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Climate change and the EU's response

What is the problem?

Climate change is happening. There is an overwhelming consensus among the world's leading climate scientists that global warming is being caused mainly by carbon dioxide and other 'greenhouse gases' emitted by human activities, chiefly the combustion of fossil fuels and deforestation. These gases remain in the atmosphere for many decades and trap heat from the sun in the same way as the glass of a greenhouse.

The latest science report from the UN Intergovernmental Panel on Climate Change (IPCC), published on 2 February 2007, represents the most authoritative and up-to-date global scientific consensus on climate change. It finds that the warming of the global climate system is "unequivocal" and accelerating. The global average temperature has risen by 0.76°C over the past 100 years, with Europe warming faster than the average, by around 1°C. The 15 hottest years on record have all occurred during the last 20 years, 11 of them since 1995. The second half of the 20th century was the warmest period in the northern hemisphere for at least 1,300 years. The rate of sea level rise has almost doubled from 18 cm per century between 1961 and 2003 to 31 cm per century in 1993-2003.

The report points to a greater than 90% probability that increases in man-made emissions of greenhouse gases have caused most of the temperature increase seen since the middle of the 20th century. The current atmospheric concentrations of carbon dioxide and methane, another greenhouse gas, are the highest for at least 650,000 years.

The IPCC working group projects that temperatures and sea levels will rise further this century. The global average temperature is projected to increase by between 1.1 and 6.4°C. Its best estimate, assuming no further action is taken to reduce emissions, is a temperature rise of between 1.8 and 4.0°C and a further rise in sea level of between 18 and 59 mm. However, the projections of sea level rise may be underestimated as they do not include the full effects of changes in ice flows.

What impacts is climate change expected to have?

The warming of the global climate system is already evident in the increases in average air and ocean temperatures, widespread melting of snow and ice and rising sea levels. The impacts of climate change are expected to become progressively severe as temperatures rise. There is strong scientific evidence that the risks of irreversible and possibly catastrophic changes would greatly increase if global warming exceeded 2°C above the pre-industrial temperature. The EU's position is therefore that the objective of global action must be to keep the temperature rise within this 2°C limit.

The impacts of climate change are generally forecast to include the following:

- Extreme weather events - storms, floods, droughts and heat waves - will become more frequent, causing human suffering and economic damage. It is likely that tropical typhoons and hurricanes will become more intense, with larger peak wind speeds and more heavy rain.
- Changes in rainfall patterns will put pressure on water resources in many regions, which will in turn affect both drinking water supplies and irrigation. Increases in the amount of precipitation are very likely in high latitudes and the tropics whereas decreases are likely in most sub-tropical regions
- Warm seasons will become dryer in the interior of most mid-latitude continents, increasing the frequency of droughts and land degradation. This will be particularly serious for areas where land degradation, desertification and droughts are already severe. Developing countries will suffer particularly, and tropical diseases will extend their geographical range
- In Europe agricultural yields are projected to start declining if the temperature rises beyond 2°C above the pre-industrial level. With a global temperature increase to 2.5°C above pre-industrial levels, 2.4 to 3.1 billion more people worldwide are likely to suffer from water scarcity
- Geographical shifts in the occurrence of different species and/or the extinction of species will occur. Cold weather mammals like polar bears could be especially threatened.
- Projections show that by 2080 cold winters could disappear almost entirely and hot summers, droughts and incidents of heavy rain or hail could become much more frequent.

What about impacts in Europe?

According to the new IPCC projections, the temperature in Europe may climb by a further 4 - 7 °C this century as emissions of greenhouse gases continue building up.

A 2004 report[1] by the European Environment Agency identified a broad range of current and future impacts of climate change in Europe, including the following:

- Almost two out of every three catastrophic events since 1980 have been directly attributable to floods, storms, droughts or heat waves. The average number of such weather and climate-related disasters per year doubled over the 1990s compared with the previous decade. Economic losses from such events have more than doubled over the past 20 years to around €8.5 billion annually. This is due to several reasons, including the greater frequency of such events but also socio-economic factors such as increased household wealth, more urbanisation and more costly infrastructure in vulnerable areas.
- The annual number of floods in Europe and the numbers of people affected by them are rising. Climate change is likely to increase the frequency of flooding, particularly of flash floods, which pose the greatest danger to people.
- Glaciers in eight of Europe's nine glacial regions are in retreat, and are at their lowest levels for 5,000 years.
- Climate change over the past three decades has caused decreases in populations of plant species in various parts of Europe, including mountain regions. Some plants are likely to become extinct as other factors, such as fragmentation of habitats, limit the ability of plant species to adapt to climate change.

[1] "Impacts of Europe's changing climate", EEA Report No 2/2004, available through: http://reports.eea.eu.int/climate_report_2_2004/en/.

What are the expected costs of climate change, and of action to control it?

The economic costs of climate change and the economic advantages of taking strong and early further action to control it have been highlighted by the Stern Review of the economics of climate change, commissioned by the UK government and published in October 2006.

The Review has further underlined that the benefits of prompt action to reduce emissions far outweigh the costs, and that the earlier action is taken the less costly it will be. The report estimates that without further action to limit emissions, the damage caused by climate change would eventually reduce global GDP by between 5% and 20% a year.

Unabated climate change could create risks of major disruption to economic and social activity, later this century or early next, on a scale similar to the upheavals caused by the two world wars and the 1930s economic depression, it warns. By contrast, taking early action to stabilise greenhouse gas concentrations at a level that prevents climate change from reaching dangerous proportions would cost around 1% of GDP.

What international agreements are in place to fight climate change?

The United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol provide the international framework for combating climate change.

UNFCCC

The UNFCCC, the first international measure to address climate change, was adopted in May 1992 and came into force in March 1994. So far 189 governments - almost all the world's governments - have ratified it.

The Convention's goal is to stabilise greenhouse gas concentrations in the atmosphere at a level that prevents dangerous human interference with the climate system. It obliges Parties to establish national programmes for reducing greenhouse gas emissions and to submit regular reports.

It also encouraged industrialised countries to stabilise their greenhouse gas emissions at 1990 levels by the year 2000. The EU comfortably met this target.

The UNFCCC is based on the principle of 'common but differentiated responsibilities and respective capabilities'. This recognises that while all countries have in interest in controlling climate change, the developed world is responsible for most of the historical build-up of greenhouse gases in the atmosphere and should therefore lead in reducing emissions.

Parties to the UNFCCC meet annually to review progress and discuss further measures. A number of global monitoring and reporting mechanisms are in place to keep track of greenhouse gas emissions.

Kyoto Protocol

In December 1997, in the Japanese city of Kyoto, governments took a further step by adopting a protocol to the UNFCCC - the Kyoto Protocol.

Building on the UNFCCC framework, the Protocol sets legally binding limits on greenhouse gas emissions from originally 38 industrialised countries and the European Community (the EU-15). It also introduces innovative market-based implementation mechanisms - the so-called Kyoto flexible mechanisms - aimed at reducing the cost of curbing emissions.

Under the Protocol, industrialised countries are required to limit or reduce their emissions of six greenhouse gases: carbon dioxide (CO_2), the most important and common gas, methane, nitrous oxide, and the industrial gases hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. The overall reduction required amounts to a cut of around 5% below the level in the chosen base year (often 1990), and is to be achieved during the first Kyoto Protocol "commitment period" from 2008 to 2012. A five-year commitment period was chosen rather than a single target year to smooth out annual fluctuations in emissions due to uncontrollable factors such as weather. There are no emission targets for developing countries.

The EU-15 (the 15 countries that were Members of the EU at the time of ratification of the Protocol in 2002) took on a commitment to reduce their combined greenhouse gases emissions to 8% below base year levels (1990 in most cases). Under the EU Decision to ratify the Protocol, this collective target has been translated into differentiated, legally-binding national targets for each EU-15 Member State, ranging from a reduction of 28% by Luxembourg to an increase of 27% for Portugal. Of the 12 Member States that have acceded since 2004, 10 have individual reduction commitments of 6 or 8% under the Protocol. Only Cyprus and Malta do not have Kyoto targets.

The Kyoto Protocol entered into force on 16 February 2005. So far 168 countries and the European Community have ratified it. Two developed countries that originally signed the treaty have not ratified: the US has rejected the Protocol, whereas Australia has decided not to ratify it. This means the Kyoto emission targets now apply to 36 developed countries plus the European Community (EU-15).

What are the Kyoto flexible mechanisms?

The Kyoto Protocol creates three market-based mechanisms, known as the Kyoto flexible mechanisms: emissions trading between governments with Kyoto targets, the Clean Development Mechanism and Joint Implementation.

The aim of these mechanisms is to allow industrialised countries to meet their targets cost-effectively while stimulating investment in, and the transfer of clean technology to, emissions-saving projects in developing countries and economies in transition. The rationale is that emission reductions have the same impact on the atmosphere regardless of where they are made, so it is sensible to make them wherever it costs least. Detailed rules and supervisory structures have been set up to ensure that these mechanisms are not abused.

Emissions trading

Emissions trading can take place between countries with Kyoto targets, ie industrialised nations. Reflecting the emission targets agreed in Kyoto and under the EU 'burden sharing' agreement, each country will be assigned a fixed maximum amount of emissions that it may emit over the commitment period (2008-2012). Countries that emit less can sell the unused quota to others that emit more. This will allow reductions to take place where they are cheapest, reducing compliance costs.

Inspired by this model, the EU has developed and implemented its own company-level emissions trading scheme. This 'cap and trade' system, launched on 1 January 2005, covers all 27 EU Member States and is the first and biggest international emissions trading scheme in the world. It has developed rapidly and is now driving the fast-expanding global carbon market.

Under the EU Emissions Trading Scheme (EU ETS), Member States set a national 'cap' on CO_2 emissions from over 10,000 energy-intensive plants (power plants, steel factories, oil refineries, paper mills, and glass and cement installations). Together these installations account for almost half of the EU's CO_2 emissions. Within the limits of their national cap, governments issue allowances to each installation to emit a certain level of CO_2 each year. These allowances are tradable.

Companies that emit less than the number of allowances they receive can sell the surplus to companies that have problems staying within their limits, or for which emissions reduction measures are more expensive than buying allowances on the market. Any company may also increase its emissions above the level of its allowances by acquiring more allowances from the market.

By putting a price on emissions and a value on emissions saved, the scheme has made climate change a boardroom issue for the companies involved and given them a permanent incentive to minimise CO_2 emissions and fully integrate emission costs into their decision making. The system induces operators to make emission cuts where they are cheapest, thereby ensuring that reductions are made at the lowest possible cost to the economy. It also fosters innovation - companies have an incentive to improve their energy efficiency and invest in climate-friendly technologies.

The EU ETS is being closely watched by businesses and governments around the world and serving as an important reference point for others developing their own schemes, eg seven north-eastern US states, California, and states and territories in Australia. The EU has indicated its willingness to link the EU ETS to other cap-and-trade schemes to form a global emissions trading network.

Clean Development Mechanism and Joint Implementation

The Clean Development Mechanism (CDM) and Joint Implementation (JI) allow industrialised countries to achieve part of their emission reduction commitments by investing in emission-saving projects abroad and counting the reductions achieved toward their own commitments. JI covers projects in other industrialised countries with Kyoto targets, while CDM projects are carried out in developing countries. The two mechanisms lower compliance costs, promote the transfer of advanced technologies to developing countries and economies in transition, and foster cooperation between countries with Kyoto targets.

CDM credits can be generated retroactively, from 2000 onward, while JI credits must be generated during the 2008-2012 period. The CDM is thus already operational. A condition for the issue of credits is that the projects result in real, measurable and long-term emission savings that are additional to what would have happened without the projects. Several EU Member States intend to buy CDM and JI credits to help them meet their Kyoto targets. Collectively they have budgetted more than €3 billion to do so.

The EU Emissions Trading Scheme is linked to CDM and JI. Companies covered by the scheme can use emission credits from most types of CDM projects and from JI projects (from 1 January 2008) to offset their emissions in the same way as emission allowances. This link is driving investment in CDM and JI projects by European companies, in addition to the purchases planned by governments.

What will happen if a country misses its target?

The compliance regime for the Kyoto Protocol is among the most comprehensive and rigorous in the international arena. If a Party fails to meet its emissions target, the Protocol requires it to make up the difference in the second commitment period (after 2012), with an additional 30% penalty. It must also develop a *compliance action plan*, setting out the actions that it will take to meet the target and the timetable for doing so. In addition, its eligibility to "sell" under the Protocol's international emissions trading system will be suspended.

However, for the EU-15 Member States, the Kyoto Protocol compliance procedures will apply only if the EU-15 as a whole misses its 8% reduction target. Should this occur, each Member State will be held to the target set out in the Decision to ratify the Protocol and the Community will be held to be in non-compliance.

The remaining 10 Member States with Kyoto targets (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) are bound to their individual targets as set out in the Protocol, both under the Protocol's non-compliance procedures and under EC law.

Member States are committed in EC law to meet their targets, which are enforceable through infringement procedures by the European Commission.

What action is the EU taking to combat climate change?

The fight against climate change is a priority for the European Commission, as it is for EU Member States. EU-level action is an essential complement to Member States' own efforts to reduce greenhouse gas emissions. Combating climate change is the first of the 6th Environmental Action Programme's four priority areas and one of the main commitments made under the EU Sustainable Development Strategy. The need to reduce emissions has been progressively integrated into key EU policy areas such as agriculture, energy, regional policy and research.

Central to the Commission's action to ensure the EU and Member States meet their Kyoto targets is the European Climate Change Programme (ECCP), launched in 2000. Under this umbrella, the Commission, Member States and stakeholders have identified and developed a range of cost-effective to reduce emissions. So far, some 35 such measures have been implemented. They include the EU Emissions Trading Scheme and legislative initiatives to promote renewable energy sources for electricity production, expand the use of biofuels in road transport and improve the energy performance of buildings.

A second ECCP was started in October 2005 to identify further cost-effective measures to reduce emissions up to and beyond 2012 and to develop strategies for adapting to the climate change that is already under way. This work has led to the Commission's recent proposals to include aviation in the EU Emissions Trading Scheme from 2011 and to strengthen the EU strategy for reducing CO_2 emissions from new cars through legislation. Other areas of ECCP-2 work include reviewing the EU Emissions Trading Scheme with a view to its revision from 2013 and the development of a legislative framework for the environmentally safe use of carbon capture and geological storage technology.

In January 2007 the Commission put forward an integrated package of measures to establish a new energy policy for Europe aimed at stepping up the fight against climate change and boosting the EU's energy security and competitiveness. The proposals put the EU on course towards becoming a low-carbon economy.

The package sets a range of ambitious targets to be met by 2020. Energy efficiency would be improved by 20%, the market share of renewable energy sources increased to 20% and the share of biofuels in transport fuels raised to 10%. On greenhouse gas emissions the Commission proposes that, as part of a new global agreement to prevent climate change from reaching dangerous levels, developed countries should cut their emissions by an average of 30% from 1990 levels. As a concrete first step towards this reduction, the EU would make a firm independent commitment to cut its emissions by at least 20% even before a global agreement is reached and irrespective of what others do.

What progress is the EU making towards the Kyoto targets?

National and EU-level action to reduce greenhouse gas emissions has enabled the EU to ‘decouple’ emissions from economic growth. Between the base year (1990 in most cases) and 2004, the EU-15 reduced its collective emissions by 0.9% while the economy grew by 32%. EU-25 emissions were down by 7.3%. These reductions compare, for instance, with a 15.8% rise in US emissions between 1990 and 2004 as the US economy expanded by 52.6%.

Projections show that the EU-15’s 8% reduction target can be achieved in 2010 provided that all actions planned by Member States are fully implemented and deliver the emission savings anticipated. However, seven EU-15 Member States have projected that they will exceed their emission limits: Austria, Belgium, Denmark, Ireland, Italy, Portugal and Spain (see Annex for details). All of the new EU-10 Member States were on track to achieve their individual targets. If all actions planned are taken, the total EU-25 emissions reduction would reach 10.8% in 2010.

What happens after the Kyoto Protocol's first commitment period?

The increasingly evident changes taking place in the global climate, together with major recent publications such as the Stern Review and the latest IPCC science report, have further underlined the urgent need for further action to control global emissions of greenhouse gases. The window of opportunity to keep global warming below 2°C is narrowing as temperatures rise, and the costs associated with climate change will keep increasing the longer further action is delayed.

The Commission and EU Member States therefore strongly support the development of a new global climate change agreement. This should succeed the Kyoto Protocol's first commitment period at the end of 2012 and provide the international framework for action that is ambitious and comprehensive enough to limit the temperature increase to 2°C.

Talks on post-2012 action were launched at the annual UNFCCC ministerial conference in Montreal in December 2005 at the initiative of the EU and other countries. The talks are taking place on two parallel tracks. On one track, the Parties to the Kyoto Protocol are discussing new emission targets for industrialised countries post-2012. A detailed work programme for these discussions, as well as a comprehensive review of the Protocol to take place in 2008, were agreed at the annual ministerial held in Nairobi in November 2006.

On the second track, the UNFCCC Parties, including those that are outside Kyoto such as the US and Australia, are conducting a dialogue on long-term cooperative action against climate change. This dialogue is scheduled to conclude at the next annual ministerial in December 2007. The EU's view is that it should be followed up by negotiations on a comprehensive global agreement on post-2012 action. Negotiations on this should be completed by the end of 2009 at the latest to ensure the agreement enters into force by the end of Kyoto's first commitment period.

What are the European Commission's proposals for further action to combat climate change?

The key elements of the EU position on further action were outlined in a Communication published by the Commission in February 2005.[2] They include five elements:

- Broad participation by all major emitting countries
- inclusion of all emitting sectors, including aviation, maritime transport and forestry (to address deforestation)
- increased research and development and uptake of low-carbon technologies,
- continued use of market mechanisms to keep reduction costs low
- adaptation to the impacts of climate change since some effects are unavoidable

The EU Summit in Brussels in March 2005 affirmed these principles and initiated an intensive outreach effort, engaging the EU in dialogues with a range of countries on further action to combat climate change.

The Commission's January 2007 package of energy and climate change measures buildson this earlier work. It includes a Communication[3] setting out concrete proposals for the content of a new global climate change agreement aimed at limiting the temperature rise to 2°C above the pre-industrial level. Remaining within this limit is both technically feasible and economically affordable if the international community acts swiftly.

As mentioned above, the Commission is proposing that developed countries commit to cutting their emissions by an average of 30% from 1990 levels by 2020. As a concrete first step towards the 30% reduction by developed countries, and to set an example to our partners, the EU would make a firm independent commitment to cut its emissions by at least 20% even before a global agreement is reached and irrespective of what others do. The energy-related measures proposed in the January 2007 package, together with measures already in place such as the EU Emissions Trading Scheme, would deliver this reduction.

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[2] *Winning the Battle against Global Climate Change*. See http://www.europa.eu.int/comm/environment/climat/pdf/comm_en_050209.pdf

[3] *Limiting global climate change to 2 degrees Celsius: The way ahead for 2020 and beyond.* http://ec.europa.eu/environment/climat/future_action.htm

It would be essential for developing countries – except for the least developed nations – to broaden their contribution as well since their emissions are projected to overtake those from developed countries by around 2020. Developing countries would need to start slowing their emissions growth as soon as possible and then reduce their emissions in absolute terms after 2020.

To control climate change effectively it will also be essential to halt tropical deforestation completely within the next two decades and then reverse it through afforestation or reforestation schemes. Deforestation currently contributes around 20% of global greenhouse emissions, more than transport.

The Commission's analysis shows that these actions by developing and developing countries are the essential next steps if the world is to have a fair chance of staying within the 2°C temperature limit. This will require global emissions to peak before 2025 and then fall by as much as 50% of 1990 levels by 2050. This implies reductions in developed countries' emissions of 60-80% from 1990 levels by mid-century.

How much would this all cost?

The Commission's impact assessment shows that taking action to limit climate change is fully compatible with sustaining global economic growth. Investment in a low-carbon economy will require around 0.5 % of total global GDP over the period 2013–2030. This would reduce global GDP growth by just 0.19 % per year up to 2030, a fraction of the expected annual GDP growth rate of 2.8%, and this is without taking into account associated health benefits, greater energy security and reduced damage from avoided climate change. This is a small insurance premium to pay for significantly reducing the risk of irreversible damage, particularly when compared with the Stern Review's estimate that uncontrolled climate change will cost between 5 and 20% of GDP in the longer term.

Company-level emissions trading schemes such as the EU Emissions Trading Scheme (EU ETS) will be a key tool to ensure that developed countries can reach their future targets cost-effectively. The international framework for combating climate change after 2012 should enable comparable trading schemes in different regions to be linked together. In this way the EU ETS would be the pillar of a global carbon trading network. The scope of the Kyoto Protocol's Clean Development Mechanism should be expanded after 2012, for instance to cover entire national sectors rather than individual projects.

Emission reductions by developing countries are also perfectly feasible without undermining their economic growth or poverty reduction policies. The Commission's impact assessment estimates that implementing policies to control emissions would reduce the overall GDP growth of developing countries in 2020 by a only a very small amount, and this is without taking account of co-benefits such as avoided impacts of climate change. Many policy options are available to developing countries where the benefits can outweigh the costs, for example by increasing energy efficiency, promoting renewable energy, improving local air quality or capturing methane from sources such as landfills as a cheap source of energy.

Information about future action against climate change can be found in MEMO/05/42 and about emissions trading in MEMO/06/2 and MEMO/05/84

Comprehensive information about EU climate change policies is available at:
http://www.europa.eu.int/comm/environment/climat/home_en.htm

Information about the UN framework can be found at:
http://unfccc.int.

Annex:

Projected emissions limitations or reductions by EU-25 Member States up to 2010

Member State	Emissions target	With existing policies and measures	With additional policies and measures	With additional measures, Kyoto mechanisms and carbon sinks		
	Commitment	Projections for 2010	Projections for 2010	Use of Kyoto mechanisms	Use of Carbon sinks	Projections for 2010
	(in % of base year)	(in % of base year)	(in % of base year)	(in % of base year)	(in % of base year)	(in % of base year)
Austria	-13.0%	+14.8 %	+3.3 %	-8.9 %	-0.9 %	-6.5 %
Belgium	-7.5%	+1.2 %	-0.7 %	-5.8 %		-6.6 %
Czech Republik	-8.0%	-24.4 %	-26.7 %		-0.6 %	-27.4 %
Denmark	-21.0%	+4.2 %	+4.2 %	-6.5 %	-0.7 %	-3.0 %
Estonia	-8.0%	-56.5 %	-60.0 %			-60.0 %
Finland	0.0%	+9.9 %	-1.9 %	-3.4 %	+1.3 %	-4.0 %
France	0.0%	+6.4 %	+0.5 %		-0.6 %	-0.0 %
Germany	-21.0%	-19.8 %	-21.0 %			-21.0 %
Greece	25.0%	+34.7 %	+24.9 %			+24.9 %
Hungary	-6.0%	-28.5 %	-28.8 %			-28.8 %
Ireland	13.0%	+29.6 %	+29.6 %	-6.5 %	-3.8 %	+19.4 %
Italy	-6.5%	+13.9 %	+4.1 %	-7.8 %	-2.1 %	-5.8 %
Latvia	-8.0%	-46.1 %	-48.6 %			-48.6 %
Lithuania	-8.0%	-50.5 %	-50.5 %			-50.5 %
Luxembourg	-28.0%	-22.4 %	-22.4 %	-23.6 %		-46.0 %
The Netherlands	-6.0%	+3.6 %	+0.7 %	-9.3 %	-0.1 %	-8.6 %
Poland	-6.0%	-12.1 %	-12.1 %			-12.1 %
Portugal	27.0%	+46.7 %	+42.7 %	-3.1 %	-7.8 %	+31.9 %
Slovakia	-8.0%	-22.4 %	-24.8 %			-24.8 %
Slovenia	-8.0%	+4.7 %	-1.7 %		-8.3 %	-10.0 %
Spain	15.0%	+51.3 %	+51.3 %	-6.9 %	-1.9 %	+42.4 %
Sweden	4.0%	-1.0 %	-1.0 %		-3.0 %	-3.9 %
United Kingdom	-12.5%	-18.8 %	-23.2 %		-0.5 %	-23.7 %
EU-15	**-8.0%**	**-0.6 %**	**-4.6 %**	**-2.6%**	**-0.8%**	**-8.0 %**
EU-10	**-**	**-21.4 %**	**-22.4 %**	**0.0%**	**-0.3%**	**-22.6%**
EU-25	**-**	**-4.6 %**	**-8.1 %**	**-2.1%**	**-0.7%**	**-10.8%**