

# THE EUROPEAN UNION'S EXPERIENCE IN THE USE OF ECONOMIC INSTRUMENTS, INCLUDING TAXATION, TO REACH SPECIFIC OBJECTIVES IN ENERGY POLICY

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Statement, By His Excellency John Bruton, Ambassador, Head of Delegation of the European Commission to the United States To The Committee on Finance, United States Senate, 29 March 2007

### 1. POLICY CONTEXT

Reliable energy is a vital part of our daily lives in Europe and we have come to rely on it. But the days of secure, cheap energy are over and we are already facing the consequences of climate change, increasing import dependence and higher energy prices.

Energy use is the main factor in climate change, accounting for some 80% of the European Union's (EU) greenhouse gas emissions. The EU is committed to reducing these emissions, but its present energy practices will actually result in increasing them by 5% by 2030. Therefore the EU's current energy and transport policies are not sustainable. Acting now to tackle climate change is essential.

Rising, volatile prices, blackouts and difficulties in supply have all illustrated the risks of being overly dependent on oil and gas. With global needs on the up, this pattern is set to continue. The International Energy Agency expects worldwide demand for oil alone to increase by well over a third by 2030 - so how will this be met? If energy trends and policies remain as they are, the EU's reliance on imports will jump from half to almost two thirds in 2030. 84% of gas would have to be imported, as would 93% of oil. But from where and how these supplies would come is unclear. Add to this the fact that several EU Member States are essentially dependent on one single gas supplier and factor in the lack of a crisis support structure between countries, and the EU's growing vulnerability is evident.

The EU's increasing dependency on imports threatens not only its security of supply but it also implies higher prices. If, for example, the price of oil rises to \$ 100/barrel in today's money, the EU's energy import bill will be around 50% higher by 2030. While Europeans would have to pay a lot more for their energy, few additional jobs in the EU would be created this way. In contrast, boosting investment in energy efficiency, renewable energy and new technologies has wide-reaching benefits and would contribute to the EU's strategy for growth and jobs.

Even though Europe is doing quite well if we compare its energy consumption per capita and CO2 emissions per capita with the respective indicators for US and Japan (EU's energy consumption per capita is half of the US and CO2 emissions are even less than half ), this gives no reason whatsoever for the EU to be complacent. Its energy situation is alarming even though it might be even more alarming in the US.

What is clear is that in order to ensure a sustainable, secure and competitive energy supply, a common response is needed.

### 2. THE OBJECTIVES OF EUROPEAN ENERGY POLICY

Although EU energy policy is far from being created from scratch (a number of energy efficiency and renewables promotion measures date back more than 10 years) it is just recently that the EU has opted for a comprehensive, integrated and ambitious policy set in the field of energy and fight against climate change.

The 2007 Spring European Council of heads of state and government, held on 8-9 March 2007, demonstrated that the EU is taking the lead in the fight against global warming. EU heads of state and government adopted an energy policy for Europe which does not simply aim to boost competitiveness and secure energy supply, but also aspires to save energy and promote climate-friendly energy sources.

EU leaders set a firm target of cutting by 20% the EU's greenhouse gas emissions by 2020. The EU will be willing to increase this goal to 30% if the US, China and India make similar commitments.

EU leaders also set a binding overall goal of 20% for renewable energy sources by 2020, compared to the present 6.5%. A subordinate goal is to increase the level of bio-fuels in transport fuel to at least 10% by 2020.

The European Council also confirmed the target to improve energy efficiency by 20% by 2020 compared to the baseline (the target proposed by the European Commission - the EU executive - in October 2006).

### 3. USE OF ECONOMIC INSTRUMENTS IN ENERGY POLICY AND RELATED AREAS: THE OVERALL PHILOSOPHY

When using economic policy instruments for furthering energy and environmental policy goals the EU and its Member States seek first to discourage what is undesirable, and only in the second place, (and if still necessary), to use public resources to directly support desirable behaviour.

Article 174 of the Treaty establishing European Communities requires Community policy to be based on the "polluter pays" principle. The costs associated with protecting the environment should be internalised by firms just like any other production costs. In order to implement this policy, the Community will have to use a series of instruments: regulation, and in particular the adoption of standards, but also voluntary agreements and economic instruments.

Ensuring that prices reflect costs at all stages of the economic process is the best way of making all parties aware of the cost of protecting the environment. Apart from their potentially adverse effects on trade and competition, subsidies generally undermine that aim because they enable certain firms to reduce costs artificially and not to reveal the costs of environmental protection to consumers.

Thus, the "polluter pays" principle and the need for firms to internalize the costs associated with protecting the environment would appear to militate against the granting of subsidies. Nevertheless, the EU acknowledges that state aid (subsidies) can be justified in two instances:

- in certain specific circumstances in which it is not yet possible for all costs to be internalised by firms and the aid can therefore represent a temporary second-best solution by encouraging firms to adapt to standards;
- the aid may also act as an incentive to firms to improve on standards or to undertake further investment designed to reduce pollution from their plants.

### 4. EU-WIDE MEASURES (EXISTING AND FORTHCOMING)

Describing the EU system in a simplified way one could say that emissions from the most energy intensive sectors are currently addressed by the EU emission trading scheme, whereas energy taxation applies to energy consumption in

households and in the transport sector and lighter industrial processes.

#### 4.1. Taxes and charges

##### 4.1.1. Energy taxation - overall approach

Traditionally the EU member states have taxed energy consumption by means of energy taxes (known as excise duties, energy taxes, or CO2 taxes for example). These taxes are always "specific taxes" - they are levied on the quantity of energy products once these are released for consumption. In practice such taxes are levied once the finished product is released from a refinery. This means that such taxes are easy to administer, since they are applied only once and the number of tax payers is extremely limited. These taxes are then included in the final price of energy paid by all consumers, be they private individuals or industry. In many cases, reduced rates of duty apply to industry in order to preserve its international competitiveness. In practical terms this is handled by means of refunds or authorised consignments without tax.

Taxes related to energy use are well-established measures in all Member States of the European Union. Although their main purpose has traditionally been to raise revenues, they also contribute to reducing energy consumption by raising the price of energy and energy-using goods and services. They thus support in a general way the goals of improving energy efficiency and fighting climate change. Energy taxes also act as a "shock absorber" by damping the impact of energy price swings on the EU economy. In this way, and by reducing overall energy consumption, they contribute to security of supply.

At the EU level the harmonisation of energy taxes started in 1992 with the latest relevant legislation dating back to 2003.

Energy products and electricity are only taxed when they are used as motor or heating fuel, and not when they are used as raw materials or for the purposes of chemical reduction or in electrolytic and metallurgical processes (e.g. for the production of plastics, steel and other metals).

Taxable energy products include:

- mineral oils (e.g. gasoline, diesel, LPG, kerosene, heavy fuel oil...),
- natural gas,
- coal and other solid hydrocarbons, when they are used as motor fuel or heating fuel.

In order to avoid fraud, any product used as motor fuels is taxable and any other hydrocarbon used as heating fuel is taxable.

Energy products used in electricity generation are exempt from tax whereas electricity itself, once delivered to the consumer, is subject to tax.

EU energy tax legislation lays down those products that are taxable together with when and how they should be taxed.

When it comes to tax rates, EU legislation only sets minimum levels of taxation. Above these minima EU Member States are free to set their own national rates as they see fit.

EU minimum levels of taxation per product and use

## EURO/USD

Minimum levels of taxation when used as motor fuel

Minimum levels of taxation when used as motor fuel for certain industrial and agricultural uses

Minimum levels of taxation when used as heating fuel

Current

From 2010

Non-business use

Business use

gasoline (1000 liter)

359 / 477

359 / 477

374 / 497

Diesel (1000 liter)

302 / 402

330 / 439

21 / 28

21 / 28

21 / 28

Kerosene (1000 liter)

302 / 402

330 / 439

21 / 28

0

0

LPG (1000 kg)

125 / 166

125 / 166

41 / 55

0

0

natural gas (1 GJ gross calorific value)

2,6 / 3,5

2,6 / 3,5

0,3 / 0,4

0,3 / 0,4

0,15 / 0,2

coal and coke (1 GJ gross calorific value)

0,3 / 0,4  
0,15 / 0,2

electricity (1 MWh)

1 / 1,3  
0,5 / 0,65

(The volumes are measured at a temperature of 15° C).

As a result of international agreements, and due to the international nature of shipping, energy products supplied for use as fuel for the purpose of air navigation and sea navigation are exempt from taxation.

If one looks at how Member States transpose the EU legislation in their national laws, one can see that the 12 countries that have recently joined the EU (2004 and 2007 accessions) do not go beyond the EU stipulated minimum or do so by very little. In contrast Germany, Netherlands and UK have the highest rates of excise duties. In case of the UK, the minimum rate is more than doubled.

Detailed information on applicable excise duty rate on energy products in different Member States is regularly published by the European Commission in the overview called "Excise duty tables - Energy products and Electricity."

As to the future development of legislation at the EU level, first one has to mention the recent European Commission proposal on commercial gas oil. The proposal is based on the fact that existing tax differentials on diesel used by trucks create distortions of competition within the liberalised Internal Market of the haulage sector. In addition, they lead to "fuel tourism", where truck drivers lengthen their routes in order to benefit from low tax rates applied in certain Member States, thereby having a negative impact on the environment. In consequence, the Commission's proposal aims at narrowing these differentials while reducing environmental damages. Inter alia, the proposal will increase in two steps the minimum rate of excise duties from 302 to 380 Euros (\$402 to \$505) per 1000 liter in 2014 (intermediate step at 359 Euros or approximately \$477), which will reduce the distortions of competition and environmental damages.

The EU Commission is also about to launch a debate on the further options for the use of energy taxation in the EU. This discussion will start with the forthcoming publication of a "Green Paper (consultation paper) on economic instruments for environment and related policy purposes" that should provide input for a review of the Energy Taxation Directive to be proposed by the Commission before the end of 2008.

The review is motivated by two factors:

- Making the Energy Taxation Directive more supportive of the objectives of energy efficiency. Energy taxation is not always neutral and sometimes treats certain energy products more favourably than others without any justification. One possible idea would be to link the taxation of energy products to their energy content (as is already the case for natural gas, coal and electricity) and therefore make it fully neutral, but support the objective that each engine or combustion unit, whatever fuel it consumes, must be as efficient as possible.

- Making the Energy Taxation Directive a more environment-related tool. The idea is to introduce an explicitly environmental element into the Energy Taxation Directive, as is the practice already in some Member States. Such an approach would have three advantages:

- It would allow renewables, such as bio-fuels, to be favoured, as the environmental tax would not apply. The energy tax would, at the same time ensure that the incentive in favour of energy efficient consumption is maintained and that some revenue is generated.
- It would allow a better combination of taxation and other economic instruments (when emissions are addressed by the emission trading scheme, they do not need to be addressed by taxation).
- Finally the "component" approach to Energy Taxation would also allow a better combination of energy taxation and infrastructure charging at the EU level (for non-greenhouse gas emissions).

In practice this would mean splitting the current minimum levels (where possible) into two separate components or counterparts. Since energy taxation is a very cross-cutting instrument that applies in many sectors and areas, it often interacts with other economic instruments used within the EU. Better structured energy taxation would make such interaction easier and more effective and would ensure fairer sharing of costs of EU energy and climate policies between all parts of the society.

Consideration still needs to be given however, as to whether focussing on energy efficiency and environmental impacts would also allow proper attention to be given to another key objective of energy policy, that is, security of supply. The Commission will have a closer look into this issue once responses to the Green Paper have been analysed.

#### 4.1.2. EU energy taxation - approach to renewables

Since energy taxation does not apply to non-hydrocarbons used in heating, it indirectly favours almost all sorts of biomass used for heating purposes.

A different approach exists, however, for motor fuels. In order to prevent both erosion of the tax base and fraud, the general rule for taxation of motor fuels is that all additives, extenders or substitutes for hydrocarbons shall equally be taxed, at the rate of the equivalent motor fuel (gasoline or diesel). However, EU legislation provides for an option, according to which motor fuels (or their components) that are of bio origin can be exempt from energy taxation.

Electricity is always subject to taxation, irrespectively of its origin. On an optional basis, Member States are allowed to exempt electricity of renewable origin from taxation. This possibility, however, requires the origins of electricity to be traced. The application of this option cannot lead to discrimination between imported (other EU or third countries) vs. domestically-produced electricity. In practice this option is not widely used.

#### 4.1.3. Passenger car taxation

EU Member States have intentionally encouraged the purchase of more fuel-efficient cars relative to less efficient cars by differentiating car purchase or ownership taxes according to engine size or power. Several have made the environmental objectives of these taxes more explicit by introducing differentiation based on CO<sub>2</sub> emissions per kilometre (or mile), and the Commission has proposed that all Member States should do so.

Notably, the European Commission has presented a proposal for a Directive that would require Member States to re-structure their passenger car taxation systems. It would promote sustainability by restructuring the tax base of both registration taxes and annual road use taxes so as to include elements directly related to the carbon dioxide emissions of passenger cars. This would mean a tax differentiation on the basis of the number of grams of carbon dioxide emitted per kilometre by a car. By 31 December 2008, at least 25% of the total tax revenue from registration and annual road use taxes should derive from the CO<sub>2</sub> based element of the taxes and this figure should rise to 50% by 2010.

The proposal also aims to improve the functioning of the Internal Market by removing existing tax obstacles to the transfer of passenger cars from one Member State to another.

#### 4.1.4. Taxation of freight vehicles and infrastructure charging

In May 2006 European legislators adopted the Directive establishing a new Community framework for charging for the use of road infrastructure. The so called Eurovignette directive (the title comes from name for small, coloured stickers affixed to motor vehicles using highways in some European nations The affixing of a vignette on a motor vehicle indicates that the respective road toll has been paid.).

The new directive will make it possible to improve the efficiency of the road transport system and ensure the proper functioning of the internal market. The Directive lays down rules for the application by Member States of tolls or user charges on roads.

The main objective is to ensure road usage better reflects its true impact on society and the environment at large by introducing a "user pays" and a "polluter pays" principle. It also aims to shift freight away from roads onto other modes of transport such as rail and waterways.

Vehicle taxes. In accordance with Eurovignette Directive Member States may not set vehicle tax rates any lower than the minimum rates set out in the Directive (this can go beyond \$1000 per year depending on the technical specifications of the vehicle).

Tolls and user charges. The Directive lists the conditions to be met by Member States wishing to introduce and/or maintain tolls or introduce user charges. These conditions are as follows:

- application of the principle of no discrimination on the grounds of the nationality of the haulier or the origin or destination of the vehicle;
- no checks at internal borders;
- application of the principle of proportionality of rates for user charges, based on the duration of the use made of the infrastructures;
- possibility of varying the rates depending on the categories of emissions from the vehicles and/or the time of day;
- possibility for two or more Member States to cooperate in introducing a common system for user charges.

Maximum amount of user charges can go beyond \$ 2000 per year depending on specification of the vehicle, including emission limits according to so called Euro-norms.

Tolls shall be based on the principle of the recovery of infrastructure costs. Specifically weighted average tolls shall be related to the construction costs and the costs of operating, maintaining and developing the infrastructure network. Nevertheless, individual toll rates may vary for the purposes of combating environmental damage, tackling congestion, etc.

From 2012 onwards tolls and/or user charges will apply also to vehicles weighing between 3.5 and 12 tonnes whereas currently they only cover vehicles above 12 tonnes.

The directive's main novelty is to introduce the possibility for individual states to integrate the 'external costs' of road transport into toll prices. After intense discussion, it was finally agreed that these 'external costs' can include congestion costs, environmental pollution, noise, landscape damage, social costs such as health and indirect accident costs which are not covered by insurance. To be integrated in the charges ('internalised'), the costs have to be proved "undeniable", EU legislators agreed.

The Commission ended a dispute between the European legislators on how precisely to integrate such costs in toll prices by promising to come forward with a calculation method two years after the directive comes into force (June 2008).

#### 4.2. European Union Greenhouse Gas Emission Trading Scheme

As regards tradable permits, the EU emissions trading scheme (ETS) is the centrepiece of the EU's efforts to reduce greenhouse gas emissions and meet its international climate change commitments. It logically complements the energy taxation system.

Strictly speaking, ETS is not a part of EU energy policy, but it has an impact both on the development of cleaner energy mix and improvement in the energy efficiency.

By increasing energy prices in general, and the cost of burning fossil fuels in particular, the ETS has the potential to contribute to improving the competitiveness of renewable energy sources. Basically, it has the potential to be one of the most important tools for attaining EU energy policy objectives.

In January 2005 the European Union Greenhouse Gas Emission Trading Scheme commenced operation as the largest multi-country, multi-sector Greenhouse Gas emission trading scheme in the world. The ETS scheme is unique in its size and international nature. Over 10.000 installations in the 27 Member States are covered by the scheme, providing them with a clear incentive to reduce their emissions and look towards cleaner and more efficient technologies. The upcoming review, which will be prepared in close cooperation with stakeholders, will provide the opportunity to further improve the functioning of the scheme.

To date, the first phase of the EU ETS, running from 2005 to 2007, has delivered valuable lessons. These lessons are informing the review process, which is aimed at strengthening the scheme by looking at its functioning and its scope, in particular expanding it to other sectors and gases, beyond the second trading period, running from 2008 to 2012. However, the first set of independently verified emissions reports for the year 2005 was of particular importance. This indicated that aggregate 2005 emissions, at just over 2 billion tonnes, were significantly below the annual average allocation for the first period of close to 2.2 billion tonnes. Hence, the Commission is taking a much stricter approach with respect to allocation of emission allowances for the period 2008 to 2012. The decisions the Commission has taken so far on the national allocation plans for the second period is proof of this. Unlike the first trading period the second one will be characterised by scarcity of allowances in the EU ETS, thereby in turn ensuring emissions reductions are delivered and that the emerging carbon market is strengthened. This will allow the EU ETS to realise its full environmental and economic potential in terms of environmental and economic benefits.

In an effort to tackle aviation's small but fast-growing contribution to climate change, the European Commission issued a legislative proposal in December 2006. This is another important recent development concerning ETS. It suggests imposing a cap on CO<sub>2</sub> emissions for all airplanes arriving or departing from EU airports at an 2004-2006 average level, while allowing airlines to buy and sell 'pollution credits' on the EU 'carbon market'. 2011 is the Commission's target date for the aviation sector to start trading CO<sub>2</sub>.

During their Spring 2007 meeting the Heads of State and Government of the member states confirmed their commitment to ETS: its functioning will continue well beyond 2012. The ambitious CO<sub>2</sub> reduction targets they agreed on for 2020 will make the system even more effective.

The current on-going review of the ETS aimed at improving its functioning after 2012 explores a number of issues, including issues related to auctioning (In the first trading period, i.e. 2005-2007 the European Directive on the EU ETS allowed governments to auction up to 5% of the allowances; in the second - 2008-2012 - up to 10%).

The issues to be answered are: What share of allowances should be auctioned in the trading periods? Should these be nationally coordinated or EU-wide auctions? What should be auction schedules? What should be auction design? For the option of separate national caps it is being analysed if there should be a harmonised minimum of auctioning after 2012, and what share might be suitable. For the option of a single EU-wide cap, full auctioning should be considered as a possibility.

Of course, as the EU only accounts for around 14 % of global emissions, it is clear that whatever we do concerning global warming, we have to do it in broad global cooperation. In this respect we are happy to observe the latest trends in the US.

More information on the functioning of the EU's Emission trading system can be found at <http://ec.europa.eu/environment/climat/emission.htm>

#### 4.3. The EU approach to Sustainable Coal Technologies

Coal and gas account for over 50% of the EU's electricity supply and will remain an important part of our energy mix in the future. On the international level, it is expected that twice as much electricity as today will be produced from coal by 2030. However, increasing concern over the effects of climate change, mean that Europe has to take the lead in undertaking serious measures to ensure that we reduce CO<sub>2</sub> emissions from coal and work on developing cleaner coal technologies.

On 10 January 2007 the European Commission therefore adopted an Energy Package for Europe, which included a Communication on the sustainable use of fossil fuels in electricity generation.

The Commission has underlined that the future use of fossil fuels must be sustainable and in line with Europe's climate change policy. This means that fossil fuels can continue to provide essential energy security benefits in Europe and worldwide only with the use of new technologies allowing for combustion with radically reduced levels of CO<sub>2</sub> emissions.

For coal, which produces relatively more CO<sub>2</sub> per unit of electricity than other fossil fuels, the sustainability objective will require the development and commercialization of new integrated technological solutions, or so-called "Sustainable Coal" technology. This combines improvements in conversion efficiency and CO<sub>2</sub> capture and geological storage processes.

Sustainable Coal technologies will also represent important solutions to the sustainable use of other fossil fuels, particularly natural gas, in power generation.

This can also be envisaged for the co-production of electricity and hydrogen on a large scale, opening the door to the future hydrogen economy.

There are indications that the technical and commercial feasibility of new technologies for sustainable power production from coal could be achieved in Europe by 2020 and then be ready for wide penetration in the power generation industry and for application, also to other fossil fuels.

However, to achieve such development will require early bold industrial investments in a series of demonstration plants and related policy initiatives.

Strategy for the period up to 2020: during this time a first element of an EU strategy for sustainable power production from coal will be to use the best available technologies (BAT) and the most efficient coal conversion processes, when replacing or renovating outdated coal-fired power plants. Furthermore, new plants built in this period should be designed as "capture-ready", i.e. prepared for later addition of CO<sub>2</sub> capture and storage (CCS) technologies, when these become commercially available.

At the same time such a strategy will need to actively pursue further development and demonstration of sustainable fossil fuel technologies. Up to 12 large scale demonstration projects relying on integrated technological solutions, using natural gas or coal, have been proposed by industry in 2006 and the Commission is keen to see these projects progressing to their full-scale implementation by 2015. The Commission will be ready to increase the financial support provided through its research programmes for the development and demonstration of technological solutions for sustainable fossil fuels in power production.

As a third element the Commission will engage in closer collaboration with third countries on the further development and demonstration of sustainable technologies for power production from fossil fuels, enabling the use of CCS.

A stable, consistent policy and regulatory framework removing barriers to implementation of CCS is crucial for the commercial roll-out of sustainable fossil fuels technologies. At the EU level, the Commission will propose to amend accordingly the EU environmental legislation (a public consultation will be launched early 2007) and expects to include CCS activities in the EU Emission Trading System (when proposing the revision of this system in 2007). At the international level, the Commission plans to continue its efforts to ensure a wide international consensus regarding the future emissions reduction objectives for CO<sub>2</sub> and other greenhouse gases. The Commission would support amendments to existing international conventions so as to allow underground storage of CO<sub>2</sub> below the seabed.

Strategy for the period after 2020: If needed, the Commission may consider proposing appropriate measures to encourage wide penetration of Sustainable Coal. These could entail a range of initiatives including: extending the horizon of the Emission Trading System to match or surpass the usual lifetime of an investment in power generation, identifying and developing CO<sub>2</sub> storage sites and pipelines, favouring sustainable electricity production, and implementing timed phase-out of high CO<sub>2</sub> emitting installations. On the basis of the information available today, the Commission believes that after 2020 all new power plants using coal, and most likely gas as well, should be built and operate with CCS, whereas capture-ready plants built in the previous period should be rapidly retrofitted.

## 5. NATIONAL POLICY MEASURES USED BY EU MEMBER STATES TO PROMOTE RENEWABLES

### 5.1. Support schemes for electricity from renewable energy sources (RES-E)

According to the present green electricity directive adopted at EU level the EU aims at having renewable sources provide 21% of the electricity generated in the EU by 2010. To reach national indicative targets established on the basis of this overall reference value Member States have taken a number of measures to promote market penetration of green electricity.

Currently there is a range of different support systems operational in the EU that can be broadly classified into five groups: feed-in tariffs, green certificates, tendering systems, tax incentives and investment grants. The first two support instruments are the most popular and important ones, therefore they will be described in more detail.

Feed-in tariffs exist in most of the Member States (France, Spain, Romania, Greece, Bulgaria, Hungary, the Czech Republic, Slovakia, Latvia, Estonia, Lithuania, Luxembourg, Cyprus and Malta). These systems are characterised by a specific price/premium, normally set for a period of several years that must be paid by electricity companies, usually distributors, to domestic producers of green electricity. The additional costs of these schemes are paid by suppliers in proportion to their sales volume and are passed through to the power consumers.

According to how the funds for the support system are collected and managed, one can distinguish 3 main sub-categories of feed-in tariff systems:

- So called Preussen Elektra system (named after the European Court judgment) used in Germany. This support scheme foresees a burden sharing mechanism between the Distribution System Operators (DSO), which are subject to the purchase obligation of green electricity at a fixed price, and Transmission System Operators (TSO). It does not foresee compensation payments to the DSO and/or TSO for the additional financial burden resulting from the purchase obligation and/or the burden sharing mechanism. Normally, DSO and TSO can pass the additional financial burden onto their clients through higher electricity prices (in the past this, however, required the prior approval of the ministry of the economy of the German Land (state) in question).

- Para-fiscal levy system. This system is practiced in the majority of Member States. Normally, under such systems TSO and DSO are compensated for the obligation to buy green electricity at a fixed feed-in tariff through a consumption-based levy paid by energy users. Usually, the collected levies are channelled to DSO/TSO through the funds specifically established for that purpose. To make such systems compatible with the smooth functioning of the EU's internal market the European Commission's practice is to ask that the imports of green electricity from other Member States is de-taxed. This is necessary because importers of green electricity do not benefit from the respective support schemes in the country of destination.

- Connection fee system. Such a system is practiced in Austria, Ireland, the Netherlands and Slovenia. Under such systems the mode of collection of the support funds is based on lump sum payments on connection, irrespective of the amount and source of the electricity consumed. When determining the amount of the lump sum payment, account may be taken of the power of the connection (fuse rating) and the voltage level at which particular consumer and consumer group is connected.

There are also variations in the feed-in systems across the EU as to the "modulation" of support paid to producers of green electricity:

- Germany, for example, uses a pure fixed tariff system. This means that producers of green electricity can count on the fixed and same tariff for a long period of time. As there are no fluctuations depending on market price developments, this system offers to producers the highest stability.

- Denmark, in turn, has a premium system for onshore wind. While the level of the premium is fixed, the other part of the price is dependent on market price. Other renewable technologies are supported by fixed feed-in tariffs.

- Spain has a premium system; however it gives the option to choose between the "market price plus premium" formula and the "fixed price plus premium" formula.

Feed-in schemes have the advantages of investment security and the promotion of mid- and long-term technologies. On the other hand, they are difficult to harmonise at the EU level and involve a risk of over-funding, if the level of support is not degressive over time.

Under the green certificate system, currently existing in the United Kingdom, Sweden, Italy, Belgium and Poland, green electricity is sold at conventional power-market prices. In order to finance the additional cost of producing green electricity, and to ensure that the desired green electricity is generated, all consumers (or in some countries producers) are obliged to purchase a certain number of green certificates from RES-E producers according to a fixed percentage, or quota, of their total electricity consumption/production. Penalty payments for non-compliance are transferred either to a renewables research, development and demonstration (RD&D) fund or to the general government budget. Since producers/consumers wish to buy these certificates as cheaply as possible, a secondary market of certificates develops where RES-E producers compete one with another to sell green certificates. Therefore, green certificates are market-based instruments, which have the theoretical potential, if functioning well, of ensuring best value for investment. These systems could work well in a single European market and have in theory a lower risk of over-funding. However, green certificates may pose a higher risk for investors and long-term, currently high cost technologies are not easily developed under such schemes. These systems present higher administrative costs.

Pure tendering procedures existed in two Member States (Ireland and France). However, both have changed this system to a feed-in tariff combined with tendering system in some cases. The same is basically true for Portugal. Under a tendering procedure, the state places a series of tenders for the supply of RES-E, which is then supplied on a contract basis at the price resulting from the tender. The additional costs generated by the purchase of RES-E are passed on to the end-consumer of electricity through a specific levy. While tendering systems theoretically make optimum use of market forces, they have a stop-and-go nature not conducive to stable conditions. This type of scheme also involves the risk that low bids may result in projects not being implemented.

Systems based only on tax incentives are applied in Malta and Finland. In most cases (e.g. Cyprus, UK and the Czech Republic), however, this instrument is used as an additional policy tool.

The above categorisation into four groups is a fairly simple presentation of the situation. There are several systems that have mixed elements, especially in combination with tax incentives.

An overview of the use of the different mechanisms:

Support mechanisms in EU-15 (old EU Member States)

## Support mechanisms in EU-12 (Member States that joined EU in 2004 and 2007)

On 10th January 2007 the European Commission published a report on progress in renewable electricity , which shows how successful individual Member States and the EU have been so far in promoting green electricity.

### 5.2. Support schemes for biofuels

The present biofuels directive adopted at EU level<sup>10</sup> includes a 5.75% target for 2010 with respect to the share of the market for gasoline and diesel in transport. To reach national indicative targets established on the basis of this overall reference value Member States have taken a number of measures to promote the market penetration of biofuels.

The two Member States that have made most progress in the field are Germany and Sweden. While Germany's success has rested mainly on biodiesel, Sweden has concentrated on bioethanol. In other respects, however, their policies have several common factors. Both countries have been active in the field for several years. Both promote both high-blend or pure bio-fuels (giving the policy visibility) and low blends compatible with existing distribution arrangements and engines (maximising the policy's reach). Both have given biofuels tax exemptions, without limiting the quantity eligible to benefit. Both have combined domestic production with imports (from Brazil in the case of Sweden, from other Member States in the case of Germany). Both are investing in bio-fuel RTD and have treated first-generation bio-fuels as a bridge to second-generation.

Tax exemptions are a longstanding form of support for biofuels. In 2005 and 2006, several Member States announced the introduction of a new form of support: bio-fuel obligations (France and Austria's obligations came into force in 2005, Slovenia's in 2006. The Czech Republic, Germany and the Netherlands have announced the introduction of obligations in 2007, the UK in 2008). These are legal instruments requiring fuel suppliers to include a given percentage of bio-fuels in the total amount of fuel they place on the market. Some Member States are using obligations as a complement to tax exemptions, others as an alternative. There is good reason to believe that in the long run, bio-fuel obligations will bring down the cost of promoting biofuels - in part because they ensure large scale deployment - and will prove the most effective approach. The Commission encourages their use.

Since the beginning of 2005, 13 Member States - Austria, Belgium, Czech Republic, Denmark, Estonia, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Sweden and the UK - have received state aid approval for new biofuel tax exemptions (via this approval procedure the European Commission checks if the way the excise duty exemption will be applied will not result in overcompensation of biofuel producers and in distortion of the EU's internal market). At least 8 Member States have brought bio-fuel obligations into force or announced plans to do so.

On 10 January 2007 the European Commission published a "Report on the progress made in the use of biofuels and other renewable fuels in the Member States of the European Union."

### 5.3. Support schemes for heating and cooling of buildings from renewable energy sources (RES-H&C)

The renewable heating and cooling sector is more fragmented than its electricity or transport counterparts, with a range of fuels (biomass, geothermal, solar), technology and equipment included in the sector. For this reason, policy and support systems for the sector are not always coherent and are a bit piecemeal.

Support schemes in EU countries include grants and/or low interest loans for the purchase of equipment (biomass (e.g. pellet) boilers, solar thermal panels, geothermal heat pumps). Germany and Austria (two countries with significant penetration of solar thermal panels) use such schemes. France has introduced an income tax credit (worth 50% of the

purchase cost of solar equipment), which is proving very popular.

Analysis of support schemes suggests that major financial support is not always necessary: continuity of the support programme, combined with publicity campaigns, are seen as key elements of successful policies.

The main barriers to the uptake of renewable energy technology in the heating and cooling sector are not always cost related (much of the equipment has payback periods of 5-10 years); local planning rules and delays and poor information on the part of installers seem to be much more significant barriers.