an energy certification system for buildings. Furthermore, the Regulation for Managing Energy Consumption establishes goals for companies to reduce their energy use two times in each decade, to prepare and carry out annual plans for rationalising their energy consumption and to achieve energy savings. Finally, the regulated end-user electricity tariffs have applied time-based pricing since 1999.

Romania: Financial measures are in place such as funds, subsidies, loans, technical standards, voluntary agreements between stakeholders and public sector bodies for promoting end user energy efficiency.

³⁷ As amended by a Decree issued in December 2007. The original obligation referred to distributors serving more than 100,000 customers in 2001.

Slovenia: Investment support is available for increasing energy efficiency in buildings.

Spain: Subsidies are granted for improvements in energy efficiency by substituting to higher energy efficiency household equipment.

UK: In the household sector, there are building regulations in place to strengthen energy efficiency standards with the aim that all new homes are zero carbon by 2016. There is also a Code for Sustainable Homes for sustainable design and construction of new homes. The Market Transformation Programme supports the development and implementation of government policy on sustainable products and the Warm Front Grant tackles fuel poverty by installing energy efficiency measures. The Carbon Emissions Reduction Target is an obligation on suppliers to deliver energy efficiency improvement measures to residential customers. Finally, the Energy Performance Certificates provide information on the energy efficiency of homes which is required for all homes to be sold or rented.

In the business and public sectors, the EU ETS is in place and the Carbon Reduction Commitment (CRC) is a mandatory emissions trading scheme which covers large non energy-intensive business and public sector organisations. The CRC will cover electricity use and direct energy use outside of the EU ETS and Climate Change Agreements and the first phase will begin in 2010. The Climate Change Agreements allow energy intensive business users to receive an 80% discount from the CCL in return for meeting energy efficiency or carbon savings targets. In addition, the Environmental Transformation Fund focuses on demonstration and deployment phases of bringing low carbon technologies to market by funding emerging technologies. The Market Transformation Programme and Product Standards support development and implementation of government policy on sustainable products and Energy Performance Certificates and Display Energy Certificates will be required at the point of sale for all non-domestic buildings by the end of 2008. Finally, the CCL is a tax on the use of energy in the industry, commerce and public sectors which was introduced in 2001.

6.3. NRAs' role in end user energy efficiency

The majority of NRAs surveyed do not have any specific competencies relating to end-user energy efficiency with major policy responsibility resting with their central governments. However, there are a few exceptions to this. For example, the Austrian NRA is preparing a green book on energy efficiency and the Belgium, French, Spanish and UK NRAs are currently involved in developing advanced metering. Furthermore, the Italian NRA is responsible for the design, implementation, administration, monitoring and enforcement of its energy efficiency certificates scheme³⁸ and the Hungarian NRA is on the committee to evaluate energy savings tenders. The Portuguese NRA is responsible for managing, administering and monitoring the progress of the PPEC tender mechanism and the UK NRA administers the CERT and CCL schemes as discussed above. Finally, the Irish NRA can impose public service obligations on licence holders relating to energy efficiency and climate protection.

³⁸ These responsibilities are likely to be given to another Agency once Directive 2006/32/EC is transposed into Italian legislation.

Most of the NRAs surveyed do not carry out any reporting on energy efficiency. However, Italy does undertake reporting on its energy efficiency certificates mechanism, Portugal on its PPEC tender mechanism and the UK on its CERT scheme. Many NRAs surveyed stated that they integrate energy efficiency within their regulatory measures such as setting the structure of transmission and distribution tariffs by making them cost-reflective and ensuring there are no incentives that do not unnecessarily increase the volume of energy that is being transported.

The table below lists the specific competencies on end user energy efficiency held by each of the NRAs who responded to the questionnaire.

	Role of NRAs' in end user energy efficiency
Austria	NRA is preparing a Green Book on energy efficiency and determines tariff structures which influence energy efficiency. Role rests primarily with other public bodies.
Belgium	NRA involved in development of advanced metering. The following public sector organisations also have a role in energy efficiency: Federal Public Service Economy; Flemish Energy Agency; Brussels Institute for Environment Management; and Ministry of Energy for Walloon.
Estonia	No role. Rests with Ministry of Economic Affairs & Communication.
Finland	No role. Rests with Ministry of Employment and the Economy and Motiva Ltd (state owned company).
France	NRA involved in development of advanced metering. Role rests primarily with Ministry of Finance, Ministry of Energy, Climate & Environment, Energy and Environment Management agency (ADEME), Standardization Agency, State owned banking institution (Caisse des dépôts et consignations) and local authorities.
Germany	No role. Rests with Federal Ministry of Economy.
Greece	No role. Rests with the Ministry for Development.
Hungary	Contribute as experts in the committees evaluating energy savings tenders. Role rests primarily with Ministry of Transport, Telecommunication & Energy. Technical implementation is carried out by the Energy Centre and the Ministry of National Development and Economy is in charge of Environmental and Energy Operative Programmes.
Ireland	NRA approves regulated tariffs and industry schemes. Role rests with central government and local administrations.
Italy	NRA responsible for definition, implementation, administration, monitoring and enforcement of white certificate scheme but likely to change. NRA also

	Role of NRAs' in end user energy efficiency
	integrates promotion of energy efficiency in regulatory measures. Primary responsibility rests with central government.
Luxembourg	No role. Rests with Ministry of Economics & Foreign Trade and Ministry of Environment.
Portugal	Role rests primarily with central government but NRA manages, administers and monitors progress of PPEC and establishes time-based tariffs.
Romania	Responsible for setting up rules regarding smart metering in the wholesale and retail markets. Rests with Romanian Agency for Energy Conservation (ARCE). Other institutions/ministries involved include Ministry of Economy & Finance, Ministry of Development, Public Works and Housing, Ministry of the Environment & Sustainable Development (MMDD), Ministry of the Interior and Administrative Reform (MIRA for local government, and Ministry of Transport (MT).
Slovak Republic	Role rests with Ministry of Economy.
Slovenia	No role. Rests with Ministry of Environment & Spatial Planning.
Spain	No role. Rests with IDAE linked to the Ministry of Industry, Tourism & Trade.
United Kingdom	Rests with Department of Energy & Climate Change (DECC) and Department for Communities & Local Government (DCLG). NRA administers CCL and CERT programmes and works with DECC to ensure the lessons learnt from the CERT programme are fed into the design of the future programme.

Table 5 – Role of NRAs' in end user energy efficiency

6.4. Directive on end-use energy efficiency and energy services, 2006/32/EC

As discussed in section 3.4.3, the Energy Efficiency Directive places various obligations on Member States. About half of the NRAs who responded to the questionnaire have either fully or partially implemented this Directive and many have produced their first National EEAP. This section discusses the progress that Member States have made in meeting the key obligations in the Directive.

Article 5.1 – Energy end-use efficiency in the public sector

Article 5.1 requires that energy efficiency improvement measures are taken by the public sector, focussing on cost-effective measures which generate the largest energy savings in the shortest span of time.

In Greece, there is an obligation on the public sector to install energy efficient lighting in all

public sector buildings. In Ireland, the Department for Communication Marine and Natural Resources has set up a working group to produce an action plan on how to achieve the public sector target of 33% and the Energy Management Bureau gathers data on energy performance across 250 public sector buildings to monitor performance. In Italy, public sector buildings are required to be energy certified and to purchase low energy consumption equipment. There is also a national fund that is used to finance energy audits and energy efficiency measures in local public administration buildings. Furthermore, in Portugal, energy efficiency targets for the public sector are higher than for other sectors and, in Romania, the Romanian Agency for Energy Conservation and the central and local governments are responsible for ensuring that energy efficiency measures are carried out by the public sector through national, regional or local legislative initiatives and/or voluntary agreements or other schemes. The Ministry of Industry, Tourism and Trade in Spain is promoting voluntary agreements with regional and local public institutions. Finally, work has begun to improve the sharing of best practice and effective communication across the public sector on energy efficiency measures in the UK.

Article 10 – Energy efficient tariffs

Article 10 requires Member States to ensure the removal of those incentives in transmission and distribution tariffs that unnecessarily increase the volume of distributed or transmitted energy. As discussed above, many NRAs surveyed stated that the transmission and distribution tariffs they set are cost-reflective and do not include any incentives that unnecessarily increase the volume of energy that is being transported.

Article 12.1 – Energy audits

Article 12.1 requires Member States to make energy audits available to all final consumers which are designed to identify potential energy efficiency improvement measures and are carried out in an independent manner.

In Estonia, energy auditing is a private business but audits for apartment buildings receive state support. A state owned company in Finland provides energy efficiency services including energy audits to consumers. In Italy, the future National Agency for Energy Efficiency will define the rules to ensure the availability of energy audit schemes to all final consumers. In Portugal and Romania, the central governments are coordinating the availability of energy audit schemes and in Spain energy audit schemes are available for new buildings. Finally, auditing in Belgium is carried out by auditing bodies which are certified by the regional governments.

Article 13.1 – Smart metering

Article 13.1 sets out a requirement for Member States to provide final customers with competitively priced meters as far as technically possible, financially reasonable and proportionate in relation to the potential energy savings.

The majority of NRAs who responded to the energy efficiency questionnaire indicated that plans are either in place or will be in the foreseeable future to implement smart metering.

In Austria, smart metering is expected to be implemented in the next 7 to 10 years. There are plans to install smart meters for all electricity consumers by 2013 in Estonia. In France, the NRA is funding an advanced metering trial and deployment is expected to follow and, in Ireland, the NRA commissioned the implementation of a smart meter pilot scheme in November 2007 which rolled out 20,000 smart meters to test the technology and determine the potential to effect measurable change in consumer behaviour. In Greece, time-of-use smart meters have been fully deployed for large industrial and commercial customers. Installation of electronic time-of-use meters at all new connections for medium sized industrial and commercial customers is currently under way, albeit with limited functionality at present. Pilot projects combining smart-metering and smart-grid technologies are currently carried out by the Distribution Network Operator, in order to evaluate potential for full scale deployment. The NRA in Belgium is carrying out a market design study on smart metering and is also involved in the introduction of smart metering in the Flemish region to begin with.

At the end of 2006, the Italian NRA issued a provision to encourage the introduction of smart meters which will facilitate introduction of time-of-use prices, enable network operator to reduce power and interact with household equipment to optimise consumption habits. Currently in Norway, all customers with consumption of over 100,000 kWh/year have smart meters and new regulations will ensure smart metering for all customers will be implemented by 2013. In Portugal, every consumer on a medium voltage level or higher has smart meters. The Romanian NRA is responsible for setting up rules regarding metering in the wholesale and retail markets.

Finally, the UK government has confirmed plans to move ahead with advanced metering for medium-sized businesses. For domestic consumers, The Government recently announced its plans to mandate a domestic roll out of smart meters by 2020. The UK NRA is involved in a number of work streams to assist Government in making these decisions on smart meters. It has also pledged to lead work on interoperability of smart meters to ensure their smooth functioning in the market. The UK NRA is managing a series of co-funded trials, which test consumers' responses to different interventions including combinations of some or all of the following: Smart meters; Clip-on real time display units; Improved billing (with and without smart meters); Energy efficiency information; and Community engagement. The trials began in July 2007 and involve around 50,000 households across Great Britain. They will conclude in 2010.

Article 13.2 – Regulate billing with the aim of reducing energy consumption

Article 13.2 requires billing to be based on actual energy consumption and is presented in clear and understandable terms. Billing should also be performed frequently enough so that customers can regulate their own energy consumption.

In a number of Member States (Finland, Italy, Romania, Slovenia, Spain, UK), bills are based on actual energy consumption but meter readings are usually only carried out annually. In Norway, customers must receive bills at least every quarter which are based on actual use and include a graphic comparison of consumption of the previous year. In the UK, suppliers are required to take a meter reading of each premise at least every two years but customers are free, at any time, to contact their supplier to provide them with an actual meter reading so that their quarterly or monthly bill is based on actual not estimated consumption. Furthermore, if a customer who is of pensionable age, disabled or chronically sick requests a meter reading, then a supplier, under the licence conditions, must, free of charge, arrange to

read the customer's meter at least once each quarter and inform the customer of that reading.

Article 13.3 – Information to customers on their consumption

Article 13.3 lists the types of information that should be made available to final customers in or with their bills including a comparison of current energy consumption with consumption for the same period in the previous year and contact information for consumer organisations, energy agencies etc.

Information to compare energy use in different billing periods is provided to customers in bills in some Member States (notably, Belgium, Finland, Norway, Portugal, Romania and Spain). From 1 January 2009, suppliers in the UK will have to provide on bills or statements historical information comparing energy usage in one billing period with the same period the previous year. Finally, in very few Member States suppliers provide contact details in bills on where to seek advice regarding energy efficiency measures. In some Member States, suppliers provide information to customers free of charge on how to improve the energy efficiency of their homes and in Belgium some suppliers provide details on energy audits to its consumers.

7. Market distortions – Renewable and energy efficiency

7.1. Renewable electricity

The large increase in renewables for generating electricity as implied by the proposed Renewables Directive carries substantial implications for balancing arrangements given the intermittent nature of some renewable generation (e.g. wind). In this respect, at times of high renewables generation, the system may have excess generation and where there is limited generation from renewables the system is likely to be under-supplied. These trends can be mitigated to some extent by the existence of sufficient and flexible reserve of conventional generation, greater interconnection across Member States to allow electricity to be imported or exported as required and effective constraint management.

However, it is likely that there will be a significant impact on market prices. For example, when there is a surplus of generation (e.g. when it is particularly windy), prices will likely tend towards zero and this will particularly affect the conventional generation which will not benefit from government support schemes, but which is needed to support the renewable plants which will operate at the margin, if renewables are prioritised. This trend is likely to have an impact upon investment incentives for conventional generation needed to support renewable plants as it will have a large impact upon the potential returns that could be earned by the conventional plant.

The proposed Renewables Directive includes provisions to guarantee priority access to the electricity network for renewable generation which could have substantial implications on network balancing and security of supply. At the extreme interpretation of "priority", all renewable generators currently queuing could be connected in advance of conventional plants. Due to the intermittency of some renewables, more technology and back-up generation from conventional sources will be required to protect against the variability of generation through renewables. It will therefore be necessary to ensure that there are sufficient volumes of reserve available to preclude blackouts through lack of secure

generating capacity. This reserve may not be available if all renewables must get priority access.

Additionally, some NRAs have expressed concerns that the increase of production of electricity by renewable energy sources which is not accompanied by the necessary network investment and build, carried out in a timely manner, might lead to severe network security situations and even blackout of systems. Currently, in some Member States, it can take 10 years to put new power lines in place, even those which are urgently required for the transport of electricity generated from renewable energy sources. This will impact on the achievement of targets, regardless of the support schemes put in place. Finally, costs should be factored into decision making regarding issues such as network investment. For example, the absence of provisions in the legal framework for consideration of cost could result in the requirement to underground a significant proportion of new lines, which could have huge implications for electricity prices.

It is important that the proposals for the facilitation of further renewables deployment are considered alongside the wider objectives of EU energy policy, in particular issues relating to security of supply, competitive markets, cost, network security and interconnection. In some respects, the increase in renewables may have a positive impact on security of supply where it increases diversity and reduces the EU's reliance on imported fuels, but the increase in intermittency of generation may lead to a negative impact on security of supply. In addition, the volume of investment in new renewable technology over a short period brings other risks. It is likely that the current proposals on priority access will mean that there will be a negative impact on security of supply overall.

7.2. Energy efficiency

As discussed in section 6, energy efficiency measures are one of the most cost-effective means of reducing GHGs. Despite this, less cost-effective and highly subsidised technologies are crowding out energy efficiency measures. However, as an effective carbon price, delivered through the EU ETS, begins to feed into the electricity price, consumers will increasingly be encouraged to undertake measures to conserve energy and reduce their electricity consumption.

As discussed in section 6.2, there are various support schemes in place in Member States to encourage the public, business and residential sectors to undertake energy efficiency measures. These support schemes will go some way in placing energy efficiency measures on a level playing field with other measures to reduce GHG emissions.

7.3. General market distortions

Section 4.5 discussed the possible need to harmonise support schemes within Member States in order to bring consistency and transparency and reduce regulatory burden. If harmonisation within Member States does not take place, there is a risk that consumers may over pay for support schemes that have similar aims and that some schemes contradict each other.

8. Barriers to renewable energy

8.1. Technical and financial barriers

There are issues associated with grid access and planning delays as well as financing issues which will need to be addressed to ensure the further deployment of renewable generation to meet the 2020 targets.

It is apparent that some forms of renewable electricity will be remotely located and investment in new transmission infrastructure will be required in order to connect this generation to the electricity grid. Given the significant volume of new renewables that will be seeking to obtain access to the system, there may be relatively long lead times in connection dates due to insufficient capacity being available to accommodate the new generators. It will also take time for the necessary investment to be made to provide further transmission capacity, not least because of the need to obtain relevant authorisations/consents. For example, in December 2004, the UK NRA approved funding for £560 million of investment associated with the Scottish transmission system to accommodate renewables, but construction work on the main upgrade has yet to commence due to delays awaiting the outcome of a planning inquiry. As a result of the limited capacity in the meantime, it is likely we will see an increased level of constraints on the system and a greater need for active constraint management actions from TSOs.

The complex processes and unpredictable timetables for building and construction authorisations and permissions processes in many Member States are a major issue. In February 2007, ERGEG hosted a workshop concerning electricity transmission infrastructure attended by representatives from the European Commission (DG ENV and DG TREN), TSOs, industry, Member States, NRAs and other interested parties. The stakeholders were particularly concerned with the issue of building and construction authorisations and permissions for transmission infrastructure projects. The workshop was a part of the work undertaken by the European energy regulators to look at the cross-border framework for electricity transmission infrastructure investments³⁹. The regulators concluded that processes for building and construction authorisations and permissions, including land planning, should be expedited, with the introduction of clear criteria, transparent guidelines and deadlines, with appropriate appeals mechanisms and with the consistent and transparent definition of roles of various authorities.

Linked to the above, there will also be associated issues to consider with regard to investment in distribution infrastructure, in particular brought about by increases in renewable distributed generation – that is electricity generation that connects directly to distribution networks. Work undertaken by the SmartGrids European Technology Platform for Electricity Networks of the Future⁴⁰ has demonstrated the challenges and potential in this area. These issues will require consideration along with the need to improve authorisation timescales and

³⁹ Cross Border Framework for Electricity Transmission Network Infrastructure, An ERGEG Conclusions Paper, Ref E07-ETN-01-03, 18 April 2007, http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_CONSULT/CLOSED%20PUBLIC%20CONSULTATIONS/ELECTRICITY/E06-PC-15/CD/E07-ETN-01-03_CB-Frameword-ETNI_V24-04.pdf

⁴⁰ www.smartgrids.eu

increase network investment.

8.2. Environmental and social barriers

Many Member States have cited environmental and social barriers to the deployment of renewable generation. For example, ideal locations for wind turbines are often in areas of outstanding beauty which are protected or in areas that are conserved. Furthermore, when finding a suitable location for a renewable generation plant, the habitats of specific species must also be considered which is particularly important in terms of wind generation and migratory birds. A more general issue related to the location of any type of power plant – conventional or renewable – is the potential environmental impact of communities in close proximity. In most Member States, the main social barrier has been community opposition/acceptance to the installation of wind turbines due to their impact on the landscape and to a lesser extent on tourism and property prices.

9. Barriers to energy efficiency

While support schemes are one tool to facilitate further energy efficiency measures, there are barriers that, if overcome, could ensure further improvement in energy efficiency.

A key barrier to energy efficiency is a lack of information, specifically some people are not aware of the savings that are available from improving energy efficiency. It is therefore difficult to expect them to behave rationally. Even if this information is conveyed, it is then difficult to change the behaviour of individuals. Consumers could find that their energy costs are relatively low and not high enough to warrant the effort and expense involved in putting in place energy efficiency measures. However, in the face of increasing energy bills and consumer awareness, the financial savings from being energy efficient should act as a strong motivator. Issues of split incentives could also act as a barrier - landlords may not have the incentive to make improvements in energy efficiency as they do not pay the bill. In addition, the lifespan of an energy efficiency improvement may be longer than the average ownership of a property⁴¹.

Furthermore, different standards across borders can act as a barrier to the widespread adoption of energy efficiency measures. In addition, energy efficiency is not always given a clear commitment and lead by government departments due to the crowding out of energy efficiency measures as a result of the existence of support schemes for renewables. The responsibilities of different actors involved should be clearly defined. To this end, it would be desirable to establish a body taking over the role of implementing the national energy efficiency action plan and of coordinating different activities at different levels. Related to this is the lack of enforcement capabilities at all policy making levels, which could exacerbate any weak commitment shown by government in implementing energy efficiency measures. From

⁴¹ Energy Efficiency Policy and Demand-Side Management Strategies, presentation by Paul Waide, IEA, February 2008, http://www.iea.org/Textbase/work/2008/asean_training/Waide.pdf

the perspective of the private sector, energy budgets are often given a low priority and bundled in with more important capital decision factors⁴².

Finally, the energy industry (such as generators or other companies involved) must not be incentivised to increase the amount of energy delivered. The development of the market of energy services may help the energy sector to invest in increasing the energy efficiency of final consumers. There is an emerging market for energy services companies but this appears to be restricted to the business sector. Due to various grants available to residential customers, there is little incentive to enter into a long-term contract for energy efficiency services. However, energy services companies may have an important role to play. Specifically, they could deliver efficiency gains if more, stable and well designed financing tools were available.

10. Conclusion

Over the last several years, the political and legislative landscape in the EU has changed significantly as ways to mitigate climate change have come to the forefront. The publication of the European Commission's Green Package brought with it necessary and ambitious targets to reduce the level of GHG emissions in the EU as well as targets to increase the amount of renewable energy and the level of energy efficiency.

In light of this, policies to encourage the greater deployment of renewable energy and energy efficiency are vital to achieving the targets as well as increasing security and diversity of supply. It is clear from our assessment that the most popular type of support scheme in place to encourage renewable electricity is the feed-in tariff. Analysis undertaken by Intelligent Energy Europe demonstrates that feed-in tariffs are more successful, in terms of deployment of renewable technologies at lower costs, than quota systems with tradable certificates. Our review also shows that Member States use a range of policy instruments. Fiscal incentives such as tax reductions or exemptions are often used as a complement to the main support scheme of either a feed-in tariff or quota obligation system.

Recognising that energy efficiency measures are one of the most cost-effective ways to reduce GHG emissions, Member States have adopted various support schemes. These include providing grants for energy efficiency improvements in the residential and business sectors, putting in place technical standards and codes to ensure buildings are energy efficient, placing obligations on suppliers with tradable white certificates, etc.

Support schemes are one tool to encourage renewable energy and energy efficiency but there are barriers that, if overcome, would further improve the deployment of renewable energy and energy efficiency. For renewable energy, these barriers are related to grid access and planning delays as well as financing, environmental and social acceptance issues. For energy efficiency, the main barrier is the lack of information that consumers have in terms of the energy savings they could make from improving energy efficiency. However, even when equipped with this information, it is often difficult to change the behaviour of

⁴² See footnote 41.

individuals as they could find that their energy costs are not high enough to justify the effort and expense of putting in place energy efficiency measures.

A range of support schemes are being used by Member States for both renewable energy and energy efficiency. Member States are benefiting from sharing experiences and learning from each other as thirteen countries have either changed or adapted their support schemes since 2004. If and when harmonisation does come into effect, this will assist in selecting a support scheme that is both effective and efficient. Furthermore, the harmonisation of support schemes within Member States is needed to facilitate greater consistency and transparency and reduce regulatory burden for consumers and industry.

Annex 1 – Renewable support schemes in each Member State⁴³

	Feed in tariffs	Tradable certificates	Investment grants	Tax reductions or exemptions	Tendering	Other
AUSTRIA						
Large hydro:			10% for 10-20 MW			
Small hydro:	Currently 31.5-62.5 €/MWh		10-30% for additional new plants			
Onshore wind:	Currently 75.4-75.8 €/MWh					
Solid biomass:	Currently 102-160 €/MWh		Up to 30% reduction for waste			
Biogas:	Currently 103-170 €/MWh					
Photovoltaic:	Currently 299.9-600 €/MWh					
Geothermal:	Currently 70-74 €/MWh					
CZECH REPUBLIC						
Small hydro:	For 30 years					
Onshore wind:	For 20 years					
Solid biomass:						
Biogas:						
Photovoltaic:	For 15 years					
Geothermal:	For 20 years					
ESTONIA						
Small hydro:	Yes, either power purchase with fixed price of 73 €/MWh or direct support with fixed price of 54 €/MWh.					
Onshore wind:						
Offshore wind:						
Solid biomass:						
Biogas:						
FINLAND						
Small hydro:			For construction of renewable projects - amount is project specific	Electricity tax return of 4.2 €/MWh		
Onshore wind:				Electricity tax return of 6.9 €/MWh		
Offshore wind:						

⁴³ As defined in section 3.1

Solid biomass:				Electricity tax return of 6.9 €/MWh for woodchips			
Biogas:				Electricity tax return of 4.2 €/MWh			
Photovoltaic:							
Geothermal:							
FRANCE							
Small hydro:	55.28 €/MWh			For businesses, write-off of equipment costs in first fiscal year and deduction of up to 33% of investment made in overseas projects from net results. For photovoltaic, there is also a tax credit available for households equal to 50% of investment.			
Onshore wind:	83.68 €/MWh						
Offshore wind:	135 €/MWh as of 2008				Yes		
Solid biomass:	45.02 €/MWh						
Biogas:	66.22 €/MWh						
Photovoltaic:	248 €/MWh						
Geothermal:	Yes – amount not specified						
GERMANY							
Large hydro:	96.7 €/MWh for < 0.500 MWh		Yes, vary by size and technology			Soft loans	
Small hydro:	66.5 €/MWh for >0.500 MWh for 30 years						
Onshore wind:	45.8-87 €/MWh for 20 years						
Offshore wind:	54.9-91 €/MWh for 20 years						
Solid biomass:	73.3-115 €/MWh for 20 yrs						
Biogas:	58-76.7 €/MWh for 20 yrs						
Photovoltaic:	340.4-544 €/MWh for 20 years						
Geothermal:	68.8-150 €/MWh for 20 yrs						
GREECE							
Small hydro:			40% of investment cost				
Onshore wind:	Fixed 75.82 €/MWh		30-40% of investment cost				
Offshore wind:	Fixed 92.82 €/MWh						
Solid biomass:	Fixed 75.82 €/MWh						

Biogas:	Fixed 75.82 €/MWh						
Photovoltaic:	452.82 €/MWh for installations < 0.10MW and 402.82 €/MWh for > 0.100MW						
Geothermal:	Fixed 75.82 €/MWh						
Other:	For solar other than photovoltaic, 252.82 €/MWh for installations smaller than 5 MWe and 232.82 €/MWh for larger installations						
HUNGARY							
Large hydro:						Obligatory purchase from plants with installed capacity > 5MW at market price	
Small hydro:	Obligatory purchase from plants with installed capacity < 5MW at premium price						
Onshore wind:	Premium price		Connection fee discount (max 50%)				
Solid biomass:							
Biogas:							
Photovoltaic:							
Geothermal:							
Other:	Premium price for waste		Yes				
IRELAND							
Large hydro:	72 €/MWh increasing with CPI for hydro up to and including 5 MW			Tax relief for certified renewable projects restricted to corporate investments			
Small hydro:							
Onshore wind:	57 €/MWh for >5 MkW and 59 €/MWh for <5 MW increasing with CPI						
Offshore wind:	Recent government announcement equal to 140 €/MWh						

Solid biomass:	72 €/MWh increasing with CPI		Up 40% or €5000 per technology whichever is less for renewable heating systems and covers biomass boilers			
Biogas:	70 €/ MWh increasing with CPI					
Photovoltaic:			For solar thermal collectors and solar heating technologies			
Geothermal:			For heat pumps			
ITALY						
Large hydro:		Producers either inject a share of renewable electricity into system or buy green certificates				
Small hydro:	220€/MWh including sale price	Yes				
Onshore wind:	300 €/MWh for plants equal to or less than 0.2 MW including sale price	For plants >0.20 MW				
Offshore wind:	300 €/MWh for plants equal to or less than 0.20 MW including sale price					
Solid biomass:	220-300 €/MWh including sale price	Yes				
Biogas:	180-300 €/MWh including sale price	Yes				
Photovoltaic:	360-490 €/MWh					
Geothermal:	200 €/MWh including sale price	Yes				
Other:	340 €/MWh to support wave and tidal including sale price	Yes, for wave and tidal				
LUXEMBOURG						
Small hydro:	77.6 €/MWh for 0.001-0.500 MW and 77.5-54.1€/MWh for 0.501-10 MW					
Onshore wind:						
Biogas:						
Photovoltaic:	560 €/MWh for <0.030MW					

NORWAY						
Small hydro:		Political promise to include small hydro in a future green certificate scheme with Sweden				
Onshore wind:			Amount of grant is project specific			
Offshore wind:						
POLAND						
Large hydro:		In place since 2005		Exempt from an excise tax		
Small hydro:						
Onshore wind:						
Offshore wind:						
Solid biomass:						
Biogas:						
Photovoltaic:						
Geothermal:						
PORTUGAL						
Small hydro:	Average price for 2007 85.93 €/MWh					
Onshore wind:	Average price for 2007 94.9 €/MWh					
Offshore wind:						
Solid biomass:	Average price for 2007 109.9 €/MWh					
Biogas:	Average price for 2007 105.3 €/MWh					
Photovoltaic:	Average price for 2007 330 €/MWh					
Geothermal:	Average price for 2007 81.4 €/MWh					
ROMANIA						
Large hydro:		Quota system with tradable green certificates since 2005		Exempted from excise payment: For business, 0.34 €/MWh and for non-business, 0.68 €/MWh		
Small hydro:						
Onshore wind:						
Offshore wind:						
Solid biomass:						
Biogas:						
Photovoltaic:						

Geothermal:						
Other:						
SLOVENIA						
Small hydro:	<p>For less than or equal to 1 MW either fixed price 65.2 €/MWh or premium 13.34 €/MWh.</p> <p>For greater than 1 MW and less than or equal to 10 MW either fixed price of 63.41 €/MWh or premium 11.03 €/MWh</p>					
Onshore wind:	For less than or equal to 1 MW either fixed price 64.84 €/MWh or premium 12.46.					
Offshore wind:	For greater than 1 MW and equal to or less than 10 MW, fixed price 62.61 €/MWh or premium 10.23 €/MWh					
Solid biomass:	<p>For less than or equal to 1MW, fixed price 123.17 €/MWh or premium 70.79 €/MWh.</p> <p>For greater than 1 MW, fixed price 119.35 €/MWh or premium 66.97 €/MWh</p>					
Biogas:	Fixed price 120.89 €/MWh or premium 83.33 €/MWh					
Photovoltaic:	<p>For less than or equal to 0.050 MW, fixed price 399.57 €/MWh or premium 347.19 €/MWh.</p> <p>For less than 0.050 MW, fixed price 399.57 €/MWh or premium 347.19 €/MWh</p>					

Geothermal:	Fixed price 62.61 €/MWh or premium 10.23 €/MWh					
Other:	Power plants that use any other renewable energy such as municipal waste get a feed in tariff					
SPAIN						
Small hydro:	Producer can choose between fixed or premium. Average ⁴⁴ is 77.35 €/MWh. Support is higher during first 25 yrs.					
Onshore wind:	Producer can choose between fixed or premium. Average is 78.15 €/MWh. Support is higher during first 20 yrs.					
Offshore wind:	Maximum premium is 84.3 €/MWh					
Solid biomass:	Average is 87.06 €/MWh. 3 types of biomass, each receiving different level of support. Support is higher during first 15 yrs.					
Biogas:	Average is 93.19 €/MWh. 3 types of biogas, each receiving different level of support. Support is higher during first 15 yrs.					
Photovoltaic:	Average is 432.39 €/MWh. Support is higher during first 25 years.					
Geothermal:	Support is higher during first 20 years					
Other:	For waste and solar thermoelectric					
UNITED KINGDOM						
Small hydro:		Renewables Obligation (RO) requires suppliers	Grant funding to reduce the capital costs for early	Suppliers get exemptions from the Climate Change Levy (CCL) if they		
Onshore wind:						

⁴⁴ Average = total subsidy paid via either fixed or premium divided by total energy

Offshore wind:		<p>to source a percentage of their electricity sales from eligible renewable sources. In 2005-06, suppliers had to source 6.7% from eligible renewables rising to 15.4% by 2015-16. Companies can meet their obligation by presenting Renewable Obligation Certificates (ROCs); paying into a buy-out fund or through a combination of the two. 1 ROC is issued to generators for 1MW of electricity regardless of technologies but banding is due to come in force in April 2009. Average price of ROCs up to October 2008 was £46.79.</p>	<p>adopters of micro-generation.</p>	<p>supply renewable energy to non-domestic customers. Reduction of VAT for microgeneration technologies and exemption from income tax for microgenerated electricity,</p>		
Solid biomass:						
Biogas:						
Photovoltaic:						
Geothermal:						

Annex 2 - EU Directive on the promotion of electricity produced from renewable energy, 2001/77/EC

Detailed requirements of the Directive

The Directive requires that Member States **shall** ensure that:

- transmission system operators (TSOs) and distribution system operators (DSOs) guarantee the transmission and distribution of RES-E. Access may only be refused where it risks the reliability and safety of the grid.
- TSOs and DSOs set up and publish standard rules dealing with who bears the costs of technical adaptations (such as grid connections and reinforcements) necessary to connect new renewable generating stations to the grid and to establish a mechanism for sharing these costs between all producers who benefit from them;
- TSOs and DSOs provide any new renewable generating station wanting to be connected to the grid with a comprehensive and detailed estimate of the costs associated with the connection
- the charging of transmission and distribution fees does not discriminate against RES-E, in particular RES-E produced in peripheral regions;
- TSOs give priority to renewable generating stations when dispatching generating stations, insofar as any particular national electricity system permits;
- they report on measures undertaken to facilitate grid access for RES-E.

The Directive also stipulates that Member States **may**:

- provide for priority access to the grid system of RES-E;
- require TSOs and DSOs to bear, in full or in part, the costs of updating the grid to integrate new RES-E producers;
- allow renewable generating stations to call for tenders for the connection work to the grid.

Associated reports

1. Communication (2004) 366 of 26 May 2004, as required by Article 3 of the RES-E Directive, assesses the prospects for achieving the target of 21% share of RES-E in overall electricity consumption by 2010.

2. Communication (2005) 627 of 7 December 2005, as required by article 4 of the RES-E Directive, presents an inventory of, and the experience gained with, the application and coexistence of the different mechanisms used in Member States for supporting RES-E.

The report also includes an evaluation of Member States efforts in reducing administrative barriers, dealing with grid issues and implementing guarantee of origin for renewable energy schemes.

3. Communication (2006) 105 of 8 March 2006, Green Paper on 'A European Strategy for Sustainable, Competitive and Secure Energy' opened the debate on a future European energy policy. Consultation that preceded 'An Energy Policy for Europe'.

4. Communication (2007) 1 of 10 January 2007, 'An Energy Policy for Europe', proposed overall targets, policy framework and action plan for European energy markets. With proposals on:

- (a) achieving a functioning internal energy market;
- (b) a long-term commitment to green house gases reduction and the EU ETS;
- (c) a programme of energy efficiency measures;
- (d) a long-term target for renewable energy;
- (e) a European strategic energy technology plan;
- (f) the future of nuclear energy

5. Communication (2006) 847 of 10 January 2007, as part of 'An Energy Policy for Europe', set out a proposed process for developing a European strategic technology plan.

6. Communication (2006) 848 of 10 January 2007, as part of 'An Energy Policy for Europe', proposes that the European Union establish a mandatory target of 20% for renewable energy's share of energy consumption in the EU by 2020 and lays down a pathway for achieving this. It further proposes a new legislative framework for the promotion and use of renewable energy.

7. Communication (2006) 849 of 10 January 2007, as part of 'An Energy Policy for Europe', as required by article 3 of the RES-E Directive, assesses the prospects for achieving the target of 21% share of RES-E in overall electricity consumption by 2010. The report shows that the overall share of RES-E will fall just short of the target, reaching 19% by 2010.

Annex 3 - Energy end-user efficiency and energy services, 2006/32/EC

Detailed requirements of the Directive

The following section provides an overview of the requirements contained within the energy end-user efficiency and energy services directive. By implication, this provides an indication of the areas in which the European Commission considers that there is scope for achieving improvements in energy efficiency.

The public sector

The Directive requires Member States to promote public sector energy efficiency improvement measures, by ensuring that the public sector applies at least two of the following requirements:

1. the use of financial instruments for energy savings, including energy performance contracting that stipulate the delivery of measurable pre-determined energy savings;
2. purchase equipment and vehicles based on lists of energy-efficient product specifications;
3. purchase equipment that has efficient energy consumption in all modes;
4. replace or retrofit existing equipment and vehicles with equipment listed in points (2) and (3);
5. use energy audits and implement the resulting cost-effective recommendations;
6. purchase or rent energy efficient buildings, or replace or retrofit purchased or rented buildings in order to render them more energy efficient;

and, more generally, to consider energy efficiency issues in tendering and procurement procedures.

Promotion of energy end-use efficiency and energy services

Provision of services by energy suppliers⁴⁵

The Directive specifies that Member States may choose one of the following requirements to be complied with directly or indirectly (through other providers) by *energy suppliers*:

1. ensure competitively priced energy services are offered, and promoted, to end customers; or
2. ensure competitively-priced energy audits and/or energy efficient improvement measures are made available, and promoted, to end customers; or

⁴⁵ Where energy suppliers are energy distributors, distribution system operators and retail energy sales companies.

3. ensure *energy suppliers* contribute to a funding mechanism, whereby the minimum amount contributed shall be equivalent to the estimated cost of undertaking the provision of energy services, audits or improvement measures envisaged above.

Alternatively, Member States may ensure that a voluntary scheme is established with an effect equivalent to one of the three points discussed above.

Member States are further required to ensure that other market participants such as installers, energy advisors and energy consultants, may independently offer and implement energy services, energy audits and energy efficiency improvement measures. Member States must, where necessary, provide appropriate qualification, accreditation and certification schemes for providers of energy services, energy audits and energy efficiency improvement measures.

Finally, the Directive also requires that Member States ensure the availability of energy audit schemes designed to identify potential energy efficient improvement measures to all final consumers.

Information and transparency

The Directive requires that Member States establish appropriate conditions and incentives for market operators to provide:

1. more information and advice to final customers on energy end-use efficiency; and
2. sufficiently detailed and frequent billing so that final customers may regulate their own energy consumption; and
3. information such as final customer current actual energy prices and actual consumption relative to an average normalised benchmark and consumption in the same period in the previous year; and
4. contact information for consumer organisations, energy agencies and similar bodies; and
5. Provide on request aggregate statistical information on their final customers to authorities sufficient to properly design energy efficiency improvement programmes.

Funding mechanisms

The Directive allows Member States to establish funds to promote the development of a market for energy efficiency improvement measures by providing grants, loans or financial guarantees to all providers of energy efficiency improvement measures or final customers.

The funding mechanisms should be designed to promote energy auditing, financial instruments for energy savings and, where appropriate, improved metering and information billing.

Other Supporting Legislation

Aside from the energy end-user efficiency and energy services directive, there are a number of supporting texts which are intended to facilitate the achievement of further energy efficiency within Europe. The following section provides an overview of some of this legislation, for reference.

- *Energy Efficiency in Buildings:*

Directive 2002/91/EC of 16 December 2002 on the energy performance of buildings

- *Eco-design of Energy-Using Products:*

Directive 2005/32/EC of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products

Directive 2000/55/EC of 18 September 2000 on energy efficiency requirements for ballasts for fluorescent lighting

Directive 92/42/EEC of 21 May 1992 on efficiency requirements for new hot-water boilers fired with liquid or gaseous fuels

- *Energy labelling of household appliances:*

Regulation 2422/2001/EC on Energy Star labelling for office equipment

Directive 2003/66/EC of 3 July 2003 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations

Directive 2002/40/EC of 8 May 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric ovens

Directive 2002/31/EC of 22 March 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household air-conditioners

Directive 1999/9/EC of 26 February 1999 implementing Council Directive 92/75/EEC with regard to energy labelling of household dishwashers

Directive 98/11/EC of 27 January 1998 implementing Council Directive 92/75/EEC with regard to energy labelling of household lamps

Directive 96/60/EC of 19 September 1996 implementing Council Directive 92/75/EEC with regard to energy labelling of household combined washer-driers

Directive 95/13/EC of 23 May 1995 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric tumble driers

Directive 95/12/EC of 23 May 1995 implementing Council Directive 92/75/EEC with regard to energy labelling of household washing machines

- *Combined Heat and Power (Cogeneration):*

Directive 2004/8/EC of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC

Voluntary Agreements

The European Commission has implemented voluntary agreements, as unilateral commitments by industry, in three areas:

- stand-by losses of Televisions and Videocassette Recorders
- domestic washing machines
- refrigerators and freezers
-

Voluntary programmes also exist in the following three areas:

- European Motor Challenge Programme
- Green Light Programme
- Green Building Programme

Policy papers:

COM(2007)1; An Energy Policy for Europe

COM(2006) 545; Action Plan for Energy Efficiency: Realising the Potential

COM(2006) 105; Green Paper: A European Strategy for Sustainable, Competitive and Secure Energy

COM(2000) 769; Green Paper: Towards a European Strategy for the Security of Energy Supply

Annex 4 - Definitions

Feed-in tariff

A type of price-based policy instrument whereby eligible renewable generators are paid either a fixed price which is a guaranteed level irrespective of the wholesale price of electricity or a premium price which is a payment in addition to the wholesale price of electricity.

Financial measures

Include subsidies and taxes. Governments can change the cost of the use of energy using these measures. Subsidies include grants and low-interest loans for investments in energy efficiency while taxation policies could include energy use or pollution taxes.

Fiscal incentive

A type of price-based policy instrument such as a tax exemption or reduction whereby the government reduces or exempts the amount of tax paid by a party such as an investor, generator, supplier or customer. Investment grant is another type of fiscal incentive whereby a government body provides financial aid to particular types of projects or to purchases of particular types of renewable technologies to make them financial attractive.

Legal or regulatory instruments

Governments can set legal requirements on power companies, industry and households with financial penalties for non-compliance. Examples include appliance, vehicle and building standards (on energy use or emissions), land and other resource management codes and standards for technology.

MS

Member State

NRA

National Regulatory Agency

Price-based policy instrument

Sets either the price of renewable electricity or the cost of producing renewable electricity directly or indirectly.

Quantity-based policy instrument

Sets a quantity of renewable electricity to be produced.

Quota obligations

A type of quantity-based policy instrument whereby an obligation is placed, typically on suppliers, to source a specific percentage of electricity from renewable generation. Tradable green certificates are usually used to prove compliance with the obligation.

RES

Renewable Energy Sources

Standardisation

An instrument that is widely used in industry in order to ensure product quality and product safety. The standards can be either prescriptive (for example, prescribing the maximum heat transmission through walls) or are performance-based (giving requirements for the overall energy performance of the building without prescribing specific measures).

Tender

A type of quantity-based policy instrument, whereby a tender is announced by the government for the supply of electricity from RES, which is then supplied on a contractual basis at the price resulting from the tender.

Tradable white certificates

White certificates have up to now been used in combination with an obligation scheme. Market actors (usually retail energy suppliers or distributors) are obliged to reach a certain amount of energy saving. Target compliance requires submission of a number of certificates commensurate with the energy saving target. Certificates can be created from projects that result in energy savings beyond business as usual, by target market actors or by Energy Service Companies (ESCOs). The market actor receives certificates for savings achieved, which can be used for their own target compliance or can be sold to (other) obliged parties.

Voluntary agreements

Voluntary agreements are commitments undertaken by power producers or industries in consultation or negotiation with a public authority, and usually recognised by that agency. Voluntary agreements can take different forms; most of them are between policy makers and industry.

Annex 5 – Member States represented in this report

The following countries have been represented in this report:

1. Austria
2. Belgium
3. Cyprus
4. Czech Republic
5. Estonia
6. Finland
7. France
8. Germany
9. Greece
10. Hungary
11. Ireland
12. Italy
13. Luxembourg
14. Norway
15. Poland
16. Portugal
17. Romania
18. Slovak Republic
19. Slovenia
20. Spain
21. United Kingdom