

# The strategy of European Union regarding climate change

Iuliana Pop<sup>1</sup>, Madalina-Teodora Andrei<sup>2</sup>, Charlotte-Valentine Ene<sup>3</sup>, Radita Alexe<sup>4</sup>, Florin Vartolomei<sup>5</sup> and Petronela-Sonia Nedea<sup>6</sup>

**Abstract**—Global warming is a global problem and only global action can be effective. A post-2012 global agreement is needed between all major polluters after the Kyoto Protocol expires. A global agreement is necessary for the business community in terms of investments and technological innovations. The EU should make clear its continuing commitment to winning the battle against global climate change and to honouring its existing commitments. The EU should show its determination to take on deeper and longer term reductions in its greenhouse gas emissions in the context of an international agreement on a future strategy post-2012 which will deliver global reductions commensurate with the 2°C target.

The EU will continue to play a leading role in the multilateral approach to climate change, but wider participation on the basis of common but differentiated responsibilities is urgently required. Moreover, policies to tackle climate change must be consistent with and contribute towards other important objectives (e.g. poverty reduction), accommodating the rather diverse conditions of current and future major emitters.

**Keywords**—Climate change, EU policy, greenhouse gas emissions.

## I. INTRODUCTION

Climate change is happening. Over the 20th century, the global average temperature has risen by about 0.6°C, and the mean temperature in Europe increased by more than 0.9°C. Globally, the 10 warmest years on record occurred all after 1991. Greenhouse gas concentrations are higher now than at anytime in the past 450,000 years, and are projected to keep rising.

Climate change has become a reality with many consequences in different fields. The European Union (EU) has been at the forefront of international action to combat climate change since 1990, when the UN Intergovernmental Panel on Climate Change's (IPCC) first assessment report

warned of rising global temperatures caused by emissions of greenhouse gases. The EU committed itself that same year to stabilising its carbon dioxide (CO<sub>2</sub>) emissions at the 1990 level by 2000, a commitment which was met.

We chose this topic to demonstrate how the institutions of EU contribute to mitigate the effects of the climate change. At the same time, this study attempts to investigate to what extent the EU institutions are committed to promote environmental security.

There are many studies regarding how EU contributes to mitigate the effects of climate change.

The research will analyze the main EU policy documents on climate change from the perspective of a European and Romanian citizen.

The EU has begun reducing its greenhouse gas emissions and now needs to develop its mid- and long-term strategies for winning the battle against climate change, together with the international community. Several EU Member States have already announced or proposed national mid- and long-term climate targets.

## II. BACKGROUND INFORMATION

### II.1 The premise

In a 40 years period, the environment has become an important component of the European Union agenda, making the EU a major player in environmental policies. European Union takes the lead in "protecting the common environment and development" (Bruyninckx, 2005), leaving to the United States the second place. EU Directives can and do influence national environmental policies. However, there are problems in implementing national environmental policies, so there must be a coherent environmental policy at the EU level.

Today, the environment and climate have become two of the most important topics on the agendas of governments. Changes occurring in the global ecosystem are much too fast. Since 1800 the Earth's surface temperature increased by 0.74 ° C, and if no action is taken, is expected to rise by 1.8°- 4°C until 2100. Global warming is becoming increasingly present and threatening. At the moment, we experience the first effects of global warming, including weather deterioration around the world. There is more precipitation than normal, temperatures are rising and extreme weather conditions are visible everywhere. The main reason for rising temperatures and altering global climate is industrialization. In other words, man is causing all these dangerous environmental changes, producing greenhouse gas that is released into the atmosphere and leading to the greenhouse effect.

<sup>1</sup> Faculty of International Business and Economics, Academy of Economic Studies, Piata Romana, no 6 district 1, Bucharest, Romania, [ipop2008@gmail.com](mailto:ipop2008@gmail.com)

<sup>2</sup> Faculty of Geography, "Spiru Haret" University, Timisoara Blvd, no 58, district 6, Bucharest, Romania, [madalina71@yahoo.com](mailto:madalina71@yahoo.com)

<sup>3</sup> Faculty of International Business and Economics, Academy of Economic Studies, Caderea Bastiliei no 1-3, district 1, Bucharest, Romania, [lotte\\_ene@yahoo.com](mailto:lotte_ene@yahoo.com)

<sup>4</sup> Faculty of Human Sciences, "Valahia" University 2, Carol I Blvd., Targoviste, Romania, [radita.alexu@yahoo.com](mailto:radita.alexu@yahoo.com)

<sup>5</sup> Faculty of Geography, "Spiru Haret" University, Timisoara Blvd, no 58, district 6, Bucharest, Romania, [fvartolomei@yahoo.com](mailto:fvartolomei@yahoo.com)

<sup>6</sup> Faculty of Touristic and Commercial Management, "Dimitrie Cantemir" Christian University, Unirii Blvd, no 176, district 4, Bucharest, Romania, [petronela844@mail.com](mailto:petronela844@mail.com)

The most dangerous type of greenhouse gas is carbon dioxide. Global warming is also caused by other greenhouse gas emissions, including methane, nitrous oxide and HFC (hybrid fiber-coax), PFCs (Perfluorocarbons) and SF<sub>6</sub> (sulfur hexafluoride). These emissions result from burning fossil fuels, burning forests and crops. Greenhouse gases are necessary for our earthly life, but not in quantities that affect the temperature. Greenhouse gases have already destroyed some habitats of animals and some plant species have already disappeared.

Another major problem generated by the continuous growth of global warming is rising sea level. In the twentieth century the sea level rose 10 to 20 cm, but by 2100 it is expected to rise between 18 and 59 cm. High temperatures will cause glaciers to melt and ice cap will be destroyed. What will be the consequences? Floods. Floods will cause damage to crops, will pollute the water supply and will cause mass migrations for which we are not prepared. At the same, in tropical and sub-tropical regions there will be no agriculture. Without agriculture there will be no more food supplies. One of the biggest threats is the spread of diseases, for instance malaria.

Currently, the problem of water allotment is on the agenda of the United States, which is one of the most powerful states in the world. In Western Europe the temperatures will drop with 10°C due to cold water currents coming from the Arctic Ocean (Copenhagen Climate Change Council, 2009). In these situations the boundaries are useless. All nations and cultures of the world must cooperate to stop these negative environmental effects. The first step is to have strong environmental policies to regulate industrial standards.

The environment is a component that will generate future conflicts. Environmental diplomacy is used more and more to help prevent conflicts. Currently, scientists advise governments to incorporate climate change into their security policies and prepare for the worst-case scenario. The United Nations has reported that half of the conflicts that occurred in the last 20 years were caused by environmental degradation. There is a consensus with regard to the following statement: failed states are more vulnerable to climate change and environmental degradation due to possible armed conflict. Environmental degradation and hazardous post-war consequences in some regions are a direct threat to the welfare, health and quality of life of future generations and may constitute an impediment to peace.

“The Millennium Project defines environmental security as environmental viability for life support, with three sub-elements:

- preventing or repairing military damage to the environment,
- preventing or responding to environmentally caused conflicts, and
- protecting the environment due to its inherent moral value” (Glenn, Gordon and Florescu, 2008: 83).

In 1972 the UN organized in Stockholm the first international conference on environment. Unfortunately, the United Nations Conference on Human Environment was boycotted by countries which were under the hegemony of the Soviet bloc (Dalby, 2002).

Although the Intergovernmental Panel on Climate Change has been successful in the 1990s, negotiations on

practical arrangements against global warming were very slow. However, amid some controversy, the Kyoto Protocol was adopted in the EU and it marked the beginning of the reduction of the greenhouse gas effect. Evidence on temperature increase, melting glaciers, massive migration and early spring in many parts of the northern hemisphere has become increasingly visible and has again directed the worldwide attention to climate change.

The so-called GEO 4 (Global Environment Look) of the 2007 UN Environment Programme highlighted the threats against humanity and the 2007-2008 UN Development Programme underlined the fact that many conflicts are caused by global warming. In addition, the Stern Review stated that preventive action is all that can change the current situation. However, a big problem is that ecosystems are not predictable. Human intervention in natural systems reduces the level of predictability (Dalby, 2002).

Climate change may change the way people thought of security. Trying to reduce and then halt global warming requires rethinking the global economy, new technologies and global action, but there is no clear consensus to address the problem, and this has slowed global action (Kimble, 2005).

The international framework that addresses climate change is the United Nations Framework Convention on Climate Change, which provides a platform for debate and global consensus based on scientific research. In 1992 the United Nations Framework Convention on climate change planned to reduce their gas emissions and developing countries have reached an agreement to voluntarily reduce emissions of domestic gas until 2000.

The first meeting of the countries that had pledged domestic gas emissions reduction took place in 1995. At this meeting states have realized they cannot achieve that. They decided to be part of a process in which developed countries were asked to adopt mandatory plans and policies to help achieve these targets, while developing countries in the first round will be exempt from these efforts. The agreement was completed in 1997 with the adoption of the Kyoto Protocol which entered into force in 2005, seven years later, and the largest producer of greenhouse effect gas type – the United States of America - was not part of this deal. The entry into force of the Kyoto Protocol meant establishing a market (the European one being the largest) and a price on carbon dioxide emissions. In fact, with the entry into force of the Kyoto Protocol, a new phase of the debate on climate change and global warming started.

The EU has contributed to the development of two major international treaties on climate change – the UN Framework Convention on Climate Change (1992) and the Kyoto Protocol (1997). Although these are significant achievements, recent studies show that more ambitious global action is needed in order to avoid climate change reaching dangerous levels.

Ties scientists make between natural phenomena, natural disasters, extreme weather conditions and global warming, cannot be ignored. These connections clearly illustrate that climate change is happening and is happening in a fast pace. Similar events caused by climate change are occurring in developing countries as well, although attention toward them is rather limited there.

The most important cause of global warming and climate change remains the way we exploit and use energy

and fuel. Energy is a vital component for economic growth. The EU has sought to demonstrate that a new fee structure would limit the use of fossil fuel. The U.S., who tried to adopt an energy tax in 1990, did not follow the European strategy.

## *II.2 The December 2009 Copenhagen Conference*

2009 was the last frontier to take action against climate change, given that the Kyoto Protocol expires in 2012. The first step in 2009 was the World Business Summit on Climate Change held in Copenhagen on May 24-26, 2009. At this summit were present heads of states, ministers, scientists, including Jose Manuel Barroso and Al Gore, and CEO's of many companies. They have gathered and discussed innovative business models that will help to solve the climate crisis. The summit goal was to demonstrate that public policies and business models can make the economy to be sustainable by creating new jobs and advancing solutions based on lowering the carbon emissions. Risks can be turned into opportunities if governments and businesses cooperate to develop the necessary policies and partnerships. The main idea was to sketch a new *green* economy by creating global carbon markets, financing *clean* energy, investing in new technology and protecting forests and land. They have sent clear messages to governments to lift barriers and create incentives to implement the Kyoto Protocol.

The second step was the UN Climate Change Conference (COP15) held in Copenhagen in December 2009. At the UN conference in December 2009, the EU supported the Copenhagen agreement, considering it a first step to achieving a comprehensive legally binding treaty, to replace the Kyoto Protocol in 2013.

The diplomatic goals of the conference were the following: global cooperation, the reduction of greenhouse gas emissions, respect for the environment and living standards and energy security. The industrialized countries must reduce carbon dioxide emissions, but not so as to constrain economic growth and global market competition.

Presidents, prime ministers and ministers present at the UN Conference on Climate Change in Copenhagen in 2009 agreed on the following: climate change is "one of the greatest challenges of our time" and it must be tackled "in accordance with the principle of common but differentiated responsibilities and respective capabilities" (Copenhagen Accord, 18 December 2009, art. 1). To stabilize CO<sub>2</sub> in the atmosphere at a level that would prevent dangerous anthropogenic interference in the climate system, global temperature must be kept below 2° C.

It is also necessary for each state to develop itself in a sustainable way and that all participating states agree to cooperate to curb climate change. Developed countries should provide adequate financial resources, technology and support to implement actions to stop global warming in developing countries, least developed countries, island and African underdeveloped states. It was recognized the role played by deforestation and forest degradation on climate change, both phenomena producing high emissions of greenhouse gases.

The collective commitment of developed countries means additional resources and new investments. It was established a financing mechanism – The Copenhagen Climate Green Fund - to support programmes and policies to

halt climate change. It was put in place also Technology Mechanism that aims to accelerate technology development.

The EU will provide 7.2 billion euros for projects to help developing countries to initiate actions to strengthen capacity to combat and adapt to climate change.

In February 2010, 55 countries, accounting for almost 80% of world greenhouse gas emissions, were committed to the Copenhagen Accord. Yvo de Boer said that he views these commitments as signals of willingness of states to negotiate (EurActiv, 3 February 2010). Although consideration was a failure of the Copenhagen conference, Swedish Prime Minister Fredrik Reinfeldt and European Commission President Jose Manuel Barroso said that agreement will not solve climate change, but is a very important first step. (European Commission, *Copenhagen Accord marks first step towards legally binding global climate agreement*). However, the Copenhagen failed to complete a global deal on the climate change, and the media speculated on the reasons why it happened so (BBC news, 22 December 2009).

## *II.3 The Innovation Challenge: Giving Europe a Competitive Edge in a Low Carbon Future*

The innovation challenge over the coming five decades will be considerable. Substantial changes in how the world produces and uses energy will be required. Some of these changes in energy use can be expected to occur in any event. Factors such as rising prices for fossil fuels are likely to lead to a partial shift away from fossil fuels. Despite these developments, additional technological change in all economic sectors will be required, in addition to measures to reduce non-CO<sub>2</sub> greenhouse gases and to maintain or enhance carbon sinks. Achieving this progress will require a combination of "push" and "pull" policies.

The more prices truly reflect external costs and the more demand reflects better consumer climate awareness, the more investments in climate friendly technology will increase. Establishing a market value for greenhouse gases, for instance through emissions trading or taxation, will provide a financial incentive curbing demand, promoting the widespread use of such technologies, and encourage further technological development. Similarly, the abolition of environmentally harmful subsidies will help to create a level-playing field between different energy sources. In 2004, the European Environment Agency estimated annual energy subsidies in the EU-15 for solid fuels, oil and gas amounted to more than € 23.9 billion and for renewable energy to € 5.3 billion. International transport such as aviation and maritime transport are almost entirely excluded from taxation.

Market-based instruments can be complemented with smart and cost-effective policies that encourage the adoption of new technologies promoting their early deployment as foreseen in the context of the Lisbon strategy. They are particularly suitable at an early stage of commercialisation by helping to overcome barriers to their introduction and facilitating demonstration.

The European experience shows that active support policies have helped to radically reduce unit costs of producing electricity from renewable energy sources in the years 1980-1995 (-65 % for photovoltaics, -82 % for wind power, -85 % for electricity from biomass). Such efforts

must continue at accelerated speed. In addition, policies should exploit possible co-benefits, for instance in terms of air quality or urban transport policies. The actions proposed in the EC Environmental Technology Action Plan can provide guidance for national and European action.

Smart and cost effective 'pull' policies should take advantage of normal capital replacement cycles. Gradual transformation will require a stable, long term policy framework. Given the need for the renewal and expansion of the global capital stock in the electricity industry in the coming three decades, such a framework needs to be established as early as possible. Such opportunities cannot be missed as investments in the power sector, industry, transport infrastructure or buildings will determine CO<sub>2</sub> emissions for several decades ahead. In Europe alone around 700 GW of electricity generation (equivalent to the currently installed capacity) needs to be installed (investment cost: € 1.2 trillion) by 2030. Planning for these decisions is being done some 5 to 10 years ahead and must be based on the necessities of long-term climate policies.

Many technologies to reduce greenhouse gas emissions either exist already or are at an advanced pilot stage. A recent study identified the 15 most promising of such technologies. Taking all 15 options together this would amount to a reduction potential of more than 54 Gt CO<sub>2</sub> eq. per year in 2050. If used to its fullest extent, the major part of the projected baseline emissions in 2050 could be avoided. Five of those options concern energy efficiency. Thus, one central pillar of any future energy strategy for the EU must be cost effective energy efficiency improvements and energy savings. Action in this field further complements the Lisbon strategy, strengthens the security of energy supply, and creates significant numbers of new jobs in Europe and a more competitive industry consuming less energy. Estimates show that in the EU-15 it would be economically feasible to realise energy savings of up to 15 % over the coming decade, while a technical potential of up to 40 % exists. Carbon capture and storage is another important area.

Future technologies for widespread use in the second half of this century still need to be developed. Unfortunately, since the early 1980's IEA Members have halved their energy-related research and technology development budgets. This trend needs to be reversed in the EU if it wants to improve its competitiveness in these markets. Therefore, budgets for climate, energy, transport and production and consumption research need to be increased significantly in the upcoming 7th Framework Programme. International co-operation to develop breakthrough technologies must be enhanced with the help of public-private partnerships.

In the context of the Lisbon strategy, the Kok report stresses that the EU can gain a first mover advantage and can create a competitive edge by focusing on resource-efficient climate friendly technologies that other countries will eventually need to adopt. As an example, the countries that have taken the lead in promoting wind energy now have 95% of the rapidly growing wind turbine industry. Looking forward, this kind of phenomenon could also emerge in other countries and other sectors, such as in cars or aviation. Competitive advantages will be enhanced if participation in

a future international climate agreement is broadened and deepened.

### III. THE EU ENVIRONMENTAL POLICY

The research analyzes the main EU policy documents on climate change from the perspective of a European and Romanian citizen.

We intend to demonstrate how the institutions of EU contribute to mitigate the effects of the climate change. At the same time, this study attempts to investigate to what extent the EU institutions are committed to promote environmental security.

#### *III.1 The EU Commitment*

The greatest and most important step was the establishment of the first European Environmental Action Programme (1973-1976). It defined the general principles of EU environmental policy such as prevention (ensuring a high level of environmental protection and human health, animals and plants), action at source and polluter pays (whoever causes damage to the environment, danger or risk, is responsible for avoiding, reducing and combating these nuisances, hazards and risks). The European Commission proposed also green policies, but their adoption in the Council was very difficult.

Between 1976 and 1981 the second Environmental Action Programme was adopted, which formulated directives and regulations for different areas of the environment (water, air and soil). In 1981 the Directorate-General for the Environment was founded within the European Commission, which will later play a role in developing a system of environmental legislation and the "institutionalization of environmental issues into the overall functioning of the EU" (Bruyninckx, 2005). In 1985, the Court of Justice (240/ 35) stated that "environmental protection is one of the key objectives of the European Union" (Koppen, 2005).

The third Environmental Action Programme (1982-1986) introduced the principle of prevention and integration of environmental objectives in important sectors such as protecting the Black Sea, noise reduction, reduction of cross-border transport of dangerous substances, the compulsory use of best technologies. The Single European Act (1987) recognized the environment as an EU legal competence, by adding Title VII of the EC Treaty. The new Article 100a of the EEC recognized the competence in matters of environmental legislation in areas which affect the internal market. Articles 100R-T EEC built a European environmental policy. The formal status contributed to a rapid expansion of the *acquis* related to the environment.

The 4th Environmental Action Programme (1987-1992) and the 5th Environmental Action Programme (1993-2000) focused on strengthening environmental objectives in other policy areas (notably agriculture, industry, transport and energy) by providing economic incentives for environmentally friendly behavior and by introducing the standardized planning tool for Environmental Impact Assessment, postulating the principle of sustainable development to combine economic and environmental

objectives, transfer of skills to national governments and regional authorities, integrating different actors with different interests in institutional dialogue structure, and moving from the emission standard to environmental quality standards.

The last Environmental Action Programme (2001-2010), entitled *Our Future, Our Choice Action*, proposes five major strategic directions: improved implementation of current legislation, integrating environmental concerns into other policies, environmental consideration in the use of planning - planning and management decisions.

Between 1967 and 2004 have been taken several key decisions in the environmental policy as follows: classification, packaging and labeling of dangerous substances (1967); setting up a framework for measures to combat air pollution from motor vehicles (1970); directives on the protection of birds and their habitats (1979); guidelines for establishing minimum standards for drinking water (1980); directives on the harmonization of waste reduction programmes in the titanium dioxide industry (1989); the establishment of the European Environment Agency (1994); implementation of the Montreal Protocol of the Vienna Convention on ozone layer protection; the directive on water pollution (2000); the ratification of the Kyoto Protocol on Climate Change (2002); the directive restructuring the community framework for taxation of energy products and electricity (2003); the establishment of a framework of responsibility based on the polluter pays principle (2004).

In 2007, the Commission presented the energy and climate package. It has to increase renewable energy sources by up to 20% by 2020, to reduce greenhouse gas by 20% in 2020 (even after the Kyoto Protocol expires), and to use biofuels mainly in transport at least up to 10 % by 2020. (An EU action plan to promote energy from all forms of biomass was launched in December 2006). Two strategic plans have been established: the Energy Technology Strategic Plan and the Action Plan for two years which established a common energy policy (EuActiv, 08 January/06 July 2009).

The European Union Member States have reached an agreement in March 2007 to reduce emissions 30% by 2020 compared to the 1990 level. Meanwhile, the EU leaders have determined that the European economy needs transformation into one based on less carbon and more efficient.

In January 2008 the European Commission proposed binding legislation to implement the 20-20-20 targets. The EU action was triggered by three inter-related factors: high oil and gas prices, dependence on external suppliers and the global warming crisis (EurActiv, 12 September 2008).

*The 2020 Europe Strategy* proposes three goals to be achieved by 2020: developing an economy based on innovation (smart growth); sustainable development-promoting an economy based on fewer greenhouse effect gas emissions; and development of inclusion-promoting an economy with a high rate of employment, ensuring social cohesion.

In 2007-2013, the EU has invested in environmental research, energy and transport, the final cost being € 8.4 billion. Reducing emissions of greenhouse gases such reduction will mean that air pollution causes 370 000 deaths in Europe annually. If by 2020 to reduce air pollution by 10%, EU will save € 27 billion annually. Eco-industries are the most dynamic sector of the European Union, rising 5%

annually. Annually 3.4 million people are employed in this sector. Using renewable energy technologies have created 300,000 jobs and is estimated that 2020 jobs will increase to one million.

Commission proposed five main objectives for the European Union: 75% of the population aged 20 and 64 must have a job; 3% of EU GDP to be invested in research and development; the 20-20-20 targets on climate and energy must be met; the school dropout rate to be reduced below 10% and 40% of the younger generation to be educated; the number of people at risk of poverty must be reduced by 20 million

Commission proposed to Member States targets shells are included in national strategies to ensure the success of Europe's strategy in 2020. Action must be taken nationally, but internationally, too. *2020 Europe strategy* is based on two pillars: priorities and objectives and creating national reports that allow Member States to develop their own policies to ensure sustainability. The Commission will monitor progress by Member States in achieving their targets. The Council will be involved in this strategy and the European Parliament will mobilize citizens and will be co-legislator.

At the December, 11-12, 2008 European Council Summit, Member States reached a political agreement on energy - climate change package, which was followed on December 17, 2008, by the adoption of the *EU energy and climate package* by the European Parliament. This package consists complementary legislation regarding a revision and strengthening of the *Emissions Trading System (EU ETS)*; an *'Effort Sharing Decision'* governing emissions from sectors not covered by the EU ETS, such as transport, housing, agriculture and waste; binding national targets for renewable energy which collectively will lift the average renewable share across the EU to 20% by 2020; and a legal framework to promote the development and safe use of *carbon capture and storage (CCS)*. The European Commission has identified two actions to be taken to implement carbon capture and geological storage: developing a legal framework and economic incentives for carbon capture and geological storage. (Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 allow capture and safe storage of CO<sub>2</sub>) and encouraging the setting up of renewable energy-based pilot plants in Europe.

On the other hand, the Directive 2009/28/CE of the European Parliament and Council of 23 April 2009 on promoting renewable energy use, modifying and then repealing Directives 2001/77/EC and 2003/30/EC, imposed ambitious targets for all Member States. These targets include: 20 % of energy to be secured by the renewable energy and 10% of the renewable energy to be used in transport by 2020. It has also been established to promote the renewable electricity, bioenergy and biofuels. The new Directive must be implemented by Member States by December 2010 (European Commission; Energy; Renewable Energy).

In the nuclear issue, the Commission has left to each Member State to decide what to do. EU leaders said they can reduce emissions by 30% provided that other developed countries with high emissions to adopt a global agreement to reduce their emissions.

By adopting the package in the Member States, the EU has shown leadership in combating global climate change. As part of the future post-2012 global agreement, the EU committed itself to reduce emissions by 30% by 2020 if other developed countries will adopt similar goals.

### *III.2 The Main Actors in EU Environmental Policy Making*

Commission is present throughout the whole process of elaborating a policy, having the power of initiative, being responsible for implementing the EU legislation. The Commission is relying on committees composed of national officials, which were created for certain aspects of environmental policy. The Commission has a sectoral organization Directorate-Generals (DG). Environmental policies can be very delicate, affecting various economic sectors and therefore requires approval of several DGs, which makes it difficult for the Commission.

The EU Council is also characterized by segmentation, and there is no coordination between the Environment Council and other councils.

The European Parliament is the greenest of all three main decision-making bodies, therefore set up two committees on environment and consumer protection (Lenschow, 2005).

Other EU institutions with competences in the area include: the Committee of the Regions, the Economic and Social Committee and the European Investment Bank.

The EU initiated a major move on environment lobbying in Europe, taking place at national level to influence national government to have a greater impact on European policy formulation process. At the level of civil society, a leading role is played by Green 9 group, which includes Greenpeace and WWF, Friends of the Earth and the European Environmental Bureau. These organizations have no formal status, but they have contacts with the Commission and at the informal level are very important in the policy formulation process. The most influential organization is the European Environmental Bureau that aims "to protect and improve the environment of Europe and allow European citizens to play a role in achieving this goal" (Bruyninckx, 2005). One of the objectives of Green 9 group is to involve citizens and make them more aware of environmental problems. Given the principle of subsidiarity, the citizens' involvement can occur at several levels (fact underlined by the Aarhus Convention).

In 2007 the European Commission made public the first report on the progress in sustainable development strategy, and in 2006 the European Council adopted the Renewed EU Sustainable Development Strategy (EU SDS, European Council, 10917/06) which confirmed that the EU has made a success in this area and has become a leader in combating climate change and promoting the economy based on carbon emissions reduction (European Commission, 22 April 2010).

The European Union has shown that economic growth is possible along with the reduction of greenhouse gas effect. Sustainable development must take into account the environment precisely because human welfare cannot be ensured if the environment that ensures it dies (Glenn, Gordon and Florescu, 2008: 12-13).

### *3.3 Benefits and Costs of Limiting Climate Change*

There is increasing scientific evidence that the benefits of strong, early action on climate change outweigh the costs. "Mitigation - taking strong action to reduce emissions - must be viewed as an investment, a cost incurred now and in the coming few decades to avoid the risks of very severe consequences" (Stern Review, 2007: 1). If temperatures continue to rise beyond 2° C a more rapid and unexpected response of the climate becomes more likely and irreversible catastrophic events may occur.

The current level or stock of greenhouse gases in the atmosphere is equivalent to around 430 parts per million (ppm) CO<sub>2</sub>, compared with only 280 ppm before the Industrial Revolution. At the level of 550 ppm CO<sub>2</sub>, which could be reached as early as 2035, there is at least a 77% (up to a 99% chance, depending on the climate model used) of a global average temperature rise exceeding 2°C.

Under a business-as-usual emissions scenario, there is at least a 50% risk of exceeding the threshold of 5° C average temperature increase in the following decades, which would transform the physical geography of the world, with severe consequences on where people live, and how they live their lives (Stern Review, 2007: 3-5).

The greenhouse gas emissions can be cut basically in four different ways: reducing demand for emissions-intensive goods and services; increased efficiency, which can save both money and emissions; action on non-energy emissions, such as deforestation; and switching to lower-carbon technologies for power, heat and transport. Policy frameworks to reduce emissions should be based on three essential elements: carbon pricing, technology policy and the removal of barriers to behavioural change. The Stern Review estimates the annual costs of stabilisation at 500-550 ppm CO<sub>2</sub> to be around 1% of GDP by 2050 – a level considered to be significant but manageable and fully consistent with continued growth and development (Stern Review, 2007: 13).

The Commission has carried out an analysis of the costs and benefits which shows that the costs of mitigation policies can be minimized if all sectors and greenhouse gases are included, participation in reducing emissions is broadened to include all major emitting countries, emissions trading and project based mechanisms are fully used, and if synergies with other policies are fully exploited (e.g. Lisbon Strategy, energy security policy, continuing reform of the Common Agricultural Policy, cohesion policy, and air quality policies).

The EU has proposed to achieve a global, legally binding treaty, aimed at achieving these objectives, on the occasion of the UN Climate Change Conference, which took place in November 2010 in Mexico City.

## IV. CONCLUSION

The scope of international action must be widened to cover all greenhouse gases and sectors. Despite the implementation of already agreed policies, global emissions are likely to grow within the next two decades and global reductions of at least 15 % in emission by 2050 compared to 1990 levels would seem to be necessary, and will take significant effort.

In particular, the fast growing emissions from aviation and maritime transport should be included. A fresh look will

have to be taken at how to halt deforestation of the world's forests. Addressing this problem as a specific issue in some regions is necessary as almost 20 % of global greenhouse gas emissions are currently emitted due to land use changes.

The required transformation of energy and transport systems presents a major innovation challenge. Within the context of the Lisbon strategy, a technology policy employing an optimal mix of 'push' and 'pull' policy instruments should be developed to underpin the restructuring process. Placing an emphasis on cost-effective emission abatement would be essential.

Successful structural elements of the Kyoto Protocol should be maintained in any new system post-2012. These include emissions trading, as introduced by the European Union, on the basis of emission limitations and project based mechanisms as building blocks to a truly international carbon market, the rules for monitoring and reporting on emissions, and a multi-lateral compliance regime. Developing countries need to make huge investments into their energy infrastructure over the coming decades. Public funds that are channelled by the World Bank, EIB, EBRD and other development banks have to be used to leverage developing countries' own savings towards climate-friendly investments, particularly in the energy sector. The potential of a global low-carbon energy programme and technology transfer and diffusion funds focusing on major emerging economies needs to be explored.

There is a need for immediate and effective implementation of agreed policies. The EU has succeeded in reducing its emissions by 3% below the 1990 level, but much more needs to be done to reach the 8% emission reduction targets agreed in the Kyoto Protocol. Measures identified in the Green Paper on the security of energy supply and the White Paper on Transport Policy such as infrastructure charging, the revision of the Eurovignette Directive and measures encouraging a modal rebalancing towards rail and waterborne transport, such as those included in the Trans-European Transport Network policy, need to be fully implemented. The removal of bottlenecks preventing the deployment of existing or promising new technologies and new initiatives (e.g. the assessment of the potential of an EU market for green certificates, the swift implementation of Environmental Technology Action Plan) should also be pursued. A key element will be strengthened support for investment in climate-friendly technologies under different headings in the new Community budget for the period 2007 to 2013. In addition, a major new effort throughout Europe is necessary to make real progress in energy efficiency: a new European-wide Energy Efficiency Initiative.

Increased public awareness should be fostered through a strategic programme to sensitise the general public to the climate change significance of their actions, i.a through the launching of an EU-wide awareness campaign.

More and better focussed research should be directed to further improving knowledge on climate change, including the links to ocean processes, to addressing global and regional impacts, developing cost-effective adaptation and mitigation strategies, including non CO<sub>2</sub> gases. This could be done through a significant increase in EU spending under the 7th Framework Programme for climate-friendly technology research and development, in particular in the energy and transport sectors, but also in agriculture and industry.

Stronger co-operation with third countries could be promoted through a strategic programme for enhanced technology transfer (incl. technology diffusion funds) and scientific R&D cooperation on low greenhouse gas technologies in the field of energy, transport, industry and agriculture. Climate friendly development policies should be drawn up in co-operation with developing countries, in particular in the areas of energy and air quality. In implementing these recommendations, coherence between the internal and external dimension of the EU climate change policies needs to be ensured. For instance, the European Neighbourhood Policy could emphasise early transposition and implementation of the climate related 'acquis' promoting convergence with the EU's climate policy. The same approach should be followed in the pre-accession strategies. Strengthening the adaptive capacity, particularly of the most vulnerable developing countries, should become an integral part of development assistance.

In building support for further multilateral action against climate change the EU should engage in real dialogue with its international partners. In bilateral contacts with interested countries, including the large emitters, actions should be identified that they are ready to take within specified time horizons and conditions. In this way, the EU should use its international leadership role on climate change to pursue an action oriented approach at the international level.

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