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COMMUNICATION FROM THE COMMISSION

**REPORT ON DEMONSTRABLE PROGRESS UNDER THE KYOTO PROTOCOL
(required under Article 5(3) of Decision 280/2004/EC concerning a mechanism for
monitoring Community greenhouse gas emissions and for implementing the Kyoto
Protocol)**

{COM(2005) 615 final}

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1. DESCRIPTION OF DOMESTIC MEASURES

1.1. The policy-making framework and process

Sustainable development is one of the fundamental objectives of the European Union (EU) and EU-wide action against climate change is firmly set within this wider context. Tackling climate change is one of four key objectives of the Sixth Environmental Action Plan (2000-2010)^a [14] and the EU is committed to taking decisive measures to control it. Common policies and measures (see Box 1) adopted by the EU and implemented by all Member States strengthen and support national Member State's measures to reduce greenhouse gas emissions.

The EU has developed a wide range of measures to reduce greenhouse gas emissions in cost-effective ways. The policy of greenhouse gas reduction has been prepared and coordinated under the European Climate Change Programme (ECCP) [3], a Commission initiative involving major stakeholders from Member States, business and environmental groups.

Box 1

The **legal instruments** used by the EU are (Article 249 of the European Community Treaty [20]):

Regulations: A regulation shall have general application. It shall be binding in its entirety and directly applicable in all Member States.

Directives: A directive shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods.

Decisions: A decision shall be binding in its entirety upon those to whom it is addressed.

Recommendations and opinions: Recommendations and opinions shall have no binding force.

Legal Action (Article 226 of the European Community Treaty) [20]:

If the Commission considers that a Member State has failed to fulfil an obligation under this Treaty, it shall deliver a reasoned opinion on the matter after giving the State concerned the opportunity to submit its observations. If the State concerned does not comply with the opinion within the period laid down by the Commission, the latter may bring the matter before the Court of Justice.

If the Court of Justice finds that the Member State concerned has not complied with its judgment it may impose a lump sum or penalty payment on it. (Article 228 of the European Community Treaty) [20].

^a The 6th Environmental Action Plan sets the environmental objectives and priorities that will be an integral part of the European Community's strategy for sustainable development

1.2. Policies and measures

1.2.1. A brief history

The EU has been at the forefront of measures to tackle climate change since the Intergovernmental Panel on Climate Change (IPCC) published its first scientific report on the subject in 1990 [21]. In that year a political agreement to stabilise carbon dioxide emissions in the EU at 1990 levels by the year 2000 was reached. Following the Earth Summit in Rio de Janeiro in 1992 and the agreement of the United Nations Framework Convention on Climate Change (UNFCCC), the EU continued to strengthen its action to reduce greenhouse gas emissions [22].

In 1993, the EU established the monitoring mechanism for greenhouse gases, which required each Member State to publish and implement national programmes for limiting emissions of carbon dioxide [23]. The monitoring mechanism is revised as necessary to keep abreast of developments and provides the main means of tracking trends and projections in greenhouse gases in the EU [24]. All monitoring and reporting requirements under the Kyoto Protocol and the UNFCCC are transposed into European law through this mechanism the associated implementing provisions [25].

Integrating the energy system and the environment was also a major component of energy policy development in the 1990s culminating in the publication of the Community's energy policy priorities in the Energy Policy White Paper of 1995 [26] and the Renewable Energy Systems (RES) policy paper in 1997 [27].

The preliminary agreement on the Kyoto Protocol in December 1997 and its entry into force on 16 February 2005 set binding targets on reducing greenhouse gas emissions from the EU and other developed countries and provided a stimulus for continued policy action. Under the Kyoto Protocol, the EU has committed itself to reducing its greenhouse gas emissions by 8% compared to the base year (1990) during the first commitment period 2008-2012. This target is shared between the 15 countries that were EU Member States at the moment of the EU's ratification of the Protocol on 31 May 2001 under a legally binding burden-sharing agreement [28]. This agreement sets an individual emissions target for each EU-15 Member State in accordance with Article 4 of the Kyoto Protocol. Article 4 enables countries to conclude an agreement for a joint target equal to the sum of the targets of the participating countries.

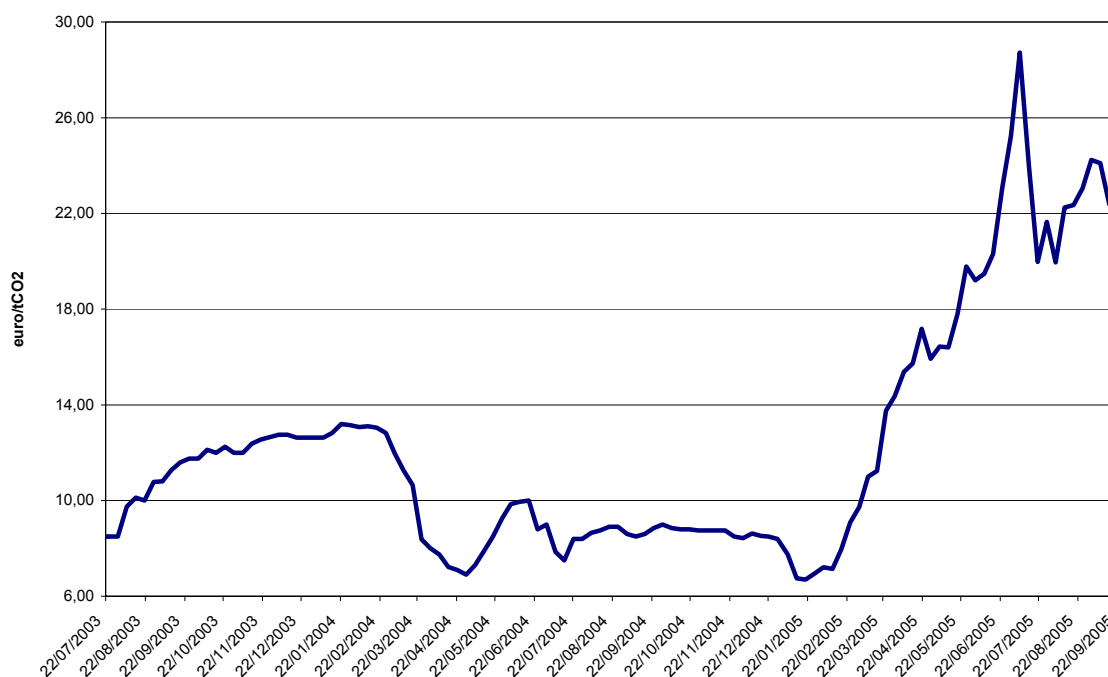
Of the ten Member States that acceded on 1 May 2004, eight have individual reduction targets under the Kyoto Protocol, of 6 or 8% which they will need to honour separately from the collective EU-15 -8% target. Cyprus and Malta are Non-Annex I Parties to the UNFCCC and thus do not have a target under the Kyoto Protocol.

The ECCP, launched in 2000, provides a coherent policy development framework. [3] The initial work to develop further policies and measures focused on the Kyoto flexible mechanisms, the energy supply and consumption, transport and industry sectors and research. A number of working groups focussing on these sectors were set up to consider and give recommendations on the best options for reducing greenhouse gas emissions cost-effectively. Under the first phase of the Programme, the Commission committed itself to 12 priority actions to be implemented covering issues that apply in a number of sectors, energy efficiency, transport and industry. One of the most promising and innovative measures to emerge from the ECCP is the EU Emissions Trading Scheme (EU-ETS) [4].

1.2.2. The world's largest company-level trading scheme for CO₂

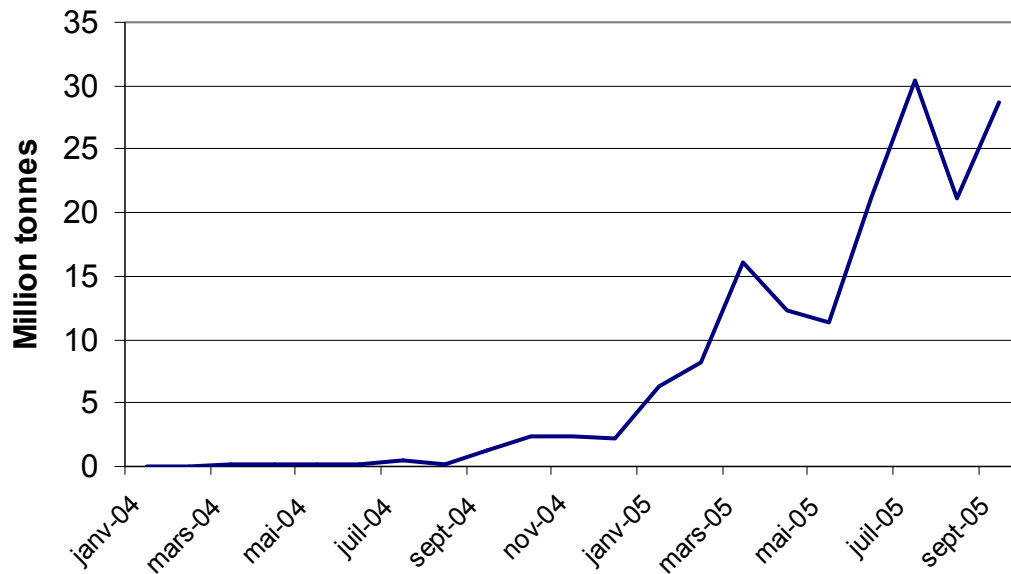
Starting in January 2005, the EU-ETS [4] is the largest company-level trading system for CO₂ emissions in the world. The scheme covers installations representing close to half of the CO₂ emissions from the EU-25. These installations covered by the system are allocated permits by governments that allow them to emit a certain tonnage of CO₂ each year. Those that emit less than their allocation can sell the surplus allowances. Those that expect to emit more than their allowance have the option of either investing in ways to reduce their emissions or of buying additional allowances on the market. Companies can use credits from Kyoto flexible mechanisms to help them comply with their obligation. This means the system will not only provide a cost-effective means for EU-based industries to cut their emissions but will also create additional incentives for businesses to invest in emission-reduction projects outside the EU. This investment will contribute to the transfer of technologies to developing nations. The first trading period is from 2005 to 2007, with a second trading period covering 2008 to 2012. The price of carbon allowances and the monthly volume of allowances traded are shown below in Figure 2^b and Figure 3 [29] respectively indicating a dynamic market in particular since the beginning of 2005. Europe now has a real «Carbon Market», which puts a price on greenhouse gas emissions and requires companies to take the costs of these emissions into account in their activities.

Figure 2: Price of emission allowances under the EU Emissions Trading Scheme



^b The source for both prices and volumes is PointCarbon, the reported price is based on numbers from brokers and traders, the volume data are assessments by PointCarbon.

Figure 3: Monthly volumes of traded emission allowances under the EU Emissions Trading Scheme



1.2.3. Environmental Technologies Action Plan

Through the Environmental Technologies Action Plan [30] the EU takes action to speed the development of environmental technologies in areas relating to climate change, soil, water and sustainable production and consumption. It seeks to exploit their potential both in the EU and globally to improve both the environment and competitiveness, thus contributing to economic growth and job creation.

1.2.4. The energy system

More than 80% of the EU's greenhouse gas emissions come from the production and use of energy and from transport, the rest from agriculture, waste and industry. Since the early 1990s, the EU has taken action to reduce emissions from the energy sector and encourage the development of new, cleaner technologies, within liberalised energy markets. In particular, Directive 2003/96/EC [13] has restructured the Community framework for the taxation of energy products so as to gradually steer consumption to less carbon intensive fuels, and thereby helping to reduce emissions of greenhouse gases.

Intelligent Energy - Europe

Intelligent Energy – Europe (IEE) [6] is the EU's programme to support sustainable development in energy. There are four specific areas:

- improvement of energy efficiency and rational use of energy.
- promotion of new and renewable energy sources.
- promotion of energy efficiency and renewable fuels in transport.

- promotion of renewable energy sources and energy efficiency in developing countries.

In 2003 to 2006, the EU has allocated approximately €200 million to this programme. This programme is particularly focussed to deal with local and regional authorities.

This programme will continue during the period 2007-2013, providing support in the same fields as currently. The proposed EIE budget from 2007-2013 is €780 million. This programme foresees an innovation in encouraging replication of innovative processes or products that are close to but not yet cost-competitive, and hence to bring forward their commercialisation.

1.2.5. Energy supply

Policies and measures in energy supply focus on the introduction of cleaner technologies and fuels, such as renewable energy and combined heat and power.

Renewable energy

There was early recognition in the EU of the importance of renewable energy sources in the transition to a low carbon economy. Early efforts to promote renewable energy included programmes focused on enhancing the use of new and renewable energy sources (small hydro, wind, solar, biomass, biogas, and geothermal) and providing a framework for research, development, demonstration and dissemination of new technology. In doing so, the vital role that EU-wide action could play in developing and implementing better technologies in a single market was recognised and complemented efforts by Member States.

This was followed by the 1997 White Paper on renewable energy sources [27] that set an indicative target for increasing the share of renewable energy sources in total energy consumption to 12 % by 2010, supported by a plan for action at the EU and Member State level.

Directives on the promotion of electricity generation from renewable energy sources [7] and on the substitution of conventional transport fuels by biofuels [8] have put in place the framework for Member States to support renewable energy. National and EU-wide targets are used to monitor progress. The aims are to achieve in the EU-25, 21% of total electricity consumption from renewable energy sources and 5.75% share of biofuels in transport by 2010. Achievement of these aims would produce substantial reductions in carbon emissions. The Directives allow flexibility for the Member States to choose the policy actions most appropriate for their country. Progress up to now has not been sufficient in all Member States, so additional actions will be needed and are under preparation.

To encourage a diversity of renewable energy sources, the Commission will propose a Community action plan for energy from biomass by the end of 2005. A Communication concerning biofuels is scheduled for early 2006.

Cogeneration

Cogeneration supplies a heat demand using heat produced during electricity generation or heat that would be wasted. Its use therefore represents a substantial potential for increasing the overall efficiency of electricity and heat production, and reduced greenhouse gas emissions.

While the longer-term prospects for cogeneration in liberalised energy markets look promising, over recent years a combination of low electricity prices and high fuel prices have been an obstacle to further expansion in some Member States. In 2002, the share of electricity production in the EU-15 from cogeneration was just over 9 %. A new Directive [10] was agreed in 2004 that provides a framework for promoting and developing high efficiency cogeneration, including from renewable energy sources. It also requires Member States to take steps to facilitate access to the electricity grid for cogenerated electricity.

1.2.6. Energy consumption

The EU has introduced a range of policies and measures to reduce emissions from energy consumption. Some policies target all consumption of energy, while others are specific to particular sectors.

Energy efficiency

As well as moving towards cleaner and more efficient forms of energy production, it is also important to improve the efficiency with which energy is used. Within the EU many initiatives are being undertaken to reduce the amount of energy wasted through inefficient equipment or the lack of awareness of energy users. The cost-effective saving of energy means not only lower greenhouse gas emissions, but also reduced costs for the EU economy and lower dependence on energy imports from third countries.

Energy savings of 20% identified in the Green Paper on Energy Efficiency in 2005 [31] would save the EU an estimated €60 billion on its energy bill. Half these savings could be achieved through full implementation by Member States of already adopted legislation (see below). To save the rest, more innovative actions need to be taken. The Green Paper will be followed with a specific Action Plan on energy efficiency in 2006.

Current potentials therefore build on earlier action on energy efficiency. The main policy actions to date arose out of a Communication (a document setting out the Commission's policy) [32], which refocused attention on promoting energy efficiency and introduced a target for reduced energy use per unit of production of 1% per year above and beyond business-as-usual trends. An Action Plan [33] to realise the available economic potential for energy efficiency was agreed.

More recently, the Commission has adopted a proposal for a directive [16] to increase the efficiency of energy use through, for example adoption of targets for energy saving, removal of barriers to energy efficiency, promotion of energy services and the establishment of energy efficiency programmes. This directive covers household, business, public sector and transport and industry, outside of the sectors covered by the EU ETS.

Specific energy efficiency measures targeting particular end-use sectors are described in the sections below.

Residential and Business Sector

Many of the actions in this sector are taken at the Member State level, but the EU has initiated important measures to reduce energy consumption from buildings and appliances, and hence CO₂ emissions.

The focus for household appliances has been through labelling and minimum standards. The EU has set up the framework for providing consumers with information on energy use from refrigerators and freezers and their combinations, washing machines, electric tumble driers, combined washer-driers, lamps, dishwashers, air-conditioners and electric ovens [34].

The Directive on energy performance of buildings [9], adopted in 2002, targets buildings themselves. It requires Member States to set minimum requirements for the energy performance of new buildings and large existing buildings undergoing major renovation, and requires energy certification of buildings and regular inspection of boilers and of air-conditioning systems. It is expected to have a significant impact on reducing emissions (see Section 4).

A new Directive [35] was adopted in 2005 that provides a comprehensive and coherent legislative framework for addressing eco-design requirements for energy using products. This Directive has the aim of ensuring the free movement of energy-using products in the EU and improving the overall environmental performance of these products.

Implementing measures establishing eco-design requirements for specific types of products will follow the above-mentioned Directive. Based on the work undertaken in the ECCP, the Directive identified a number of key products that should be given priority in terms of developing measures for improved energy efficiency.

Transport Sector

The EU began action to limit greenhouse emissions in the transport sector in the early 1990s. The Community Strategy for reducing CO₂ emissions from cars, proposed in 1995 and agreed in 1998, aims to reduce the CO₂ emissions of new cars to 120g/km by 2010 at the latest. [11] At the heart of the strategy are the voluntary agreements with European, Japanese and Korean car manufacturers to increase fuel efficiency of new passenger cars, with a target of reaching an average CO₂ efficiency for newly registered cars of 140g/km by 2008/2009. Other measures include tax changes related to vehicle purchase and/or ownership, and fuel economy labelling. By 2003, CO₂ emissions per km from new cars purchased in the EU-15 were 12% lower than in 1995.

Further significant CO₂ savings are expected from the biofuels Directive [8] (see section on renewable energy) and the ongoing revision of the road charging framework for heavy goods vehicles [36].

A number of transport related programmes will also help reduce greenhouse gas emissions. The programme named Marco Polo adopted in 2003 focusses on intermodal transport and has the objective to reduce road congestion and to improve the environmental performance of the freight transport system within the Community [37]. In 2004, the Commission presented a proposal [38] to establish a second, significantly expanded Marco Polo programme from 2007 onwards. Marco Polo II includes new actions such as motorways of the sea and traffic avoidance measures. For the programme (now extending to countries bordering the EU) a budget of €740 million has been proposed for 2007-2013.

Industry Sector

Greenhouse gas emissions from the industry sector have been decreasing, i.e., due to the switch from manufacturing industry to services, internal structural changes to less energy intensive industries and substantial progress in energy efficiency.

Early Community-wide action to reduce greenhouse gas emissions centred on implementation of the 1996 Directive on Integrated Pollution Prevention and Control (IPPC)[39], which helped support an earlier regulation agreed in 1993 allowing voluntary participation by companies in the industrial sector in a Community eco-management and auditing scheme. This directive included provisions to take preventive measures against significant emissions of nitrous oxide, methane and fluorinated greenhouse gases. Best Available Techniques (BAT)^c are identified for industry to use and there is a requirement to use energy efficiently. All new or substantially changed installations have to comply since November 1999. Member States have until 30 October 2007 to bring the remaining “existing installations” in full compliance with the Directive.

The centrepiece of current action to reduce greenhouse gas emissions from industry is the recently launched EU ETS [4] (see earlier for a full description). The EU-ETS and IPPC Directive [38] have synergies in a number of areas such as permitting and coverage, and the ETS Directive exploits these synergies. Where installations (or parts) fall under the IPPC requirements, the CO₂ emissions are part of the ETS scheme, whilst the installations must still conform to the general requirements of their IPPC permits.

Two of the basic elements of the Commission proposal for a legislative framework to reduce emissions of fluorinated gases are [17]:

- A regulation on containment, recovery, training and certification, prohibitions, use bans and reporting of fluorinated gases;
- A directive on mobile air conditioning in motor vehicles.

The focus is on new requirements for the containment, recovery market prohibitions and reporting of fluorinated gases. The Common Position^d on mobile air conditioning systems would prohibit the placing on the market of passenger cars with HFC 134a (a fluorinated gas) mobile air conditioners in new passenger cars from 2011 and in all passenger cars from 2017.

1.2.7. Agriculture and Forestry

The main sources of emissions in agriculture are nitrous oxide (N₂O) from soils, methane (CH₄) from animals, and both CH₄ and N₂O emissions from manure management. Additionally, European croplands are losing humus at large scales, emitted to atmosphere in the form of CO₂. Recent research suggests that the CO₂ emissions from cropland could be as

^c Technologies and organisational measures that minimise the overall environmental impact, and that are available at an acceptable cost.

^d This is the result of a first reading by the Council of Ministers of a legislative proposal and should take into account the positions of the European Parliament, the Committee of the Regions and the Economic and Social Committee and any revisions proposed by the European Commission. The common position is then transmitted to the other institutions for their second readings.

important as the CH₄ and N₂O emissions from agriculture. The use of biomass and the impact of carbon capture in forests are also important issues.

The foundations of policy in the agricultural and forestry sectors are set by the 2003-2004 reform of the Common Agricultural Policy (CAP) [40] and the Forestry Strategy for the European Union [41].

As part of the continuing process of the CAP reform the Commission adopted a new proposal [42] in 2004 on support for rural development through the European Agricultural Fund for Rural Development (EAFRD). In June 2005, the Agriculture Council reached political agreement on this proposal for the next programming period (2007-2013) [43]. The Commission has recently adopted strategic priorities for rural development, including the production of biomass for bio-energy applications. A number of CAP reform measures will have beneficial impacts on climate change such as reduced fertiliser use, further reduction in livestock numbers, incentives for cultivation of energy crops and increased carbon capture. The EU Forestry Strategy recognizes the importance to climate change mitigation of multi-purpose sustainable forestry. In addition to their contribution to the protection of biodiversity and social and economic development of communities, forests function as carbon sinks and reservoirs, and as a sustainable source of biomass for renewable energy and material.

A recent review of the EU Forestry Strategy [44] has confirmed its continued relevance and, therefore, the importance of forests to the carbon balance and adaptation measures to maintain their contribution under the threat of climate change. The main outcome has been to agree on the development of an EU Forest Action plan to facilitate implementation.

1.2.8. Waste Management

The management of waste can give rise to a number of emissions relevant to climate change, such as methane from the disposal of waste in landfill, when biodegradable waste decays under oxygen free conditions. Other sources include methane produced from the treatment of sewage sludge and emissions from waste incinerators.

Early action to tackle greenhouse gas emissions from waste management centred on methane. The 1996 Strategy paper from the European Commission [45] dealt with all methane emissions including those from the waste management sector. It described specific measures and proposals focusing on how an integrated waste management strategy can divert biodegradable waste away from landfills and so reduce methane emissions. This was followed later by a 1999 Directive [12] that introduced targets for reducing biodegradable waste disposed of in landfills to 75% of 1995 levels by 2006, and to 50 and 35% by 2009 and 2016 respectively. The Directive on Landfill of Waste also requires Member States to fit all new landfills that receive biodegradable waste with a landfill gas control mechanism (capture or flaring), and where possible, use the gas collected for energy production. Incentives at the level of the Member States, such as landfill taxes, support the Directive. These actions have helped to reduce emissions of methane in the EU-15 by nearly 40% since 1990.

In 2003, the Commission set out a strategy for the prevention and recycling of waste [46]. It identified means to develop further waste management policy in line with the Community's waste strategy. It also focused on the means to promote more sustainable waste management, by minimising the environmental impacts of waste while also taking into account economic and social considerations.

Other measures that should have some impact on reducing greenhouse gas emissions include the Directive on End-of-Life Vehicles [47], Directive on Waste Packaging [48], Directive on Waste from Electrical and Electronic Equipment [49] and the Directive on the incineration of waste [50].

1.2.9. Policy for integration of new Member States in the EU

Cohesion policy is supporting EU action against Climate Change as it raises the long-term growth potential of regions, enabling them to attain a higher level of sustainable development. Cohesion policy supports investment in competitive growth and jobs in line with the Lisbon Strategy and promotes the exchange of good practices and improved management of projects in line with the community acquis, helping poor regions and countries to catch up.

In the current programming period (2000-2006), significant amounts are dedicated to the development of a low carbon economy. In addition to national, public and private investments the European Regional Development Fund (ERDF) is contributing more than € 800 million (40% of total energy) for renewable energy and energy efficiency and € 12 billion (40% of total transport) for sustainable transport. Waste and other environmental infrastructures in the EU-25 are also being financed with circa € 12 billion.

The European Commission, in its Strategic Guideline (CSG) [50] document focuses on investments targeting the Kyoto commitments placing a high emphasis on R&D, eco-innovation, environmental management in small and medium enterprises (SMEs), energy efficiency, renewable energies and sustainable systems of transport which are also some of the most important priorities for the future.

For the 2007-2013 period, key theme is the promotion of sustainable growth and job creation. The legislative package proposed on the 14th July 2004 and the Commission published on 6 July 2005 draft Community Strategic Guidelines entitled “Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013” [51] [sets out a framework for growth , which will be supported by the European Regional Development Funds, the European Social Fund and the Cohesion Fund. The 10 new Member States but also Bulgaria and Romania will receive a large amount of the allocations and could therefore make significant progress.

1.2.10. Further action is planned...

While significant progress has been made in tackling greenhouse gas emissions, the EU is determined to take further action, with a new phase of the ECCP which started in October 2005. The Commission plans to review progress and explore new actions to exploit cost effective emission reduction options. Attention will be paid in particular to energy efficiency, renewable energy, the transport sector (including aviation and maritime transport), and carbon capture and storage. The role of the EU in reducing vulnerability and promoting adaptation will also be explored.

2. DESCRIPTION OF TRENDS IN, AND PROJECTIONS OF, GREENHOUSE GAS EMISSIONS

Greenhouse gas emissions in the European Union fell between 1990 and 2003 and further reductions are expected in the future. The latest aggregated EU Member States projections suggest clearly that the EU will be able to achieve its greenhouse gas emissions reduction

targets under the Kyoto Protocol on the basis of current and planned policies and measures and the use of flexible mechanisms.

2.1. Past trends in GHG emissions

Emissions of greenhouse gases (aggregated using CO₂ equivalents) in the EU-25 decreased by 8 % between the base year and 2003 (the latest year for which data are available). Although the fall in emissions in the ten new Member States were crucially affected by economic restructuring, emissions in the older EU-15 Member States also decreased, by 1.7 % over the same period alongside a 27 % increase in the economy over this time. Five-year average emissions between 1999 and 2003 are currently 2.9% below the base year emissions.

Since 2003, the EU and Member States have implemented new policies and measures, as described above to help progress towards the Kyoto target. The EU ETS launched on 1 January 2005 is expected to result in further cuts in emissions of carbon dioxide (CO₂) in the coming years (See section 2b).[4]

In addition, some Member States are starting to take advantage of other options for reducing emissions, known as project based or flexible mechanisms, available under the Kyoto Protocol. These options allow countries to achieve part of their targets by investing in emissions-saving projects in other countries that have ratified the Kyoto Protocol, or by undertaking projects that sequester CO₂ in forests or agricultural land.[5]

Figure 4: EU-25 GHG emissions 1990–2003 (excl.LUCF)

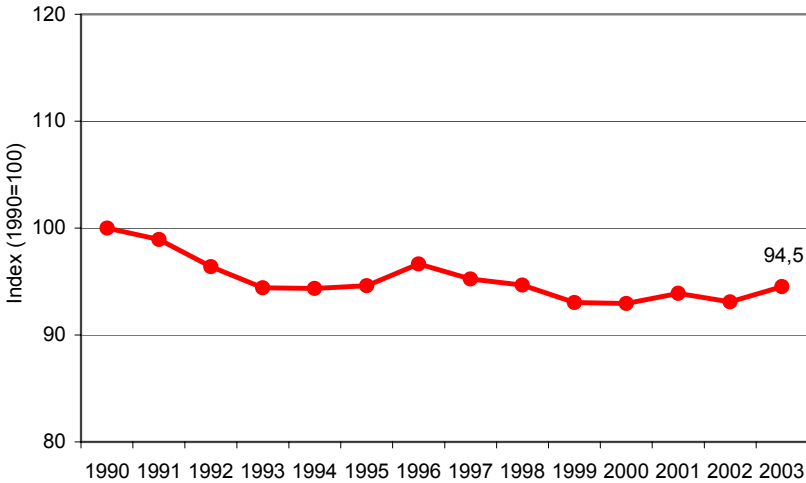
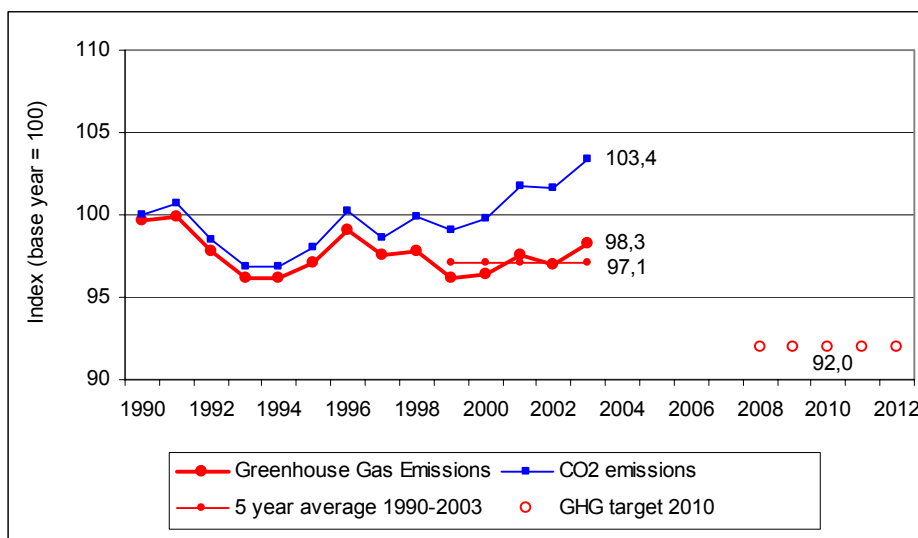


Figure 5: EU-15 GHG emissions 1990–2003 compared with target for 2008–2012 (excl.LUCF)



Notes:For the fluorinated gases the EC base year emissions is the sum of Member States’ emissions in the respective base years. Thirteen Member States have chosen to select 1995 as base year under the Kyoto Protocol, Finland and France have chosen to use 1990. Therefore, the EC base year estimates for fluorinated gas emissions are the sum of 1995 emissions for 13 Member States and 1990 emissions for Finland and France. The index on the y axis refers to the base year (1995 for fluorinated gases for all Member States except Finland and France, 1990 for fluorinated gases for Finland and France and for all other gases). This means that the value for 1990 is not exactly 100.

Most greenhouse gas emissions in the European Union are from the production and use of energy, including transport. Aggregate energy-related emissions in the EU-15 Member States increased between 1990 and 2003, largely as a result of growing transport and electricity demand. Transport emissions rose in the EU-15 and EU-25 between 1990 and 2003. However, for both EU-15 and EU-25, the growth in greenhouse gas emissions in energy supply and use excluding transport is slower than the growth in energy demand, with emissions falling despite increases in demand (Figure 6). This is also happening, but to a lesser extent, in the transport sector in the EU-15 (Figure 7).

Figure 6: Greenhouse gas emissions from energy supply and use (excluding transport) and energy demand (EU-15)

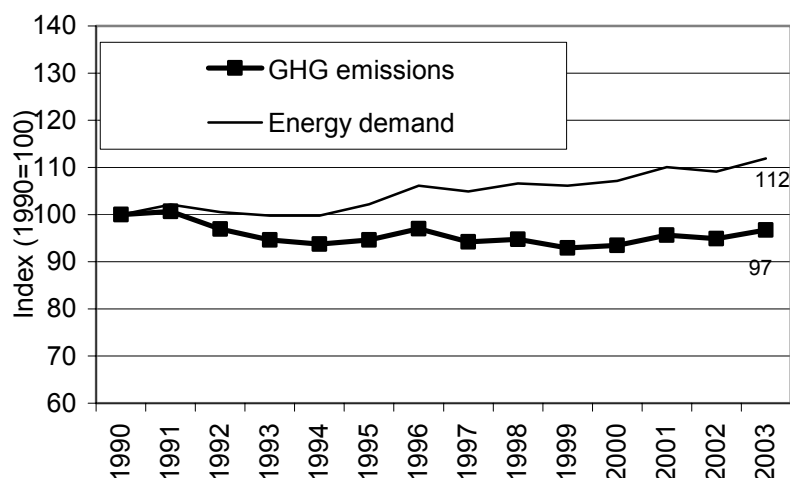
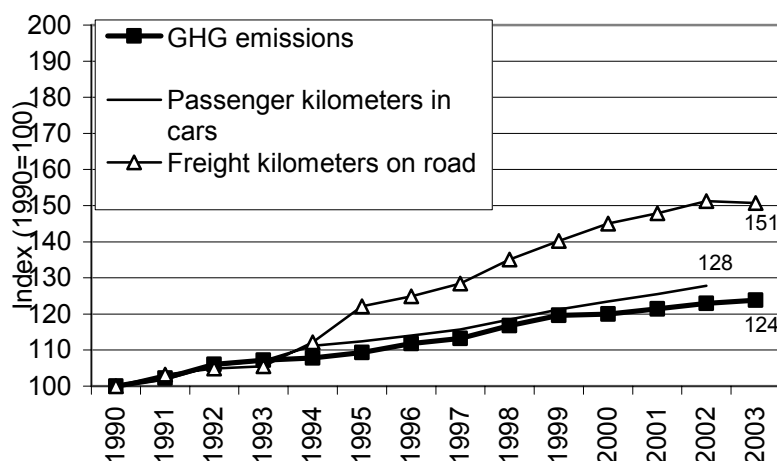


Figure 7: Greenhouse gas emissions and demand for transport (EU-15)



The growth in energy-related emissions was offset by reductions in emissions from non-energy related sources, such as agriculture, waste and industrial processes. Agricultural emissions were lower as the animal numbers have decreased in the EU and waste emissions fell as the waste policies (Landfill Directive) [12] resulted in less solid waste disposal on land. The introduction of abatement techniques, particularly for N₂O, helped reduce industrial process emissions.

As for greenhouse gas emissions in the new candidate countries, Bulgaria, Romania and Croatia, the first two are on track to reach their reduction targets under the Kyoto Protocol even though emissions increased relative to last year in all three countries. Romania could even reduce its GHG emissions by more than 40 % since the base year. No data are yet available for Turkey, no projections are available for Croatia.

2.2. Projections

Both the EU and its Member States are parties to the Kyoto Protocol. The EU must therefore project the likely future development of greenhouse gas emissions for the EU as a whole to be

able to plan appropriate action. For this purpose, the sum of the most recent projections from Member States is used. However, as the projections are not necessarily updated at the same time, this addition requires some further analysis which will be carried out in the future.

There are two kinds of projections, called by the UNFCCC the ‘with measures’ projections and the ‘with additional measures’ projections. The ‘with measures’ projections are calculated on the basis of Member States policies currently in place, complemented by existing EU wide policies and measures. These policies and measures are not necessarily sufficient to realise the individual Member States agreed reduction goals. Therefore, additional measures not currently in place are required. The ‘with additional measures’ is based on policies and measures that are planned in Member States and at the EU wide level but that are not yet in place.

The Kyoto flexible mechanisms allow countries to achieve part of their targets by investing in emissions-saving projects in other countries that have ratified the Kyoto Protocol, or by undertaking projects that capture CO₂ in forests or agricultural land. In the case of Joint Implementation (JI), industrialised countries work together to meet their emission targets by means of project activities. The Clean Development Mechanism (CDM) enables an industrialised country to meet its target through project activities hosted by a developing country. Several Member States plan to use these mechanisms (see Section 4 for more details). The planned use of flexible mechanisms amounts to about 2.6% of base year emissions. To reach the EU Kyoto target, policies and measures are required that will reduce base year emissions by 5.5%.

2.2.1. With measures and with additional measures projections

In the EU-15, existing measures lead to emissions of greenhouse gases without LULUCF in 2010 that are projected to be 1.6% below base year levels. Savings from additional domestic policies and measures being planned by Member States (EU-15) would result in emission reductions of 6.8%. In addition to this, Member States forecast that they will achieve reductions of over 100 Mt CO₂-equiv. per year through the use of Kyoto mechanisms. Including these Kyoto mechanisms would reduce emissions by a further 2.5%, bringing 2010 EU-15 emissions down to 9.3% below base year levels. The EU-15 Kyoto target requires only a reduction of 8% below base year emissions.

From the aggregate of Member States projections, total emissions of greenhouse gases without LULUCF in the EU 25 will be 5% below base year levels in 2010 as a result of measures already implemented. For the EU-25, the reduction in total greenhouse gas emissions by 2010 is mainly due to a fall in CO₂ emissions. Despite strong growth in emissions from the transport sector, CO₂ emissions are projected to reduce overall due to continued fuel switching from coal to gas, an increasing use of renewables in the power generation sector and a reduction in emissions from industry as a result of the continuing shift to less energy intensive industry.

Another major contribution to the overall reduction in emissions comes from a fall in methane emissions due to the continuing phase out of coal mining in the EU, reduced landfill gas emissions due to the implementation of the Landfill Directive [12] and reduced emissions from livestock due to declining livestock populations coupled with increased efficiency in livestock farming. Emissions of nitrous oxide and two fluorinated gases (PFCs and SF₆) also fall, but reductions in these gases are partially offset by a rapid increase in HFC emissions, which almost double over this period due to their increased use in refrigeration systems.

The implementation of additional measures is projected to reduce EU-25 greenhouse gas emissions to 9.3% below 1990 levels by 2010. The table below summarises the various EU wide emissions projection described above.

Table 1: Aggregate of Member States projections without LULUCF for the various scenarios, with and without Kyoto mechanisms

	With Kyoto mechanisms			Without Kyoto mechanisms		
	1990/ base year ¹ Mt CO ₂ eq.	2010 Mt CO ₂ eq.	%Change 1990-2010	1990/ base year ¹ Mt CO ₂ eq.	2010 Mt CO ₂ eq.	%Change 1990-2010
Aggregate of EU-15 MS with measures projections ²	4145	3974	-4.1%	4145	4080	-1.6%
Aggregate of EU-25 MS with measures projections ^{2,3}	5150	4788	-7.0%	5150	4895	-5.0%
Aggregate of EU-15 MS with additional measures projections ¹	4145	3756	-9.4%	4145	3862	-6.8%
Aggregate of EU-25 MS with additional measures projections ^{2,3}	5150	4564	-11.4%	5150	4670	-9.3%

Notes: 1. The base year for the Member States projection is the aggregate of base years from the projections and has not been adjusted to the latest inventory.

2. Member State (MS) Projections as submitted to the EC Monitoring Mechanism or from Member States 3rd National Communication.

3. No projections available for Cyprus and Malta; 1990 GHG emissions in these countries totalled 8.2 Mt CO₂ eq.

4. The projections in this table are not based on the MS GHG projections reports and not on the MS inventory reports.

3. ANALYSIS OF THE CONTRIBUTION OF DOMESTIC MEASURES AND USE OF KYOTO MECHANISMS

Action on climate change is taken individually by Member States and collectively by the EU. Common and co-ordinated measures are used in areas in which common action strengthens and supports national efforts to reduce greenhouse gases most effectively. The need for these measures is increasing with the development of the internal market. The free movement of goods places certain restrictions on national policies and measures, and means that common approaches to, e.g., norms and standards are convenient. The single market also means that consideration of the competitive positions of companies has become more important in regulating businesses.

Common policies and measures can also make it possible to take on projects that individual countries cannot do on their own. An example of this is the agreement with the automotive industry on improving the efficiency of new cars or the introduction of minimum energy performance standards on consumer products. Larger markets also increase the demand and stimulate development of products favourable to the environment.

The measures described here are the common and co-ordinated policies and measures. Individual, national actions at the Member State level will be described in their own reports.

3.1. Evaluation of projected progress in emissions reduction by measure

Emissions savings from implemented measures

The EU has implemented a large number of common and co-ordinated policies and measures across all sectors. The ‘with measures projections’ give an indication of the overall effect of the measures as they have been implemented in Member States. Estimates (Table 2 and Tables 3 to 10), based on expert judgements, of the potential effects of individual policies and measures once fully implemented, have indicated that the total reduction of CO₂ emissions in 2010 could be in the range of 420-490 MtCO₂ (10%-12% of base year emissions). Not all policies have been quantified and the level of achievement will depend on the implementation by Member States and in some cases the degree of overlap between policies. The action taken to date by the EU will clearly have a very significant impact on reducing greenhouse gas emissions and more action is currently being planned (see next section).

Table 2: Emissions reduction potential from implemented policies and measures

Sector	Savings in 2010 (MtCO ₂ eq.)
Cross cutting measures	Not known
Energy supply	157 – 207
Energy demand	114 – 129
Transport	75–80
Industry	23(fluorinated gases regulation)
Waste	41
Agriculture	10
Research and development	Not known
CO ₂ sequestration in agricultural soils & forests	Not known
Total	420-490

The largest savings are expected to come from the energy supply sector, followed by the energy demand, transport and waste sectors. Policies that will deliver particularly large savings include the Directives on renewable electricity [7], combined heat and power [10], the energy performance of buildings [9], and landfills [12], and the voluntary commitment of car manufacturers to reduce the CO₂ emissions from new cars [11].

3.2. Achievement of targets in terms of overall greenhouse gases

Emissions savings from planned policies and measures

Many new EU-wide policies and measures are currently under development, with many being at an advanced stage of preparation. The ‘with additional measures’ projection gives an indication of the overall effect of the planned policies and measures. The figures in the table below are based on ex-ante estimates of the emissions reduction potential. In 2006, the Commission will review these figures taking into account actual implementation of adopted measures.

Summary of implemented and planned policies and measures

Table 3: Cross-cutting issues

Policies and measures 'cross-cutting'	Description	Stage of implementation
1. EU emissions trading scheme (Directive 2003/87/EC) [4]	An emissions trading system limiting CO ₂ emissions from 11,500 installations in the EU's 25 Member States through the allocation of emission allowances by Member States. The allowances are tradable in order to reduce compliance costs.	Operational since 1 January 2005
2. Use of CDM and JI credits under the EU emissions trading scheme (Directive 2004/101/EC) [5]	Companies falling under the scope of the EU emissions trading scheme can use credits from the Kyoto project-based mechanisms CDM and JI to comply with their emission limits. CDM (Clean Development Mechanisms) envisages emission-saving projects in developing countries and JI (Joint Implementation) in countries with Kyoto emission targets.	To be implemented in Member States by 13 November 2005
3. Mechanism for monitoring greenhouse gas emissions and implementing the Kyoto Protocol in the EU (Decision 280/2004/EC) [1]	New mechanism, replacing the 1993 mechanism, for monitoring and reporting greenhouse gas emissions and removals by sinks in the EU. It allows to evaluate progress accurately and regularly and to comply with the requirements under the UNFCCC and the Kyoto Protocol.	In force in Member States since 10 March 2004

Table 4: Energy Supply

Policies and measures 'energy supply'	Description /Emission reduction potential in the EU-15 by 2010 ^e	Stage of implementation
4. Promotion of electricity produced from renewable energy sources (Directive 2001/77/EC) [7]	Member States are required to promote electricity produced from non-fossil renewable energy sources (such as wind, solar, geothermal, wave, tidal, hydroelectric, biomass, landfill gas, sewage treatment gas and biogas energies) with an indicative target of 21% in the share of EU gross electricity consumption to be reached by 2010 (currently: 14%). <u>Emission reduction potential</u> in the EU-15 Member States by 2010: 100-125 Mt CO₂ eq.	Implementation in Member States was due by 27 October 2003
5. Promotion of bio-fuels for transport (Directive 2003/30/EC) [8]	Member States are required to promote bio-fuels (liquid or gaseous fuels used for transport and produced from biomass) with an indicative target of 5.75% in the share of fuels sold to be reached by 2010. <u>Emission reduction potential</u> in the EU-15 Member States by 2010: 35-40 Mt CO₂ eq.	Implementation in Member States was due by 31 December 2004
6. Promotion of cogeneration of heat and electricity (Directive 2004/8/EC) [10]	Establishment of an EU-wide framework to facilitate and support the installation of cogeneration where heat demand exists. The European Commission will set harmonised efficiency reference values by 21 February 2006 for separate production of electricity and heat. <u>Emission reduction potential</u> in the EU-15 Member States by 2010: 22-42 Mt CO₂ eq.	To be implemented in Member States by 21 February 2006
7. Measures to promote the use of heat from renewable energy sources & Biomass Action Plan [52]	Measures to promote heat from renewable energy sources - e.g. biomass, solar systems and geothermal sources - are in preparation. They include a biomass action plan to increase total biomass production in	In preparation

^e This is an estimate of the emission reduction potential in the EU-15 from the moment a measure starts delivering results until 2010, compared to business as usual.

	<p>the EU for energy purposes.</p> <p><u>Emission reduction potential</u> in the EU-15 Member States by 2010: 36-48 Mt CO₂ eq.</p>	
<p>8. 'ALTENER' component of 'Intelligent Energy - Europe' funding programme (2003-2006) (Decision 1230/2003/EC) [6]</p>	<p>The 'Intelligent Energy - Europe' programme is a funding scheme with a budget of € 250 million for 2003-2006 to promote intelligent energy use and more renewables. It is not technology-related, but co-finances the start-up of local or regional agencies as well as international projects & events aimed at spreading best practise and building capacity. Ninety projects have been selected by October 2005.</p> <p>There are four areas of activity. 'ALTENER' supports the use of renewable energy sources. (The other three fields deal with energy efficiency, sustainable transport and the use of renewables in developing countries.)</p>	<p>Operational 2003-2006</p> <p>Commission proposal to continue the IEE programme during the 2007-2013 budgetary period and almost double its budget to € 780 million</p>
<p>Emission reduction potential of 'energy supply measures' in implementation in the EU-15 by 2010</p>	<p>193-255 Mt CO₂ eq.</p>	

Table 5: Energy demand

Policies and measures 'energy demand'	Description /Emission reduction potential in the EU-15 by 2010	Stage of implementation
9. Energy performance of buildings (Directive 2002/91/EC) [9]	<p>Buildings account for around 40% of EU energy demand. Based on an EU-wide common methodology to measure the energy performance of buildings, EU governments have set minimum performance standards. These will apply to all new constructions and large old buildings undergoing major refurbishment from January 2006. Sellers and landlords will have to provide prospective buyers and tenants with energy performance certificates.</p> <p><u>Emission reduction potential</u> in the EU-15 Member States by 2010: 20 Mt CO₂ eq.</p>	To be implemented in Member States by 4 January 2006
10. Energy labelling of domestic household appliances (package of Directives relating to specific appliances with Directive 92/75/EEC from 1992 providing for the framework) [33]	<p>Domestic household appliances sold in the EU must carry a label grading them according to their energy efficiency, with the grades running from A (high energy efficiency) to G (low efficiency). This allows consumers to choose the most efficient ones and has stimulated producers to improve the energy-efficiency of their products.</p> <p><u>Emission reduction potential</u> in the EU-15 Member States by 2010: 31 Mt CO₂ eq. (existing labels) 23 Mt CO₂ eq. (planned new labels and tightening of requirements for existing labels)</p>	First labels, for washing machines, mandatory since 1 January 1996, others following suit
11. Framework for setting eco-design requirements for energy-using products (Directive 2005/32/EC) [34]	<p>This initiative aims at improving the environmental performance, including energy efficiency, of products during their entire life-cycle. It requires systematic integration of environmental aspects at the earliest stage of their design. The Directive makes it possible to adopt binding measures (based on common conditions and criteria defined in the Directive) or to conclude voluntary</p>	To be implemented in Member States by 11 August 2007

	agreements with manufacturers. The European Commission is investigating groups of products that have the potential to generate significant energy savings.	
12. Proposal on the promotion of end-use efficiency and energy services (Commission proposal COM (2003) 739) [16]	<p>The proposal sets the mandatory target of a reduction in energy consumption by 1% every year, compared to the previous year, per Member State. It proposes the establishment of an EU-wide framework that will remove barriers to the efficient use of energy. Energy companies will be required to offer energy services (services that combine the sale of energy with energy-efficient end-use technology, e.g. lighting equipment).</p> <p><u>Emission reduction potential</u> in the EU-15 Member States by 2010: 40-55 Mt CO₂ eq.</p>	In adoption procedure
13. Action plan on energy efficiency as a follow-up to the Green Paper on Energy Efficiency from 22 June 2005 (COM (2005) 265) [31]	The action plan will encompass a variety of actions and measures to be taken by governments at all levels, industry and consumers. It will harness cost-effective energy savings equivalent to 20% of the EU's current energy use by 2020.	To be presented in 2006
14. Inclusion of energy efficiency requirements in the permit system for industrial and agricultural installations (Directive 96/61/EC) [38]	Under the 1996 Directive on Integrated Pollution Prevention and Control (IPPC), major polluting industrial and agricultural installations in the EU (45,000 installations in the EU-15) must obtain a permit from their national authorities to be allowed to operate. The permits are based on the concept of Best Available Techniques (BAT) to prevent and reduce emissions, and to use energy efficiently. BAT is provided in sectoral BAT reference documents, which are agreed in a process involving all stakeholders and then adopted by the Commission. In order to further improve energy efficiency, a 'horizontal' BAT reference document on energy	New installations have been obliged to comply with IPPC permits since 30 Oct. 1999; existing installations must be brought into conformity by 30 Oct. 2007

	efficiency is in preparation.	
15. Motor Challenge Programme [53]	A voluntary programme with a budget of € 1 billion for 2003-2004 and €1.8 billion for 2005-2006. Run by the European Commission, it aids companies in improving the energy efficiency of motor-driven systems (e.g. compressed air, fan and pump systems), which account for close to 70% of industrial electricity consumption in Europe. Companies receive support for energy audits and for drawing up and carrying out action plans, as well as public recognition for their contributions. The programme will continue during 2006-2007, and there might be additional funding for promoting it in new Member States and the candidate countries.	Operational since 2003
16. 'SAVE' component of 'Intelligent Energy - Europe' funding programme (2003-2006) (Decision 1230/2003/EC) [6]	The 'SAVE' component of 'Intelligent Energy - Europe' funding programme (see item 8) supports energy efficiency, in particular in industry and buildings. (The other three components of the programme deal renewable energy sources, sustainable transport and the use of renewables in developing countries.)	2003-2006 Commission proposal to continue the programme during the 2007-2013 budgetary period and almost double its budget to € 780 million
17. Sustainable Energy Europe Campaign (2005-2008) [54]	The four-year Sustainable Energy Europe campaign with a budget of € 3.7 million supports actions and partnerships to increase policy-makers' and citizens' awareness of sustainable energy technologies and policies. It also supports the 'Intelligent Energy - Europe' programme.	2005-2008
18. Handbook on Green Public Procurement encouraging public authorities to take energy efficiency into account in their procurement practices [55]	Public authorities in the EU-15 spend every year around 16% of EU GDP on purchasing goods and services. The Handbook explains how they can consider environmental aspects, including energy efficiency, in their procurement practices.	Publication of the Handbook in August 2004

19. Climate Change Awareness Campaign	In 2006, the European Commission will carry out a major multi-media campaign (budget: € 5 million) throughout the 25 Member States to raise awareness of climate change and the positive role that citizens can play in fighting it.	To be launched in spring 2006
Emission reduction potential of 'energy demand measures' in implementation in the EU-15 by 2010	114-129 Mt CO₂ eq.	

Table 6: Transport

Policies and measures 'transport'	Description /Emission reduction potential in the EU-15 by 2010	Stage of implementation
<p>20. EU strategy to reduce CO₂ emissions from new passenger cars</p>	<p>This EU strategy launched in 1995 aims to reduce CO₂ emissions from new passenger cars from their average 186 g of CO₂ per km in 1995 to 120 g CO₂/km. It rests on three pillars:</p> <ul style="list-style-type: none"> - voluntary commitments by European, Japanese and Korean carmakers to reduce CO₂ emissions from cars sold in the EU to 140 g CO₂/km by 2008/2009 (roughly a quarter compared to 1995) [11]; - information for consumers about the fuel-economy and CO₂ emissions of new cars (Directive 1999/94/EC) to encourage them to buy fuel-efficient models [56]; - proposal to base car taxation rates on CO₂ emissions (COM(2005) 261) to further influence consumer behaviour [57]. <p>The European Commission is currently reviewing the possibility of taking additional measures to achieve the objective of 120 g CO₂/km.</p> <p><u>Emission reduction potential</u> in the EU-15 Member States by 2010: 75-80 Mt CO₂ eq. (voluntary commitments; the other two measures: another 32-35 Mt CO₂ eq.)</p>	<p>Agreements concluded in 1998 and 1999 for a ten-year period</p> <p>Mandatory since 18 Jan. 2001</p> <p>In adoption procedure</p> <p>Report to be presented in mid-2006</p>
<p>21. Shifting the balance between transport modes from road to rail & water (White Paper 'European transport policy for 2010', COM (2001) 370) [58]</p>	<p>Emissions from transport account for 21% of the EU's greenhouse gas emissions, with a rise in emissions of 22% between 1990 and 2002. The White Paper from 2001 advocates a transport system that is compatible with environmental protection. Suggested measures include shifting the balance between transport modes from road to rail & water.</p> <p>One of the major initiatives to achieve the shift is the Marco Polo Programme, which tackles freight</p>	<p>2003-2006; proposal to extend it to the 2007-2013 budgetary period with a budget</p>

	<p>transport and has a budget of €100 million for 2003-2006. It co-finances:</p> <ul style="list-style-type: none"> • the start-up of non-road freight transport services, • innovative measures to overcome structural barriers in the market that act as obstacles to non-road freight transport, • cooperation and exchange of know-how among operators in the freight logistics market in order to improve the sector's environmental performance. 	of € 740 million
<p>22. Charging of heavy-duty vehicles for the use of road infrastructure (White Paper 'European transport policy for 2010', COM (2001) 370 [57]; proposal COM (2003) 448 to amend Directive 99/62/EC) [35]</p>	<p>The 2001 White Paper on transport policy (see above) also suggested infrastructure charging that takes into account costs to the environment caused by road transport.</p> <p>The Commission has therefore proposed to amend the 1999 Directive on the charging of heavy-duty vehicles for the use of road infrastructure. The Directive harmonises the levies - vehicle taxes, tolls and charges - that Member States can impose on vehicles with a laden weight of 12 tonnes. The proposed amendment will apply to vehicles above 3.5 tonnes and promote a system that translates the costs related to infrastructure use, including the environmental costs, into the prices users have to pay.</p>	In adoption procedure
<p>23. Minimum taxation of mineral oils, coal, natural gas and electricity (Directive 2003/96/EC restructuring the framework for the taxation of energy products and electricity) [13]</p>	<p>The EU system of minimum rates, which for a long time was confined to mineral oils, is extended to coal, natural gas - used as motor and heating fuels - and to electricity. It encourages more efficient use of energy, and it authorises Member States to grant tax advantages to businesses that take specific measures to reduce their emissions.</p>	Implementation in Member States was due by 31 December 2003
<p>24. Proposal to phase out HFC-134a in car air conditioning systems (as part of a package of</p>	<p>The fluorinated greenhouse gas HFC-134a has a global warming effect that is 1,300 times greater than that of CO₂. It is used in car air conditioning</p>	In adoption procedure

measures relating to fluorinated greenhouse gases - Commission proposal COM (2003) 492) [17]	systems. The proposal aims to impose maximum allowed leakage rates and phase out the use of HFC-134a in new vehicles between 2011 and 2017.	
25. 'STEER' component of 'Intelligent Energy - Europe' funding programme (2003-2006) (Decision 1230/2003/EC) [6]	The 'STEER' component of the Intelligent Energy -Europe' projects supports fuel diversification, biofuels and energy efficiency in transport systems. (The other three components deal with energy efficiency as well as renewables in the EU and in developing countries.)	Operational 2003-2006 Commission proposal to continue the IEE programme during the 2007-2013 budgetary period and almost double its budget to € 780 million
26. 'Thematic' strategy on the urban environment [59]	This cross-cutting long-term strategy will seek to improve the quality of the urban environment in the EU by promoting an integrated approach to the environmental management of cities, in particular to the management of urban transport and urban energy needs. The strategy will offer support and guidance to local authorities and promote the exchange of best practice between cities to reduce air pollution, greenhouse gas emissions and congestion caused by traffic.	To be presented in December 2005
Emission reduction potential of 'transport measures' in implementation in the EU-15 by 2010	75-80 Mt CO₂ eq.	

Table 7: Industry & non CO₂ gases

Policies and measures 'non-CO₂ gases'	Description /Emission reduction potential in the EU-15 by 2010	Stage of implementation
27. Proposal to regulate fluorinated greenhouse gases (Commission proposal COM (2003) 492) [17]	<p>These gases have a global warming effect that is hundreds or even thousands of times greater than that of CO₂. They are used in refrigeration, air conditioning, fire-fighting equipment and various industry processes. The Commission's proposal aims to improve their containment; to strengthen the monitoring of emissions through reporting requirements; to restrict marketing and use where containment is not feasible or the use of fluorinated gases is inappropriate. It also proposes to phase out the use of HFC-134a in car air conditioning (see 23).</p> <p><u>Emission reduction potential</u> in the EU-15 Member States by 2010: 23 Mt CO₂ eq.</p>	In adoption procedure
28. Prevention of emissions of greenhouse gases from industrial and agricultural installations (Directive 96/61/EC) [38]	<p>Under the 1996 Directive on Integrated Pollution Prevention and Control (IPPC) - see item 14 - the national authorities issuing permits to the installations falling under the scope of the Directive can impose emission limit values in relation to greenhouse gases, except for those installations covered by the EU emissions trading scheme.</p>	New installations have been obliged to comply with IPPC permits since 30 Oct. 1999; existing installations must be brought into conformity by 30 Oct. 2007
29. Reductions of methane emissions from landfills (Landfill Directive 1999/31/EC) [12]	<p>Under the Landfill Directive, Member States are required to reduce the amount of biodegradable waste that they landfill to 75% of the 1995 level by 2010, 50% of the 1995 level by 2013 and 35% of the 1995 level by 2020. Biodegradable waste produces methane emissions, which currently account for around 8% of EU greenhouse gas emissions.</p> <p><u>Emission reduction potential</u> in the EU-15 Member States by 2010: 41 Mt CO₂ eq.</p>	Implementation in Member States was due by 16 July 2001

30. 'Thematic' strategy on waste prevention and waste recycling [60]	This long-term strategy will promote recycling (resulting in energy savings compared to production from virgin materials), waste prevention (less methane emissions) and incineration with energy recovery (energy gains).	Due to be presented in November 2005
Emission reduction potential of 'non-CO₂ gas measures' in implementation in the EU-15 by 2010	64 Mt CO₂ eq.	

	<p>agricultural fertilisers and from agricultural waste. The reduction of N₂O in soils benefits the climate system since N₂O is a powerful greenhouse gas.</p> <p>The upcoming 'thematic' long-term strategy on soil will put an emphasis on preventing soil contamination by nitrates, while the 'thematic' strategy on pesticides will promote low-input farming, both of which will benefit the climate system.</p> <p><u>Emission reduction potential</u> in the EU-15 Member States by 2010: 10 Mt CO₂ eq.</p>	<p>December 1993</p> <p>Strategy on soil: due to be presented in November 2005 / Pesticides: due to be presented in the first half of 2006</p>
<p>Emission reduction potential of 'agriculture and forestry measures' in implementation in the EU-15 by 2010</p>	<p>43 Mt CO₂ eq.</p>	

Table 9: Integration Research & Development

Policies and measures 'R&D'	Description	Stage of implementation
<p>34. Climate-change related R&D under the EU's sixth R&D framework programme (2002-2006) (Decision 1513/2002/EC and 2002/668/Euratom) [14]</p>	<p>The EU's sixth R&D framework programme (2002-2006) allocates roughly € 2 billion to research that directly or indirectly deals with climate change. Another € 1.2 billion are being spent on nuclear research. The aims are to understand, observe and predict climate change and its impacts; to provide tools to analyse the effectiveness and costs & benefits of different policy options; and to improve existing climate-friendly technologies and develop the technologies of the future.</p> <p>The Commission's proposal for the seventh R&D framework programme (2007-2013) [17] envisages more than € 11 billion for research relevant to climate change (energy, transport and environment). Another € 4.2 billion is proposed for nuclear research.</p>	<p>Operational 2002-2006</p> <p>2007-2013: in adoption procedure</p>
<p>35. LIFE funding programme (Regulations No. 1655/2000/EC [63] and 1682/2004/EC [64])</p>	<p>An environmental funding scheme with a budget of € 957 million for 2000-2006. LIFE Environment, the component of LIFE most relevant to climate change, co-finances innovative environmental demonstration projects. Beneficiaries include enterprises, national and local authorities, NGOs, research institutions and inter-governmental bodies.</p> <p>Since 2000, more than 100 projects that directly or indirectly deal with climate change have received an estimated € 50 million.</p> <p>The Commission has proposed to extend the scope and budget of LIFE in the next 2007-2013 budgetary period.</p>	<p>Operational 2000-2006</p> <p>In adoption procedure</p>

Table 10: Integration Structural funds and Cohesion Fund

Policies and measures 'Structural Funds'	Description	Stage of implementation
36. Integration of climate change into the EU's Structural and Cohesion Funds	<p>The Structural and Cohesion Funds are the EU's main instruments for supporting regional development in the EU in order to eliminate economic and social disparities. The budget is around € 235 billion for 2000-2006. Member States submit proposals for projects, which the EU co-finances.</p> <p>Many of the projects financed contribute to the establishment of a low carbon economy: sustainable transport (€12 billion), forest and nature protection (€4.7 billion), sustainable urban centres (€2 billion), environmental technologies in industry (€1.2 billion), renewable energies (€800,000), sustainable waste management (€2 billion).</p> <p>Under the Commission's proposal for the 2007-2013 budget, the Structural and Cohesion Funds will increase by around 30% (to take account of EU enlargement), and actions against climate change, in particular in the transport and energy sectors, will receive increased funding. [50]</p>	<p>Operational 2000-2006</p> <p>2007-2013: in adoption procedure</p>

Use of Kyoto mechanisms

Nine Member States have already allocated resources for the use of Kyoto mechanisms (Austria, Belgium, Denmark, Finland, Germany, Italy the Netherlands, Sweden and Spain). Austria, Italy, the Netherlands and Spain have allocated the largest budgets (€ 288 million, €1320 million, € 606 million and € 200 million^f, respectively, for the five-year commitment period). In total, Member States have allocated resources of about € 2.7 billion for the 5-year commitment period. These resources are expected to result in emissions savings of over 100 Mt CO₂-equiv per year (1.6% of base year emissions) over the period 2008 – 2010.

A number of Member States (Austria, Belgium, Denmark, Finland, Germany, Italy, Netherlands, Spain, Sweden) have also started to implement legal arrangements such as the preparation of national legal frameworks or agreements with other countries for JI/CDM programmes. The Netherlands to date already has agreements with 14 developing countries.

^f An additional € 5 million has been allocated for capacity building.

4. PROGRESS ON OTHER COMMITMENTS

4.1. Improvements of national / EC greenhouse gas inventories

The EC greenhouse gas inventory is compiled according to set procedures [1, 25], which revised the mechanism for monitoring Community greenhouse gas emissions and implemented all Kyoto Protocol monitoring and reporting requirements in the EU law.

The inventory follows the recommendations and guidelines for inventories set out by the UNFCCC [65] and IPCC [66]. This guidance is also mandatory under EU law and has led to higher quality inventories and more reliable estimates of the magnitude of absolute and trend uncertainties in reported GHG inventories.

The EU presents an inventory based on the sum of the emissions of the respective source and sink categories of the 15 or 25 Member States. Member States use different national methodologies, national activity data or country-specific emission factors in accordance with IPCC and UNFCCC guidelines.

For some sectors quality improvement projects, including expert workshops, have been started with the aim of further improving estimates at Member State level. These sectors include energy background data, emissions from international sea and air transport, emissions and removals from changes in land use and forestry, and emissions from agriculture and uncertainty assessment of greenhouse gas inventories. Concerning specifically the sectors of agricultural soils, grasslands and forests, the large EU Integrated Project CARBOEUROPE [67] is investigating the role of carbon sources/sinks in order to reduce uncertainties in GHG monitoring and create the basis for a precise accounting system related to carbon stocks and fluxes in all EU Member States. In addition, EU experts are actively participating in the process of reviewing the greenhouse gas inventories of the Annex-I parties.

4.2. European measures for adapting to climate change

Whatever action is taken now to reduce greenhouse gas emissions, some impacts from climate change are inevitable. The European Commission has therefore undertaken research, such as the ACACIA Project [68] published in 2000, to investigate the vulnerability of Europe to rising temperatures and consider how best to adapt to the changes that are likely to occur. A recent report [69] by the European Environment Agency summarises the impacts of Europe's changing climate.

Most of the policy action currently in this area is undertaken by individual Member States because of the local nature of many of the vulnerabilities. However, the Commission is already involved in some activities relating to adaptation to climate change, in particular through the running of an EU wide early warning system for floods and forest fires. This will improve responses to natural disasters and assist in preventing damage. There is a 5-year integrated European research project developing a prediction system to help reduce the uncertainty in the regional climate impact forecasts.

The second phase of the ECCP, which started in October 2005, will help advance EU adaptation related activities to ensure that adaptation aspects are integrated fully into European climate policy. As part of this ongoing work a conference was held in October 2005 on strategies to adapt to the effect of climate change in Europe accompanied by a number of relevant mandates. The EU is also providing support to developing countries for adaptation to

the adverse effects of climate change as one of four strategic priorities in the strategy to assist EU development partner countries in meeting the challenges proposed by climate change [70].

4.3. Support for developing countries in the field of climate change

The framework for Commission action in developing countries is the EU Strategy and Action Plan on climate change and development [69]. They set out how the EU will support its partners to cope with the challenge of climate change, in particular the implementation of the Climate Change Convention and the Kyoto Protocol.

The Action Plan focuses on four priority areas: (i) raising the policy profile of climate change, (ii) support for adaptation, (iii) support for mitigation and (iv) capacity development. Scientific knowledge and the transfer of technologies are also addressed as important elements to allow developing countries to cope with climate change, both in terms of adaptation and mitigation.

The European Community is active in 140 countries and six regions of the world. The table below shows the financial resources in budget headings most relevant to climate change. Although the resources shown are not directed wholly to climate change, the table provides a picture of the overall spending, with a clear indication of the significant increase between 2002 and 2003.

Table 11: Financial resources relevant to climate change (million €)

Official Development Aid	2001	2002	2003
Economic infrastructure and services			
Transport	200.16	318.72	884.74
Energy generation and supply	134.12	104.9	233.19
Agriculture, forestry and fishing			
Forestry	not available	29.54	5.06
General Environmental Protection	132.57	85.13	115.58
Water supply and sanitation	224.27	100.9	332.28
Total*	691.12	639.19	1570.85

* This represents the total in these budget headings and is not directed only to climate change.

In addition, the European Commission makes significant financial contributions to multilateral institutions and programmes. In 2003, these contributions totalled more than €180 M. The European Investment Bank (EIB) is the European Union's long-term lending institution. Although the European Commission makes direct funds available to the EIB, e.g., risk capital, interest subsidies under the European Development Fund, most funds are raised on the markets, for financing of capital projects on favourable terms. In 2004, the EIB and The World Bank signed a Memorandum of Understanding (MoU) in which the two organizations agreed to cooperate in the development of a Pan-European Carbon Fund (PECF). The PECF would complement carbon trading within the EU ETS, with purchases of greenhouse gas emission reductions through CDM and JI arrangements.

4.4. Assistance to developing countries: adaptation and mitigation

Two areas of assistance that are particularly important for helping developing countries implement the requirements of the United Nations Framework Convention on Climate Change and the Kyoto Protocol and which are also strategic priorities under the EU Action Plan on Climate Change in the Context of Development Cooperation are adaptation and mitigation. Examples of programmes that contribute to these objectives even though they are not always directly linked to climate change, include:

- The **EU Energy Initiative** [71] (EUEI), launched at the World Summit for Sustainable Development in Johannesburg in 2002, focuses on achieving poverty eradication and sustainable development by improving access to adequate sustainable energy services in rural, peri-urban and urban areas, through a menu of technical and institutional options, including:
 - rural electrification, enhanced energy efficiency (including cleaner, more efficient fossil fuel technologies, technology for more efficient appliances and the more efficient use of traditional biomass)
 - decentralised energy systems, increased use of renewable energy (such as hydropower, biomass, solar energy, wind power, or geothermal energy)
 - institutional capacity building and restructuring, policy, planning and transfer of knowledge and skills
- One of the specific instruments under the EUEI is the **€220 million ACP-EU Energy Facility** aiming to increase access to modern energy services for people in Africa, the Caribbean and the Pacific. It is a co-financing mechanism that will make it possible to use the leverage effect of development aid resources to attract funding from other financial sources.
- **Tropical forests and climate change adaptation: Criteria and indicators for adaptive management for reduced vulnerability and long-term sustainability.** This project is promoting adaptation of tropical forests to adverse effect of climate change through the assessment of impacts and costs of climate change, and through the development of criteria and indicators for adaptive forest management for reduced vulnerability. The work is taking place in South-East Asia, West Africa and Central America. The investment in the project is €3M over 2004 – 2008.
- **Environment and community based framework for designing afforestation, reforestation and revegetation projects in the CDM: methodology development and case studies.** The aim of this project is to develop a practical framework for selection, design and evaluation of the Clean Development Mechanism, Afforestation, Reforestation and Revegetation projects in (sub) tropical non-annex I countries. The countries covered by the project are Kenya, Uganda, Ecuador and Bolivia.

4.5. Capacity building in the field of climate change

The Commission is also supporting a number of climate-related projects to strengthen the capacity of developing countries in the area of climate change, for example:

- The **BASIC Project (Building and Strengthening Institutional Capacity on Climate Change)** [72]. This project, with support of €750 000, supports strengthening the in-country capacity of Brazil, South Africa, India and China to undertake analytical work to determine what kind of climate change actions best fit within their national circumstances, interests and priorities. The project brings these four developing country governments together with domestic and international non-governmental institutions with expertise in

research, policy and implementation, providing an important starting point for shaping future climate policy, domestically and internationally.

- **Capacity building - The United Nations Framework Convention on Climate Change (UNFCCC).** This project is facilitating implementation and participation in the Asia-Pacific region. The aim of the action is to ensure in each target country that the government and key civil society stakeholders are: a) informed of the main issues regarding participation in and implementation of the UNFCCC and b) empowered to act. The main target groups include:
 - (a) government; ministries, especially those that traditionally are not involved in discussions on climate change;
 - (b) non governmental organisations (NGOs), academics and private sector actors whose core business or field of activity will be impacted by climate change; and
 - (c) negotiators from the target countries responsible for ensuring that national interests are effectively represented at the UNFCCC negotiations.

The countries covered by the programme are Tuvalu, Cook Islands, Indonesia and Nepal. The EU support to this project is €750 000 from 2004.

- **Strengthening Human and Institutional Capacity in Developing Countries for Effective Negotiation, Policy Analysis and Co-ordination on Climate Change (C3D)** [73]. This project aims to strengthen the human resource and institutional capacity of developing countries for effective negotiation, policy analysis and coordination on climate change. The project further seeks to promote an institutionalised and sustainable approach to capacity building by strengthening three endogenous centres in Asia, West Africa and Southern Africa.
- **PHARE - Capacity building for implementation of the Integrated Pollution Prevention Control directive and the Environmental Impact Assessment Directive** [74]. The PHARE programme is one of the three pre-accession instruments financed by the European Union and currently covers 10 countries: the 8 new Member States: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia, as well as Bulgaria and Romania.
- **CARDS (Community Assistance for Reconstruction, Development and Stability in the Balkans)** [75]. This programme provides financial assistance to the Western Balkans. It aims to reinforce sustainable development to help the countries of the Western Balkans move down the road to European Integration. The EU is spending over €113 million between 2000 and 2004 to support the development of environmental policy and infrastructure. Most resources have been aimed at environmental “hot spots” that present immediate steps, however longer-term improvements such as air pollution and climate change have also been supported.
- **TACIS - Supporting Economies in Transition in Eastern Europe, the Caucasus and Central Asia to implement the Convention and the Protocol** [76]. Within this EU programme, three regional capacity building projects for implementation of the Convention and the Kyoto Protocol were launched in 2004: one in Ukraine and Belarus, one in Armenia, Azerbaijan, Georgia and Moldova, and one project in the Central Asian

republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The projects offer technical assistance to the governments of these countries in order to help them meet the objectives of the Convention and the Protocol with a special emphasis on monitoring and reporting. The TACIS programme is also financing a technical assistance project to Russia for implementing the Kyoto Protocol that started in June 2005. The project assists the Russian government in establishing a national inventory and a monitoring and reporting system, a national registry, and national guidelines for Joint Implementation projects.

4.6. Technology access and transfer

Just as capacity building, technology access and transfer are also important elements which allow developing countries to cope with climate change, both in terms of adaptation and mitigation. The EC has a comprehensive programme of activities relating to technology transfer to developing countries, many of which are relevant to climate change. Examples include Phase II of the Regional Solar Programme, implemented in the 9 member countries of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) [77]. Using the abundant resources of solar energy, this project aims to establish a sustainable supply of drinking water to the populations of disenfranchised areas. The investment in this programme is €73M over 6 years (2001-2007).

The Commission's cooperation with China is a further example of technology transfer to developing countries. The Energy and Environment Programme for China seeks to improve environmental quality and health conditions, as well as protecting the global environment through policy advice, training and the introduction of new technologies relating to four areas: cross sector energy policy development, improved energy efficiency, increased use of renewable energy and increased use of natural gas. The funding for the project is €20M over 2003-2008. The EU's technology cooperation with China has recently been strengthened through the EU-China partnership on Climate Change, agreed at the EU-China summit on 5 September 2005. Among the objectives of this partnership is the development and demonstration in China of near-zero emissions coal technology through carbon capture and storage, a significant reduction of the cost of key energy technologies and the promotion of their deployment and dissemination.

4.7. Co-operation in scientific and technical research

Finally, research and scientific technological co-operation with developing countries are important elements of the EU Action Plan on climate change and development. The 6th [14] and 7th [18] Framework Programmes for research help reinforce scientific and technological capacity in developing countries, because all third country legal entities and international organisations can participate in the programme and benefit from Community financial contributions. EU foreign and development aid policies are supported by specific activities. Capacity development initiatives target both the public and private sectors in the EU to raise awareness of the opportunities offered by the UNFCCC and Kyoto frameworks in terms of financial and technical assistance, technology transfer and investment potential through CDM activities.

The thematic area that covers climate change in the 6th Framework Programme is Sustainable Development, Global Change and Ecosystems and has a budget of €2.12 billion. This thematic area comprises:

Box 2**Sustainable energy systems - €800m**

1. short term – clean energy, efficiency savings, alternative fuels
2. long term – fuel cells, renewable energy technologies, capture and sequestration of CO₂.

Sustainable surface transport - €600m

1. environmentally friendly and competitive transport systems
2. safer, more effective and competitive rail and maritime transport

Global change and ecosystems - €700m

1. greenhouse gases and atmospheric pollutants
2. water cycle and soil
3. biodiversity
4. desertification, natural disasters
5. sustainable land management
6. modelling and complementary research

A typical example of projects being funded under the 6th Research Framework Programme is ENSEMBLES, a 5-year integrated project which started in September 2004 aiming to quantify the uncertainty in long-term predictions of climate change [78]. ENSEMBLES uses the collective expertise of 66 institutes to produce a reliable quantitative risk assessment of long-term climate change and its impacts. Particular emphasis is given to probable future changes in climate extremes, including storminess, intense rainfall, prolonged drought, etc. ENSEMBLES considers impacts on timeframes ranging from seasonal to decadal and longer, at global, regional and local spatial scales.

The Commission has outlined and proposed [18] details of the upcoming 7th Framework Programme, which is due to run from 2007-2013, with an overall budget of approximately €72.7 billion. Key areas of this programme in that again all third country legal entities and international organisations can participate will be:

- **Energy:** transforming the current mainly fossil-fuel based energy system into a more sustainable one based on a diverse portfolio of energy sources and carriers combined with enhanced energy efficiency, to address the pressing challenges of security of supply and climate change (€2913M). The research key activities within this theme will focus upon: Hydrogen and fuel cells, Renewable electricity generation and for heating and cooling, CO₂ capture and storage technologies for zero emission power generation, clean coal technologies, Smart energy networks, Energy efficiency and savings. Within the nuclear programme (Euratom), key activities will include fusion energy research (support for the ITER [79] project and the accompanying programme) and research on the next generation of fission reactor systems, which promise greatly increased levels of efficiency and sustainability compared with current designs as well as the possibility of hydrogen production.
- **Environment (including Climate Change)** with its objective of sustainable management of the environment and its resources through advancing our knowledge on the interactions between the biosphere, ecosystems and human activities, and developing new technologies (€2535M). Key research activities will focus on climate change, pollution and risks, sustainable management of resources and environmental technologies for observation, prevention, mitigation, and adaptation.
- **Transport** with its objective based on technological advances, develop integrated, “greener” and “smarter” transport systems (€5940M); The related research will focus on

the greening of air, maritime and surface transport – including reduction of emissions, alternative fuels, traffic management promotion of efficient engines, hybrid technology etc. and encouraging modal shift.

The Commission also participates actively in the Carbon Sequestration Leadership Forum (CSLF) [80] and the International Partnership for the Hydrogen Economy (IPHE) [81].

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