

EU action against climate change



Adapting to climate change

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Climate change is one of the greatest environmental, social and economic threats facing our planet today. Profound shifts are under way to the systems supporting life on Earth that will have far-reaching impacts for decades to come.

The Earth's climate is warming rapidly due to emissions of greenhouse gases from human activities such as the burning of fossil fuels and deforestation. Since 1850, the average surface temperature has risen by 0.76°C, with most of the warming occurring over the last half-century.

Confronting the problems ahead poses a dual challenge.

Potentially catastrophic consequences can be avoided only by early, substantial cuts in global emissions. A rapid transition to a low-carbon world economy is therefore **the first priority** of the EU's global strategy for controlling climate change (see the brochure *EU action against climate change: Leading global action to 2020 and beyond*).

The goal must be to limit global warming to no more than 2°C above the pre-industrial temperature because the risk of irreversible and potentially catastrophic changes in the global environment greatly increases beyond this threshold. To keep within this limit, the international community needs to stop the rise in global emissions within the next decade and then cut emissions to at least half of their 1990 level by 2050. Europe is leading the way by putting in place measures to reduce its emissions by up to 30% of 1990 levels by 2020.



But climate change is already happening and will continue to become more pronounced for decades to come because of the delayed effect of past emissions. **The second challenge** for societies worldwide is therefore to adapt to the current and future impacts of climate change in order to minimise them. Taking action to adapt to climate change has therefore become an indispensable complement to reducing greenhouse gas emissions.

Climate change will bring dramatic changes to our environment, societies and economies – as big as, if not bigger than, those caused by other large-scale trends such as globalisation. All parts of Europe and other countries will increasingly feel the adverse effects of climate change. National civil protection operations, supported by the Community Civil Protection Mechanism, can provide an emergency response to disasters, but structural action is needed to reduce the risk of climate-related disasters and minimise their impacts if they do occur. Climate adaptation efforts have to be stepped up at all levels and action needs to be well coordinated.

All countries need to recognise this and prepare for these unavoidable changes as soon as possible.



What is adaptation?

Adaptation means anticipating the adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause. Early action will save on damage costs later. Adaptation strategies are needed at all levels of administration, from the local up to the international level.

Examples of adaptation measures include developing crops that can tolerate drought, using scarce water resources more efficiently and revisiting coastal flood defences.

While infrastructure investments are expensive, they are cheaper than the damage extreme weather such as severe storms or floods can cause. For example, Hurricane Katrina in 2005 - reckoned by many to be the costliest and deadliest storm ever - caused tens of billions of dollars worth of damage and will mark the New Orleans region for years to come. Houses and other buildings that had been made "hurricane proof" suffered one-fifth of the damage of those that had not.

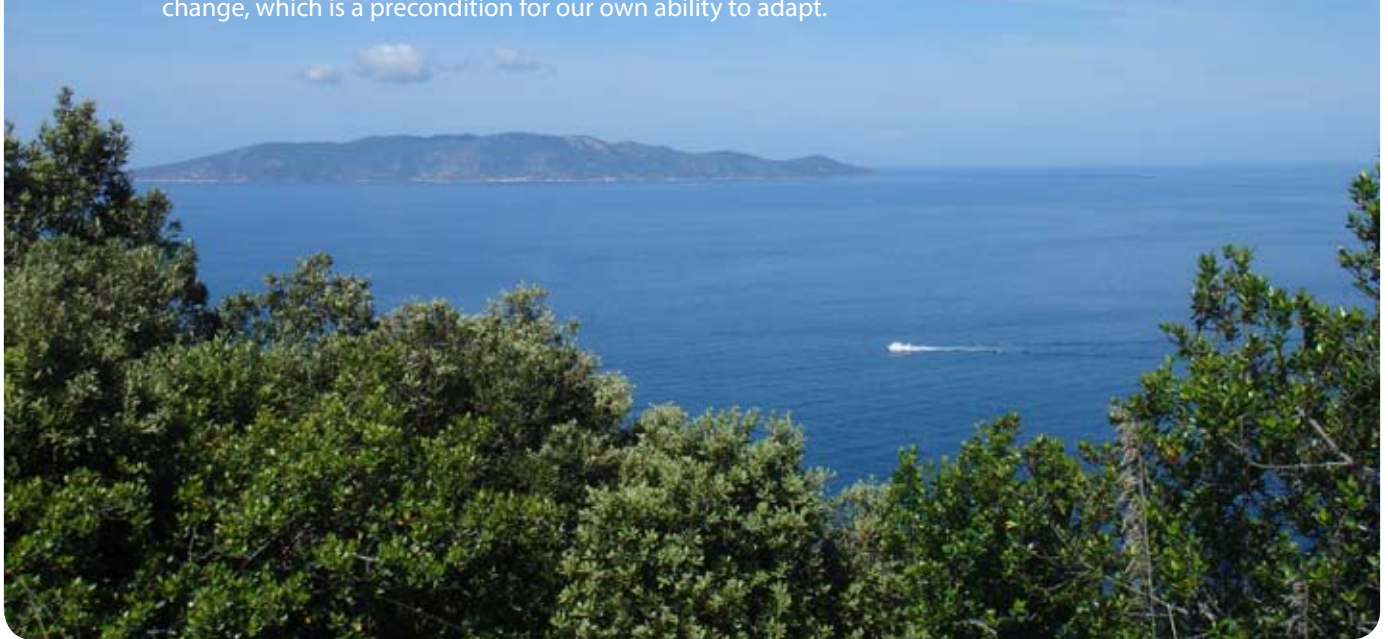
Taking climate change effects into account in property or infrastructure investments is often referred to as "climate proofing."

Healthy ecosystems are vital


Often taken for granted, healthy ecosystems not only help to preserve biodiversity but, more importantly, provide our entire resource base. When this is damaged, so is our economic prosperity.

Climate change will significantly affect entire economies and societies through its impacts on the physical and biological components of ecosystems: water, soil, air and biodiversity.

For each of these areas EU legislation and policies are either in place or in the pipeline. They must be implemented in a timely fashion to strengthen ecosystems' resilience to climate change, which is a precondition for our own ability to adapt.



The global impact of climate change



Parts of the globe are already struggling with the adverse effects of global warming. Over the past three decades, climate change has had detrimental effects on many physical and biological systems around the world, including water, ecosystems, coasts and health.

These effects will become more pronounced over the coming decades as the global temperature continues to rise.

The world's leading climatologists are projecting that, without determined worldwide action to cut greenhouse gas emissions, the global average temperature is most likely to increase by between 1.8 and 4°C above today's level over the course of this century. In the worst case the temperature rise by 2100 could be as much as 6.4°C. This range of temperature increase is three to nine times greater than the warming the Earth has experienced since the pre-industrial era.

As glaciers melt and ultimately disappear due to rising temperatures, more than 1 billion people around the world will lose their water supplies during dry seasons. The risk of famine will increase. Entire populations will be under pressure and may have to migrate from their homes, causing great upheaval that could threaten security both locally and internationally. At the same time, the number and size of areas affected by drought will increase, with similar effects.



Sea-level rise will threaten major deltas such as the Nile Delta in Egypt, the Ganges-Brahmaputra Delta in Bangladesh and India, and the Mekong Delta in south-east Vietnam, displacing more than 1 million people in each delta by 2050. Small island states are already being severely affected and in some cases their very existence is at stake.

Climate change also has major implications for human and animal health. Among the greatest risks are the effects of extreme weather and increases in infectious diseases.

Climate-sensitive diseases are already among the most deadly worldwide. Diarrhoea, malaria and protein-related malnutrition together cause more than 3.3 million deaths a year, with almost one-third of the victims in Africa. Higher temperatures will increase the range and impact of these chronic diseases.

Ecosystems, on which we depend for everything from food to clean water, and wildlife could be heavily impacted. Of the plant and animal species studied so far, 20-30% are likely to face an increased risk of extinction if the global average temperature rise exceeds 1.5-2.5°C above current levels.

Europe will not be spared



The effects of climate change are already becoming apparent across Europe, where temperatures have increased by almost 1°C in the last century – faster than the global average.

A warmer atmosphere is changing precipitation patterns. The amount of both rain and snow fall has significantly increased in northern Europe, whereas droughts are becoming more frequent in southern Europe.

Temperature extremes have been recorded across the European continent in recent years. Heatwaves are becoming more common, with some areas of Europe experiencing temperatures well above average in the summers of 2003, 2006 and 2007.

In July and August 2007, for instance, areas of south-east Europe experienced temperatures as high as 46 °C, causing hundreds of deaths and forest fires and reducing agricultural production. Meanwhile, parts of Britain were hit by their worst floods for 60 years, resulting in several deaths, billions of euros worth of damage and disruption to water supplies.

While individual weather events such as these cannot be attributed with complete certainty to climate change, they are typical of the weather shifts that are projected to occur as the world warms.

How would Europe be affected if the world failed to take action to control global warming? The next few paragraphs look at the likely impacts if the global average temperature were allowed to rise a further 3.4°C above today's level by the 2080s. This average increase is likely to translate into temperature rises ranging between 2°C and 5°C in different parts of Europe.



EU action on floods, droughts and water scarcity

Climate change will increase the frequency and severity of extreme weather events, including floods, droughts and water scarcity. The European Union is taking steps to address these threats.

Legislation adopted in 2007 requires EU member states to assess and manage flood risks. National assessments should take account of the impact of climate change where necessary.

For those areas at potentially significant risk, flood hazard and flood risk maps have to be prepared by 2013. These must map the potential consequences of both extreme flood events and medium-probability floods. To reduce the risks of flooding in these areas, flood risk management plans need to be developed by 2015.

These actions will be repeated every six years, thus enabling progressive adaptation to climate-related flood risks as knowledge improves.

Concerning water scarcity and droughts, the European Commission has launched a public debate on how best to address these in the context of climate change. The European Union has adequate water resources overall, but water scarcity and droughts are nevertheless becoming increasingly common. Droughts have increased dramatically in number and intensity over the past thirty years and cost the economy at least €100 billion.

It is estimated that there is potential for saving 40% of the EU's current water use. A communication issued by the Commission in 2007 to kick-start the debate sets out an initial set of policy options for increasing water efficiency and saving in the EU. These include giving top priority to water saving, making the "user pays" principle the rule regardless of where water is taken from, and introducing water metering programmes.



Southern Europe and the entire Mediterranean Basin – including Portugal, Spain, southern France, Italy, Slovenia, Greece, Malta, Cyprus, Bulgaria and southern Romania – will be most affected by drought. Estimates put the reduction in annual rainfall at up to 40% of 1990 levels by the 2080s. Temperatures in this region will be an average of 4 to 5°C above today's levels.

Less precipitation and much warmer temperatures will lead to greater risks of water scarcity, droughts, heatwaves, forest fires and loss of species and ecosystems. Heat-related deaths alone could cause up to 55 additional deaths yearly per 100 000 people.

In western and Atlantic Europe – including the Benelux region, parts of France, northern Germany, the UK, Ireland and Denmark – storms and floods will become more frequent and there will be more intense precipitation. Temperatures will be between 2 and 3.5°C warmer than today.

Conditions in **northern Europe** will be similar, but with greater warming and precipitation increases of up to 40%, leading to greater risk of floods. While there is potential for cultivating new areas and crops in the longer growing season, forests could be harmed by these changes.

Annual mean temperature rises in **central and eastern Europe** are projected to be between 3 and 4°C above current levels, with more precipitation than today in winter but less in summer. Agriculture is expected to suffer from soil erosion, loss of soil organic matter, migration of pests and diseases, summer droughts and high temperatures, although it could benefit from longer growing seasons. Cold-related deaths could decrease in Poland and Romania but heat-related deaths may rise.

As today, temperature increases in the **Arctic** region are likely to be greater than anywhere else on Earth. This will result in accelerated melting of ocean and land ice and thawing of permafrost. Increasing flows of melt water into the northern Atlantic Ocean could severely disrupt the Atlantic's circulation patterns. Today the maximum area covered by permafrost each year has already shrunk by 7% since 1990.



The changes to vulnerable **marine areas, coastal zones, river basins** and **mountain regions** will impact on the structure and function of ecosystems and lead to the extinction of many species.

Floods are already Europe's costliest natural catastrophe in terms of insurance payouts. By the 2080s, the total cost of damage could rise by as much as 40% in the upper Danube and 19% for the River Meuse. Many industrial and power generation plants are located near rivers, so there is the risk not only of environmental contamination from spills of harmful substances but also of reduced competitiveness.

Temperature increases in the Alps are already twice the global average. The thawing of snow and permafrost and the spectacular retreat of glaciers will further reduce the 'water tower' function of mountains, heightening the risk of floods in winter and spring and of water scarcity in summer.

Looking further into the future, a predicted rise in global sea levels of up to 80 centimetres above pre-industrial levels by 2100 will change the shape of coastlines and lead to flooding and more underground salt-water intrusion. Low-lying areas and river deltas are at greatest risk.

A more devastating long-term threat is the complete collapse of the Greenland ice sheet, which would cause a 7-metre sea-level rise over the coming centuries - a scenario that could destroy major cities including London and Amsterdam.

How industry and services sectors can respond

Companies in all sectors will have to adapt to climate change, but there are also opportunities to offer new products and services to assist this process. For example, there is a whole new market for climate-proof building techniques, materials and products.

The insurance sector could develop new products for reducing risks and vulnerability before disasters strike. Insurance premiums anticipating climate change could provide incentives for private adaptation measures.

Climate change will have a direct effect on the travel industry. For instance it may shift the focus of tourism in the Mediterranean from summer to spring and autumn - or even to northern Europe and the Baltic. Northern Europe, however, will be affected by coastal erosion, as much of its coastline is vulnerable to the predicted sea level rise.

Less snowfall in mountainous regions such as the Alps hurts the skiing industry. Adaptation responses include moving ski areas to higher altitudes and using protective sheets to slow down the melting of glaciers.

In the agricultural sector, heat waves, droughts and pests will seriously affect crop yields and food supply, adding to other pressures on the sector such as declining rural populations. This implies the need to adapt farm management practices.



The need to address increased migration



Global warming could create a new class of 'climate change refugees' forced to leave their homes for lack of water and food, especially in Africa, Latin America and Asia.

Some groups estimate that more than 1 billion people may be forced to move between now and 2050 in a dire global crisis with more far-reaching consequences than the aftermath of World War II.

This huge displacement of people is likely to lead to conflict and disputes over land as they try to settle elsewhere, for example near reliable water supplies. Many may move from harvest-depleted rural areas into cities, putting a greater strain on energy supplies and other resources there.

An early response is essential



Early action to adapt to climate change will prevent potential damage and minimise threats to human health, economic development, property, infrastructure and ecosystems. Lives will be saved and the costs of climate change reduced.

Sufficient knowledge about the timeframe within which climate change impacts will occur is important when setting priorities. The exact level and speed of temperature increase is uncertain and will depend in large part on the global action to reduce greenhouse gas emissions taken over the next few decades.

Estimates from the 2006 Stern Review of the economics of climate change suggest that with a 3-4°C average temperature increase, adapting infrastructure and buildings to cope with climate change could cost up to 10% of total construction costs in OECD countries – a bill of up to €110 billion annually. These costs will be higher if temperatures are allowed to increase by even more.

The threat from sea-level rise illustrates the advantages of early action. The cost of building additional flood defences is estimated at up to four times less than the damage that sea level rise will cause by the 2080s.

Without early policy action on adaptation, the EU and its Member States may be forced into sudden and reactive measures in response to increasingly frequent crises and disasters. This will not only prove much more expensive than planning ahead, but will also hurt Europe's economy, social stability and security.

Action is needed at all levels

Adaptation is a complex challenge because the severity of climate change impacts varies widely from region to region. The impacts depend on such factors as regions' physical vulnerability, degree of socio-economic development, natural and human adaptive capacity, health services and disaster-surveillance mechanisms.

Action on adaptation is needed at all levels of administration – local, regional, national, European and international – and requires the involvement of public authorities, the private sector and individuals.

Individuals

There are many ways in which we as individuals can protect ourselves and our property against climate change. For instance, increasingly we may want to take account of climate change impacts like heatwaves and drought when choosing where and how to build a new home or how to renovate existing buildings to make them more resilient.

Training courses in “climate proofing” buildings are now available to architects. If building a home ourselves, we should avoid constructing on floodplains or putting in a basement if the house is in a low-lying area that could flood.

Regional and local action

Being most familiar with local conditions, local authorities have a key role to play in enabling people to adapt to climate change on the ground.

Local authorities can, for example, work with farmers to prevent erosion and mud streams from reaching houses and settlements. In southern Europe, some towns have cooperated with farmers on water-saving initiatives through electronic management-and-distribution systems for crop irrigation.

Minimum requirements for spatial planning, land use and land-use change, with respect to adaptation, could play a key role in raising awareness of the need for adaptation among decision-makers, economic actors and the public. Technical guidance documents, exchange of case studies and sharing of good practice could prove useful tools in this regard. The EU could provide support to regions that work together on adaptation.

National governments

The incidence of major disasters, including fires, landslides, heatwaves and floods, is expected to increase as a result of climate change. Action at national level is therefore needed to improve disaster and crisis management and develop strategies for climate change adaptation where they do not yet exist.

Disaster prevention, preparedness, early action, response and recovery should be made top priorities and underpinned by disaster prevention strategies and alerts at national and EU levels with the assistance of satellite-based Earth-observation tools.

Experience and expertise in developing adaptation strategies and implementing policies remains limited. EU Member States, regions, municipalities and communities could overcome this information gap by sharing information and best practice on adaptive response measures.

Countries could map out vulnerable areas according to environmental, health, economic and social impacts. Experience and good practice, including contingency planning, could be shared between different countries and regions.

The weakest members of society will be most affected by the impacts of climate change. Young children and the elderly are most vulnerable to heatwaves, for example, while the poorest are most vulnerable to increases in food prices which are likely to occur as a result of water scarcity and droughts. Authorities need to pay close attention to the social aspects of adaptation, such as effects on living and housing conditions and threats to employment caused by climate-related industrial restructuring.



Some important considerations for local authorities

- Does local planning take account of the increased risk of natural disasters such as fires, flash floods, landslides and heat waves? Are contingency plans, including evacuation plans, in place?
- Are local planning and building regulations adequately addressing increased flood risks in identified flood zones?
- Are road surfaces able to cope with greater heat and more flooding?
- Do medical staffing plans for the summer take into account the potential for heatwaves? And are contingency plans in place to protect the elderly and other vulnerable groups during heatwaves, such as 'cooling centres' where they can escape the heat?
- Are public transport and riverside dwellings adequately insulated against floods? Is transport infrastructure climate-proof?
- Is the electricity grid equipped to handle additional demand, for example during longer, hotter summers? Is there an information campaign to encourage citizens to waste less electricity and water?



Areas for action at European level



Vulnerability to climate change and the severity of its impacts will be unevenly distributed, so adaptation efforts need to be based on the principle of solidarity between regions, between Member States and between the EU and third countries.

There are clear benefits to approaching adaptation in an integrated, coordinated manner at EU level. Climate change impacts will not respect administrative or geographical borders and therefore cross-boundary solutions are needed when it comes, for instance, to handling climate-related security issues, managing river basins and protecting ecosystems and wildlife.

An EU-wide approach also makes sense given that many sectors – for example agriculture, water, fisheries and energy networks – are largely integrated through the single market and common policies. EU spending programmes on regional and rural development, research and other areas should also have an adaptation dimension.

Adaptation is largely a question of political coherence, forward planning and consistent and coordinated action. However, a 'one-size-fits-all' approach is not the answer since different areas face different challenges. Where possible, action at local, regional and national level should be coordinated.

It is essential that these different administrative levels share their experience from early action and results from research. Adaptation will require solidarity among Member States so that poorer regions and those hit hardest by climate change can respond accordingly.

The EU should show how all its policies can take adaptation into account. By doing this, it will set an example and be able to intensify co-operation with international partners in responding to the global threat climate change poses.

In June 2007 the European Commission published a discussion paper ('Green Paper')¹ on adaptation to climate change in order to raise awareness of the need for action in Europe and stimulate debate about priorities.



The paper suggests EU-level action to integrate climate change adaptation needs into the EU's domestic and external policies, improve knowledge about impacts through further research and involve civil society and stakeholders in the development of adaptation strategies.

On the basis of responses received from a broad public consultation on the paper, the Commission aims to propose more concrete EU policy orientations for adaptation to climate change in a White Paper scheduled for publication by the end of 2008.

The need for adaptation in the energy sector

Climate change will bring longer, drier summers to some areas, which could put a strain on several sources of energy. A smaller volume of water flow, for example, restricts the ability of hydroelectric power stations to produce energy and depletes cooling resources for nuclear plants.

Hotter summer temperatures due to climate change will also lead to more use of air-conditioning to cool offices and homes. This could create heavy temporary demand for electricity, as well as adding to greenhouse gas emissions.

Concerns such as these underscore the need to rethink and restructure energy supplies, develop renewable energy sources such as wind and solar power, and strengthen the electricity grid to cope with greater fluctuations in demand.

1) *Adaptation to climate change in Europe - options for EU action*. Green Paper from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions. COM(2007) 354 final.



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