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Climate Change Policy in the EU Member-States: A Comparative Analysis*

by

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1. Introduction

The EU identified global warming as one of the key environmental problems to be tackled at the very early stages it made its appearance. Under the United Nations Framework Convention on Climate Change (UNFCCC), the EC committed itself to stabilize its CO_2 emissions at the 1990 levels by the year 2000. For this purpose, a Monitoring Mechanism for CO_2 and other greenhouse gas emissions was established in 1993. Further on, under the Kyoto Protocol, the EU set the emissions reduction target of –8% based on the 1990 levels, to be achieved during the period 2008 and 2012. The adoption of the Kyoto Protocol has led to the EU *"burden sharing"* agreement, according to which, the EU member-states would implement their respective commitments, forming a European "bubble". Thus, different commitment targets applied to all member-states.

Table 1 shows the member-states commitments in accordance with article 4 of the Kyoto Protocol for the reduction of six GHG emissions during the period 2008-2012 relative to 1990 base year levels, agreed upon by the Council of Ministers under the *"burden sharing"* agreement in June 1998.

Six member-states aim at reducing CO_2 emissions by the year 2000 or 2005, compared to the emissions in 1990 or 1988. More specifically, Belgium set the target at reducing emissions by 5% in 2000 compared to 1990 levels, Denmark was committed to achieve a 5% reduction in emissions in 2000 compared to 1990, Germany aimed at reducing CO_2 emissions by 25% by the

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year 2005 based on the reference year 1990, Netherlands was committed for 3% reduction by 2000 compared to 1990 emissions, Luxembourg committed itself to reduce its emissions by 30% in the year 2000, compared to the 1990 levels, in the UK total global warming potential of all greenhouse gas emissions in 2000 is projected to be of the order of 10% below the level in 1990.

Table 1

Commitments of the EU member-states for emissions reduction of six GHG under the "burden sharing" *agreement*

Austria	-13%
Belgium	-7.5%
Denmark	-21%
Finland	0%
France	0%
Germany	-21%
Greece	+25%
Ireland	+13%
Italy	-6.5%
Luxembourg	-28%
Netherlands	-6%
Portugal	+27%
Spain	+15%
Sweden	+4%
United Kingdom	-12.5%

Source: Greek Ministry for the Environment, Physical Planning and Public Works/ National Observatory of Athens. *Emissions Inventory. National Inventory for Greenhouse and other gases for the years 1990-1998 (Draft)*. Athens, March 2000, p. 9.

Two of the EU countries were committed to stabilize their emissions by 2000 at the 1990 levels. The first one is Austria. The second is Italy, whereas the stabilization of emissions in 2000 at the 1990 levels is likely; however, an increase of up to 3-4% does not seem impossible.

The rest seven EU countries will try to limit the scale of increase in their CO_2 emissions over the period 1990-2000 to a different extent. Most of the countries included in this category are the Community's less developed countries, and especially the countries of Southern Europe. Greece plans to

increase its emissions by 15%, Portugal's emissions will rise by 40% and Spain's by 11-13%, France's emissions are likely to increase by 15%, Finland is committed to limit the increase of its energy production and consumption emissions, Ireland's increase of emissions is expected to be 7% and Sweden's CO_2 emissions are projected to increase by about 4% by 2000.

2. Sectoral approach

2.1. *Energy Sector*

The most common measure that some of the member-states have applied in order to reduce greenhouse gas emissions in the energy sector is the CO_2/ energy tax. Although this tax has been the subject of several discussions in the EU context, and many alternative approaches have been proposed, only six European countries arrived at the decision of its implementation at national level. The fears, which were expressed for its implementation, regarded distributional and competitiveness issues; these problems could be overcome by recycling tax revenues or by applying exemptions for certain industries.

In Austria the CO_2/energy tax has already been implemented. In Belgium, the introduction of the CO_2/energy levy is intended to be phased in all sectors as soon as there is agreement within the EU. Denmark has a CO_2 tax in place for households since 1993 and in 1996 it was increased for the industrial sector to the level of households. Finland was the first European country to impose a CO_2 tax in 1990; it is expected to considerably contribute to the CO_2 emissions reduction and more specifically to about 4-5 % by the year 2000 compared to 1990 level. In the Netherlands there are two tax schemes having a CO_2 component. The CO_2 tax in Sweden has been applied since 1991 and it has remarkably been increasing since then.

2.2. *Power Generation Sector*

In the power generation sector the most common undertaken measures involve the energy efficiency improvement through the promotion of combined heat and power plants, the extensive use of renewable energy sources and the switch from coal to natural gas. The first policy has been implemented in most EU countries, except for France, Germany, Italy, Luxembourg, Portugal and Sweden. In these countries, the priority for global warming mitigation has been given to other policies.

In France, the importance of nuclear generated electricity considerably lowers its option in controlling future emission trends through the promotion of combined heat and power plants; in this country, the focus lays on the demand-side management. In Germany, the reduction of emissions is planned to be achieved through voluntary commitments on improved energy efficiency, extensive use of power generation and residential by renewable energy, legislation on the sale of electricity generated from renewables to the grid and the agreements on sale to the electricity network by renewable energy users. In Italy, emissions reductions will be achieved by efficiency improvements in the power generation and increases in renewable sources, replacement of electrical equipment by more efficient equipment, as well as through reductions of losses in the electricity grid and the methane network. Luxembourg measures include the use of gas vapour turbines, pilot project with gas turbine and hydro power, introduction of co-generation and the investigation of renewable energy sources potential use. In Portugal, the focus is laid on the introduction of natural gas, intensified use of renewable endogenous resources, incentives systems and legislation on the rational use of energy and technological developments for the reduction of greenhouse gases in current installations and equipment. In Sweden, the measures adopted in the energy sector apart from the CO_2 tax on fossil fuels and the VAT, which is levied on all energy forms, there are also programmes to promote and stimulate the introduction of renewable energy sources and increased efficiency in energy use, such as the energy conservation and promotion of biofuels, wind power and solar energy.

Apart from the promotion of combined heat and power plants, all European countries, have focused on the exploitation of renewable energy sources, at a different extent. Each country chooses the types of renewable sources, it will promote, according to its geographical position, its morphological and climatic characteristics. Luxembourg is the only country, which has not taken up the initials to use RES but it is still in the investigation process of renewable energy sources potential use, an exception being a pilot hydropower project. Southern countries, like Greece, Portugal and Italy have mainly focused on the extensive exploitation of their long-drawn-out sunlight, wind and water resources and have thus promoted solar, geothermal, wind, hydroelectric and other forms of renewable energy. Biomass and biofuels are more common in northern countries.

The introduction of natural gas in power generation, its extensive use and

the replacement of other fuels in the future are also expected to reduce GHG emissions considerably, especially in the less developed countries of the EU, for instance Greece, Ireland and Portugal, which have recently introduced it.

Only few countries have paid attention to the promotion of nuclear power in the power generation process. In France, due to the high penetration of nuclear power in the electricity generating field, possibilities for CO_2 reduction are considered limited in the energy sector. In the U.K., further improvements in the productivity of the nuclear sector are under implementation.

2.3. *Industry*

Voluntary agreements with the industry and the promotion of energy efficiency through fuel switching are the most common policies developed to reduce emissions in the European industrial sector.

Voluntary agreements exist in almost half of the EU countries. In Finland, agreements with the industry concern the phasing out of chlorofluorocarbons, the energy saving and the monitoring of energy efficiency. In France and in Finland, voluntary agreements involve the energy. These kinds of agreements are more common in Germany, where agreements with industry refer to CO_2 reduction and energy efficiency. Italian voluntary agreements apply to industries with medium-low energy consumption and they aim at adopting high-efficiency equipment. In the Netherlands, long-term agreements for energy conservation have been arranged. At last, the UK strives to come to voluntary agreements with industrial branches regarding energy savings.

Fuel switching mainly refers to the replacement of lignite, coal and other traditional fuels from natural gas or methane. This procedure is more common in the less developed countries of the EU, where the construction of natural gas infrastructure was delayed. The natural gas penetration in industry is still under way in Greece, Germany, Ireland, Italy, Portugal, Austria, Spain and the UK.

Other policies that have been put through in the case of industry are the implementation of CO_2 taxes, for example in Denmark, the extensive use of subsidies for the promotion of energy efficiency and energy-efficient technologies, for example in France and Denmark, the application of energy standards, as for example in the Netherlands and Denmark and the modernization of industries as in Germany.

2.4. *Transport*

Emission reductions from the transport sector are expected to accrue by the improvement and promotion of the public rail and road transport and networks. The main instruments that have been used for this purpose are taxes and duties as well as subsidies. Most of the taxes and duties in the transport sector are levied on fuels and they aim at reducing fuel consumption; this type of taxes have been imposed in Austria, Germany, Greece, Netherlands, Sweden and the UK. In Luxembourg the possibility of implementing a vehicle tax based on energy consumption is still under investigation. Subsidization for the promotion of public transport or as an incentive for renewing the vehicle fleet has also been widely used, especially in Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain. Another popular policy is the substitution of the standard polluting fuels with alternative and more environmentally friendly ones, just like in France with the promotion of electric vehicles, in Italy with the emphasis on the promotion of methane cars and vans, Netherlands, Portugal, Spain and Sweden. Forced monitoring of the existing speed limits and the environmentally friendly traffic behaviour have been implemented in Austria and the Netherlands. Fiscal instruments for controlling emissions in the transport sector are non-existent only in Belgium and Finland. All the rest EU countries have taken up measures for mitigating GHG emissions stemming from transportation.

2.5. *Residential Sector*

The tightening of the energy relevant regulations for buildings and the promotion of energy performance standards are the most popular policy instruments in the residential sector. These policies are mainly promoted through the provision of subsidies for conducting energy efficiency improvements. For some countries, like Greece, Italy, Portugal and Spain, the introduction of natural gas is considered crucial for GHG emissions reduction whereas for others, for example Denmark, Finland, Luxembourg, Spain and the UK emphasis has been given to the promotion of CHP. Specific energy performance standards for buildings have been set in the case of Austria, Denmark, Greece, Netherlands and the UK. Efficiency improvements through the implementation of efficiency standards for electrical appliances and other equipment have been put forward in Denmark, Greece and the Netherlands.

2.6. *Forestry*

In forestry, reductions of greenhouse gas emissions are expected to result from the enhancement of carbon sequestration through afforestration programmes. This policy has been implemented in Denmark, Finland, France, Greece and Ireland. In Sweden, a switching to sustainable silviculture practices extending the life of forest products has taken place.

2.7. *Agriculture*

In the agricultural sector, CO_2 reduction is expected to indirectly result from application of the European Union's Common Agricultural Policy (CAP). The CAP related measures have contributed towards a less intensive use of agricultural activity and a planting of land formerly used for agriculture with trees. Support for the promotion of energy cultivations has been given in Austria, Greece and Sweden, while land set-aside programmes have been implemented in France, Germany and Greece. The EU directives concerning the use of nitrogen fertilizers have extensively been applied in France and Sweden. Most of the measures adopted for GHG emissions reduction in agriculture are either voluntary measures and subsidies, as for instance in Austria or EU directives and codes of good practices, as in Ireland.

2.8. *Waste*

Waste treatment refers to the prohibition or limitation of combustible waste disposal at landfills and the use of their incineration for energy purposes. This kind of policy is not very widely used; its application involves only in Denmark and the Netherlands.

3. Conclusion

In this paper, we have used the sectoral approach in order to overview the various measures and policies that the EU countries have adopted for controlling their GHG emissions. The official target for the reduction of the emissions by 8% during the time period 2008-2012, led to the formation of a EU "bubble", where commitments would jointly be fulfilled. All EU member-states had to face different emission reduction targets and have therefore developed their own national programmes. The most developed EU countries are obliged to make considerable cuts in their emissions, as they are more responsible for

the greenhouse effect and they are able to achieve higher emission reductions, while the less developed EU member-states are allowed to simply limit the increase of their emissions, in order to be given the chance for further development. All policies more or less are confined in specific sectors, energy and power generation, industry, transport, forestry and agriculture, waste and the residential sector.

In the energy sector, the instrument that has attracted most of the attention was the CO_2 / energy tax, which has only been implemented by six high-income EU states. Fears about its application, expressed mainly by the low-income EU members, focused on distribution and competitiveness issues; these rigidities may though be overcome by recycling tax revenues or by applying exemptions for certain industries.

In the power generation sector, the focus was led on the achievement of energy efficiency, through the promotion of combined heat and power plants, the extensive use of renewable energy sources and the switch from coal to other less polluting fuels, for instance natural gas or nuclear power. The exploitation of renewable energy sources and the expansion of the natural gas use is the main concern of the low-income members, while the most developed ones focus on the expansion of nuclear power and the promotion of cogeneration. The economic instruments adopted in this case regard subsidisations, investments, voluntary agreements and economic incentives provision.

Policies in the industrial sector refer to the implementation of CO_2 taxes, the extensive use of subsidies for the promotion of energy efficiency and energy-efficient technologies, the application of energy standards and voluntary agreements, the provision of fiscal incentives for the modernization of industries and the replacement of traditional fuels with less polluting ones.

The main instruments that have been used for limiting emissions accruing from transport are taxes and duties led on fuels as well as subsidies for constructing better road and rail networks. In the residential sector energy performance standards and regulations for buildings and electric appliances have been put through. In forestry and agriculture, policies involve the afforestration and land set-aside programmes and the promotion of energy cultivations. Dealing with waste policies have not widely been used.

The likelihood for the EU of achieving the stabilization target by 2000 depends on the effect of the previously discussed policies and measures as well as the socioeconomic developments, which will take place at the countries

individually. Although, data for the emissions since 1998 are still not available, some short evaluation of the CO_2 emission projections for 2000 can be made. Only few countries, Austria, Denmark, Italy and Spain, seem to pace in line with the national target of limiting their emissions. A quite large number of countries, France, Germany, Ireland, Luxembourg and the UK, seem to exceed their national objectives and achieve greater reductions compared to the planned ones. The rest of the countries will probably not be able to fulfill their national targets, each one at different level.

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Abstract

This paper aims at presenting and comparing the policies and measures that the individual EU member-states have adopted in order to mitigate global warming. Both the EC and the member-states signed the Kyoto Protocol and committed themselves to reduce greenhouse gas emissions by 8% during the period 2008-2012, compared to the 1990 levels and to be on track for further reductions after 2012. The adoption of the Kyoto Protocol led to the acceptance of the *"EU burden sharing"* agreement, according to which the official target of –8% would jointly be reached; thus, different emission targets applied for the individual member-states (Council of Ministers, June 1998). The implementation of policies and measures had to take place primarily at the national level and for this purpose the member-states developed their own national climate change strategies. This paper presents an overview of the limitation strategies of the individual member-states and compares the alternative policy measures that have been adopted.