



Catalysing change

The UNECE response to the climate countdown



United Nations

About UNECE

The United Nations Economic Commission for Europe (UNECE) is one of five regional commissions of the United Nations. Its major aim is to promote pan-European economic integration.

UNECE has 56 member States located in the European Union, non-EU Western and Eastern Europe, South-Eastern Europe, the Commonwealth of Independent States (CIS) and North America. However, all interested United Nations Member States may participate in its work. Numerous international and non-governmental organizations take part in UNECE activities.

With other global players and key stakeholders, notably the business community, UNECE gives a regional focus to United Nations global mandates such as on climate change. UNECE also sets norms and standards, and its conventions facilitate international cooperation within and outside the region.

Acknowledgements

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Catalysing change

**The United Nations Economic Commission for Europe
responds to the climate countdown**

Foreword

Ban Ki-Moon

*Secretary-General
of the United Nations*



Evidence is mounting that climate change will come faster and sooner. Climate scientists are predicting greater warming, more droughts, heat-waves and flooding, with economy-wide impacts across many sectors. Feedback effects could hamper or undermine our best attempts to reduce greenhouse gas emissions.

The world is in the midst of the greatest economic and financial upheaval in many decades. That crisis is placing great pressure on domestic budgets. However, we should recognize that with crisis comes opportunity. Economic stimulus packages that include a strong focus on clean energy and environmentally friendly initiatives can chart a safer, more sustainable path that protects people and the planet while catalysing global green growth.

The United Nations Economic Commission for Europe (UNECE) region, which spans 56 countries, has a pivotal role to play. It is a leader in efforts to combat climate change, and possesses both advanced technologies and considerable financial resources.

The UNECE itself, with its regional knowledge, experience and networks, is well placed to make important contributions. Its Regional Coordination Mechanism recently created a working group on climate change to design a plan for adaptation and mitigation. The UNECE also supports the implementation of existing agreements on climate change, and will define a regional road map to advance the outcomes of the ongoing negotiations under the auspices of the United Nations Framework Convention on Climate Change.

These and other regional efforts are often overlooked. This publication summarizes the impact of climate change in the UNECE region and the main steps being taken to address it. It also showcases the work of UNECE in the areas of energy efficiency, lower-emission vehicles and sustainable forestry and buildings. I commend its information and analysis to a regional and global audience.

A handwritten signature in black ink that reads "Ki Moon Ban". The signature is written in a cursive, flowing style.

Preface

Ján Kubiš

*Executive Secretary
UNECE*



The unprecedented challenge of climate change is already present and visible in UNECE member States. Although in a direct sense it manifests itself, inter alia, through increased warming, floods, melting permafrost, droughts, water stress and desertification, climate change is part of the more complex challenge of sustainable development. These climatic developments are set to continue, leading to the increased vulnerability of many nations, with largely negative consequences for individual human beings and their well-being in the decades to come.

The UNECE region is a natural front-runner in the climate change debate. Most of the developed countries that are Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are situated in the region; they are therefore committed to binding greenhouse gas emissions reduction targets for the period up to 2012. Many UNECE member States have adopted national, regional or collective commitments to cut emissions that are ambitious and far-reaching in their scope. The region's countries will also be central to the financing and diffusion of environmentally sound technologies to developing countries that are Parties to UNFCCC.

This is a big agenda for the region, and it will be an enormous challenge to deliver it in time to quash the threat that climate change poses, and the multi-faceted economic, social and environmental impacts it will have.

UNECE member States support the UNFCCC process and are requesting that the United Nations system, including UNECE, engages in the implementation of the results agreed in Copenhagen. Based on its diverse and specialized mandate, UNECE covers many key areas relevant to mitigating or adapting to climate change. These include sustainable energy, transport, buildings, forestry, integrated water management and public participation. Its sectoral work, its development of relevant norms and standards, and its multilateral environmental agreements are all important pillars that strengthen national, regional and global efforts to confront climate change. As one of the United Nations regional commissions, UNECE acts as a convener of regional action on climate change.

Building on our existing climate change efforts, we will continue to use our sectoral mechanisms and instruments, and work with our stakeholders to achieve a durable response to the climate change threat in our region.

A handwritten signature in black ink that reads "J. Kubiš". The signature is written in a cursive, flowing style.



the global context

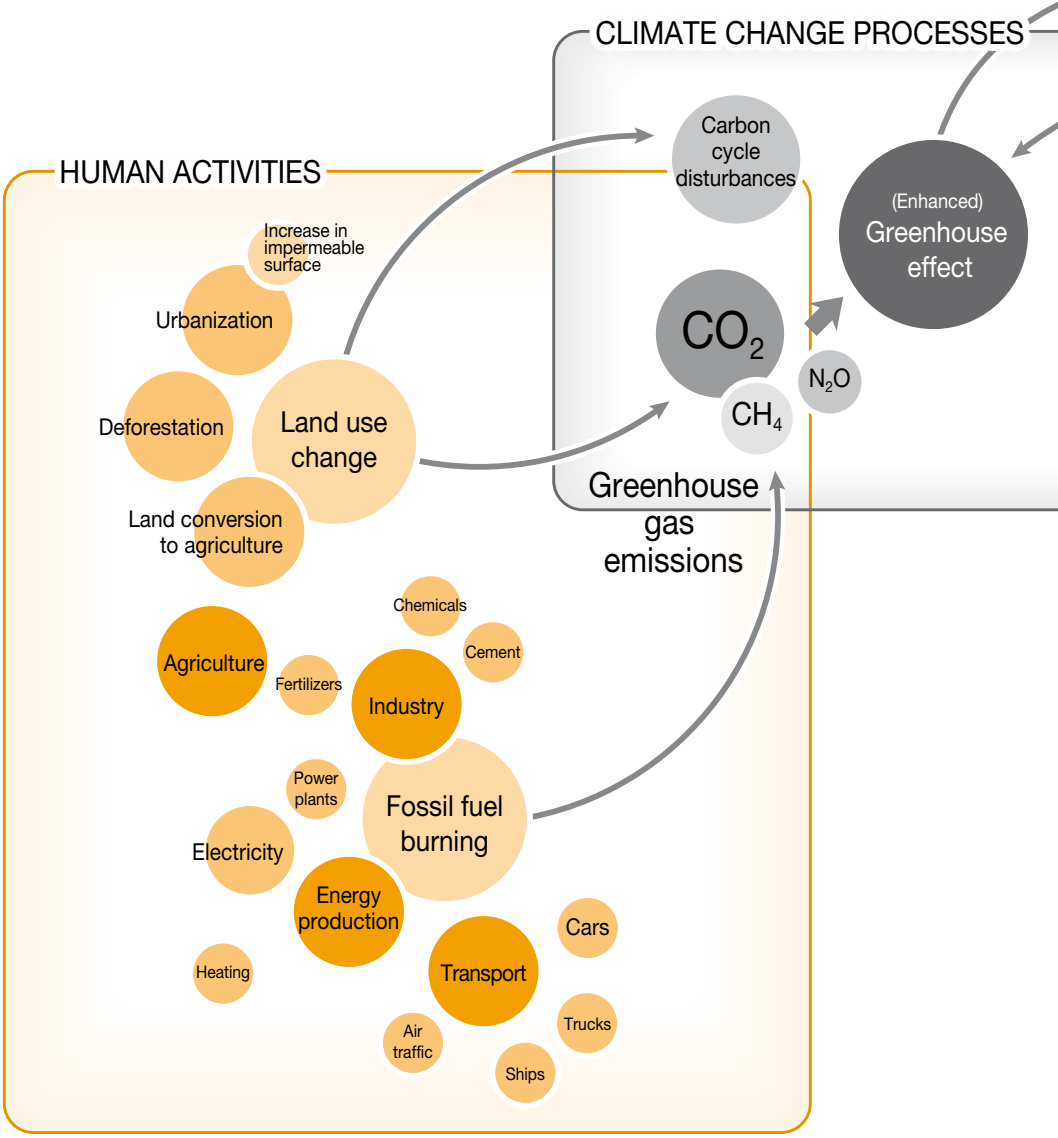
We are living in an era of climate change, caused by human activity adding to natural climate variability. Daily, we emit greenhouse gases such as carbon dioxide, nitrous oxide, methane and fluorocarbons that are altering the composition of the atmosphere and changing our climate, leading to global warming.

In its Fourth Assessment Report (November 2007), the Intergovernmental Panel on Climate Change—which reviews and assesses scientific, technical and socio-economic data and developments related to climate change—laid to rest any doubts that climate change is occurring and that it is caused by man. Many key climate indicators are already moving rapidly beyond the natural variability patterns they have exhibited over the last half a million years at least. These include increases in global average surface temperature, global ocean temperatures, diminishing Arctic sea ice, sea-level rise, heavier precipitation, greater acidification of our oceans and more frequent and severe extreme weather events.

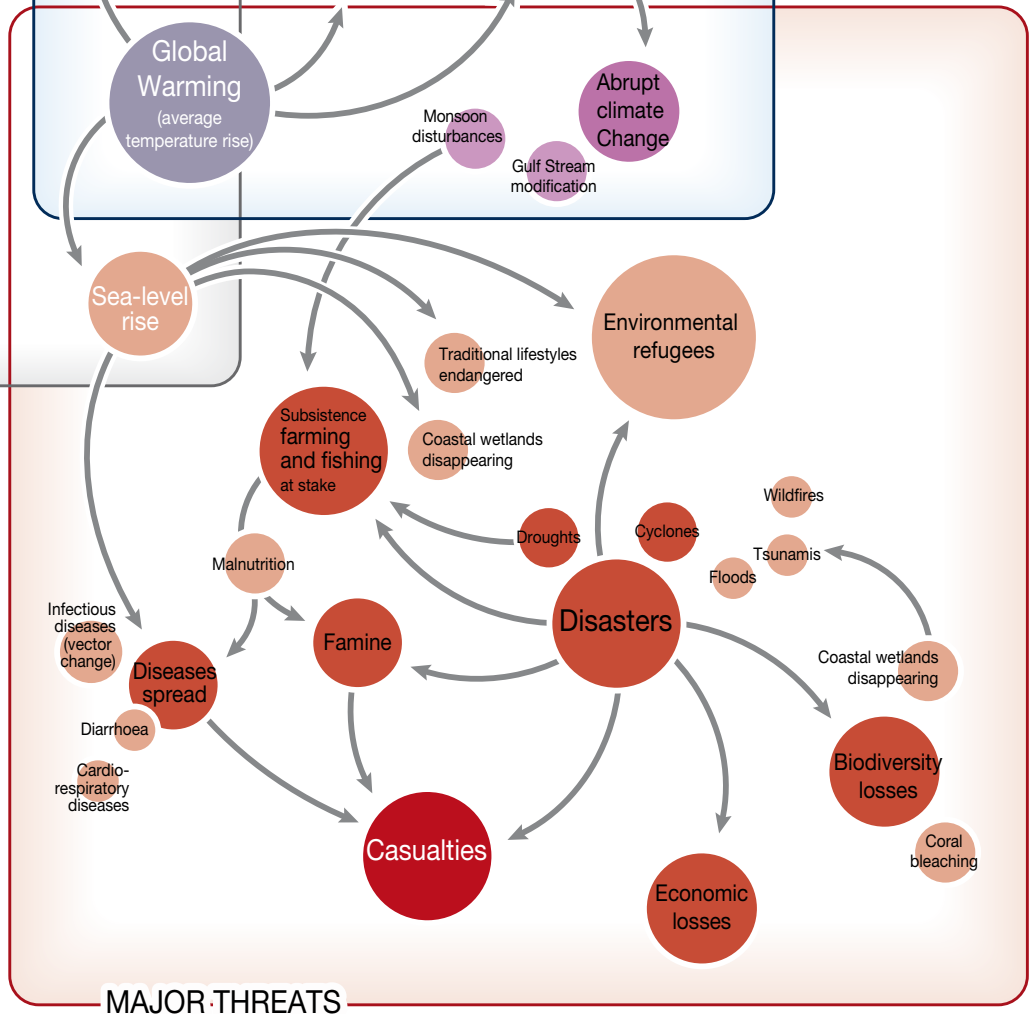
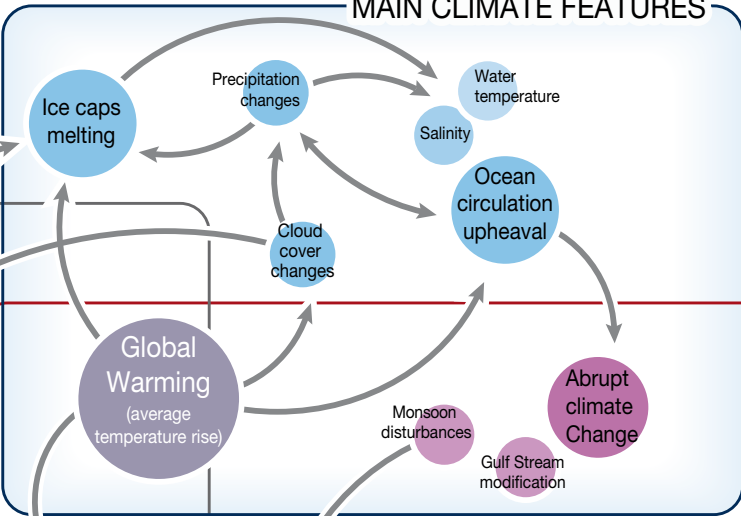
New research based on increasingly sophisticated models and data continues to reveal further causes for concern. The *Climate Change Science Compendium 2009* found that climate change will come faster and sooner: for example, arctic ice mass and mountain glaciers are melting much faster than previously predicted. Scientists now believe that summer Arctic Sea ice could disappear entirely within the next decade or two. There will be more hot extremes, more heatwaves, heavier precipitation and stronger tropical cyclones. Water resources will decrease in many semi-arid areas such as the Mediterranean basin and the western United States in the United Nations Economic Commission for Europe (UNECE) region. Up to 30 per cent of animal and plant species will be at risk if global warming exceeds 1.5 to 2.5°C. And scientists are becoming more confident about their climate change forecasts, too.

In addition to these gradual changes, there is concern that our climate system could pass significant tipping points—critical thresholds at which small changes can alter the state or development of the climatic system and accelerate climate change, with grave consequences for the environment. Once these tipping points occur, the warming process is reinforced

Climate change global processes and effects



MAIN CLIMATE FEATURES



MAJOR THREATS

by feedback mechanisms that could render ineffective any attempts we make to cut back on carbon emissions.

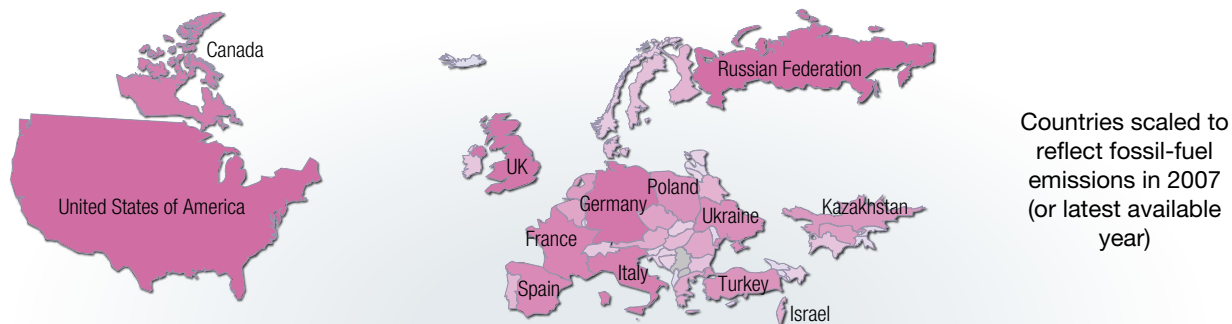
Allowing global warming to take its course is therefore being exposed as an increasingly risky gamble.

In parallel, the burden on the environment from human activities is increasing. Global warming is mainly caused by emissions of greenhouse gases from our daily activities. Greater economic and population growth have and will continue to be major determinants of global greenhouse gas emissions, while the energy intensity of production and the carbon intensity of energy remain too high in many countries. In the 1990s, global carbon dioxide emissions increased by 1 per cent each year. Since 2000, however, they have been growing at a rate of 3 per cent per year, an annual rate which would see emissions doubling every 25 years. Further, there is evidence that the efficiency of natural carbon dioxide sinks (such as forests, which neutralize anthropogenic emissions) is declining by approximately 5 per cent every year.

The region covered by the UNECE—which spans North America, Europe, Caucasus, Central Asia, and Israel—has a pivotal role in the climate change debate. Not only has this region historically been a large emitter of greenhouse gases that cause global warming—it currently accounts for around half of global greenhouse gas emissions—but it will be particularly affected by a changing climate. On the positive side, the region is also leading global efforts to combat climate change.

As a convenor to support global, regional and national action on climate change in the pan-European region, UNECE has focused many of its activities on addressing climate change. At its sixty-third session in 2009, the Economic Commission for Europe discussed the ongoing work of UNECE in climate change mitigation and adaptation and highlighted areas of work for possible future development. Its Regional Coordination Mechanism recently created a working group on climate change to design a regional action plan for climate change adaptation and mitigation, to prepare a United Nations-wide regional road map for the implementation of the outcome of the Framework Convention on Climate Change's

UNECE members: 47 per cent of carbon dioxide emissions from 18 per cent of the world's population




Other countries: 53 per cent of carbon dioxide emissions from 82 per cent of the world's population



Source: CDIAC/ORNL (annual carbon dioxide emissions from fossil fuels) and World Development Indicators.

fifteenth Conference of Parties, and to exchange information on financing, adaptation, mitigation and advocacy work.

UNECE is helping to fulfil the Secretary-General's vision that the "United Nations system will continue ... to bring to bear the collective strength of all its entities as an integral part of the international community's response to climate change". UNECE has also spearheaded the region's efforts to achieve the United Nations Millennium Development Goals, in particular to integrate the principles of sustainable development into country policies and programmes and to reverse the losses of environmental resources.

An aerial photograph of the UNECE region, showing the Arctic and surrounding landmasses. The water bodies, including the Arctic Ocean, Barents Sea, and various inland lakes and rivers, are highlighted in a vibrant green color. The surrounding land is shown in natural brown and tan tones, with some white patches indicating snow or ice. The text is overlaid on the lower portion of the map.

**the effects of global
warming on
the UNECE region**

Climate change is already occurring across the region. According to the IPCC Fourth Assessment Report, over the past century the region has experienced warming of the scale of 1 to 3°C, record-breaking heatwaves (May 2005), more intense rains, floods, droughts, a rise in permafrost temperatures reaching up to 0.6°C per year over the last half a century, and higher sea levels.

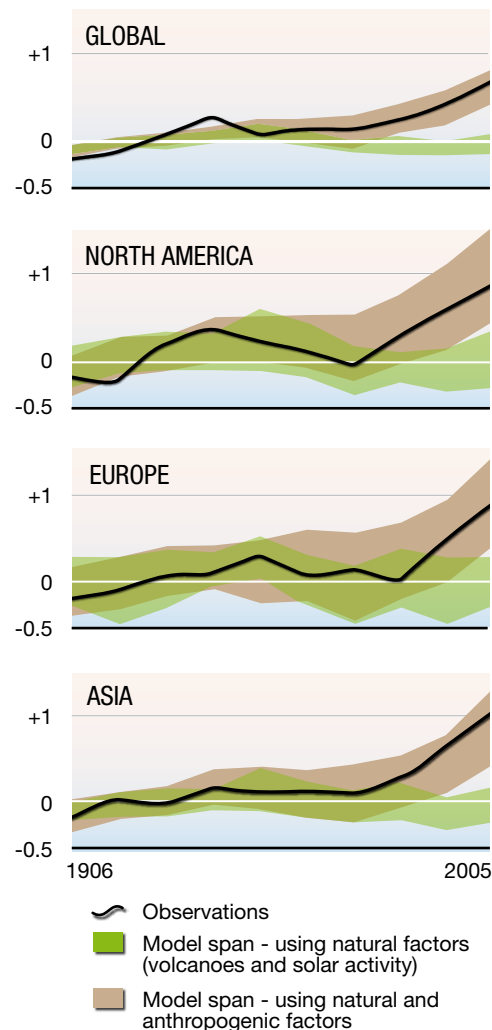
According to modelling predictions of the Fourth Assessment Report, these trends are expected to be exacerbated throughout the region in the twenty-first century. In general, warming in the region is projected to continue at a rate somewhat greater than the global average. Changes in annual precipitation—in the form of rain, snow, sleet or dew—will lead to wet areas getting wetter, while dry areas will become dryer. Summer droughts and heatwaves will be more likely, more intense and longer in Central Europe and in the Mediterranean basin. The snow season will become shorter and snow depth will decrease.

In Europe, the Fourth Assessment Report of IPCC forecasts that annual average warming in 2080 to 2099 will be between 2.2 to 5.3°C as compared to the period 1980–1999. For Central Asia, warming is projected to be 3.7°C. While most regions of North America will warm by a projected 2 to 3°C, northern regions are expected to be hardest hit by winter warming, with projected temperature increases of 10°C.

Annual precipitation is projected to increase by up to 16 per cent in Northern Europe, especially in winter, but to decrease by between 4 and 27 per cent in the Mediterranean area. In Central Asia, summer precipitation will drop by up to 13 per cent, most markedly in the western part of the subregion, while in the winter it will increase by

Observed and modelled temperature change: 1906-2005

Temperature trends relative to 1901-1950 average (°C)



The model spans in the figure represent the 5 to 95 per cent range for 19 simulations from 5 models (green) and 58 simulations from 14 models (brown)

Source: IPCC.

North America

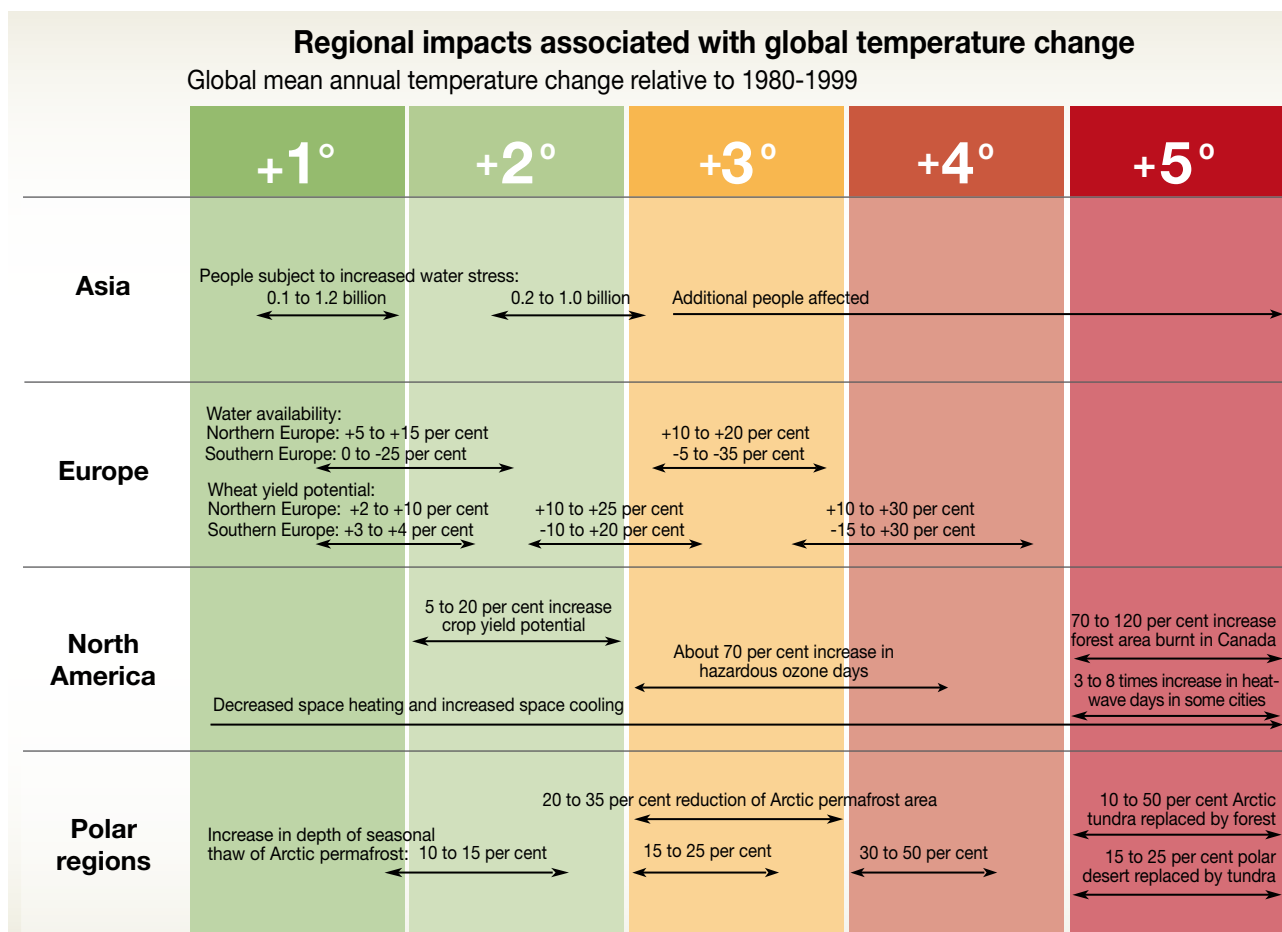
Climate change impacts 2050 and beyond



Sources: IPCC 2007, World Resources Institute 2007, Rogers and Randolph 2000, Klein et al. 2002.

around 4 per cent. Similarly, precipitation will be around 20 per cent greater in Canada and the north-eastern United States, but lower in the south-western U.S.

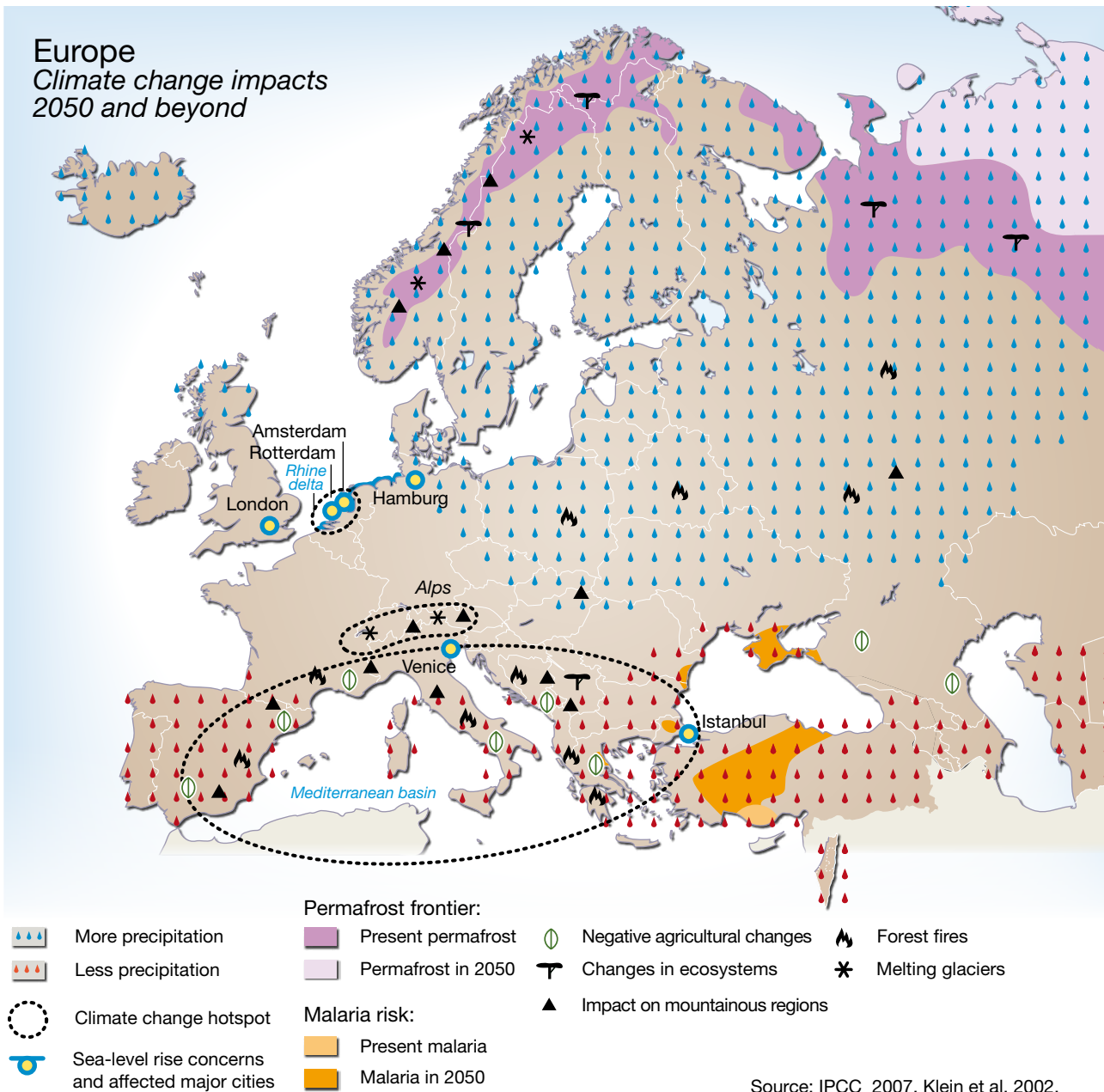
Summer droughts and heatwaves will be more likely, more intense and longer in central Europe and in the Mediterranean, rendering the entire region and especially the southern part of the region even more vulnerable to water stress and desertification. The snow season will become shorter and snow depth will decrease, although this may not affect the coldest peaks of Europe.



Note: Impacts will vary by extent of adaptation, rate of temperature change and socio-economic pathway.
Source: IPCC.

Europe

Climate change impacts 2050 and beyond



Source: IPCC 2007, Klein et al. 2002.

Asia
Climate change impacts
2050 and beyond



Source: IPCC 2007, Klein et al. 2002.

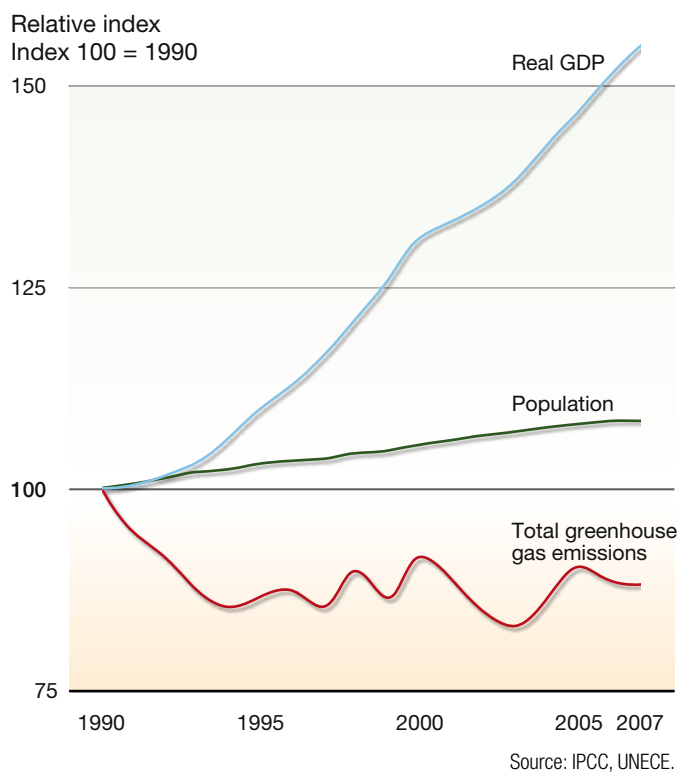
Global warming in the region will have impacts on access to water resources, food and agriculture, ecosystems, and human health and settlements. These impacts will be wide-ranging. For example, with water management in Europe, two major challenges will be increasing water stress and risk of floods across most of the continent, with consequences for ecosystems, agriculture and food security, buildings and infrastructure, and health. Water availability will rise in cold regions where rainfall is higher. However, reduced rainfall and the loss of water from snow melt will result in greater water scarcity in hotter areas. In Southern Europe, summer water availability could drop by as much as 30 per cent at 2°C warming. The subregion could also experience decreases in its hydropower potential, summer tourism and crop productivity. Heatwaves and more wildfires will increase health risks. The West Coast of United States could experience a more erratic water supply, with greater water stress leading to substantial declines in crop yields. More northern latitudes—including Canada, the Russian Federation and Northern Europe—could initially see an increase in crop yields, but this is expected

to be short-lived as warming progresses.

The graph on this page shows total greenhouse gas emissions in most of UNECE region (for which data were available), and the growth path of real GDP and population since 1990. In the first half of the 1990s, the huge decline in economic output in the former Soviet bloc at the outset of transition caused greenhouse gas emissions to decline by 5.2 per cent per annum for a decade. Since 1995, total emissions of greenhouse gases across the region have been rising slowly, despite the region's rapid growth increasing by around 5 per cent over the decade up to 2005 due to efforts by some countries in the region to seriously curb emissions.

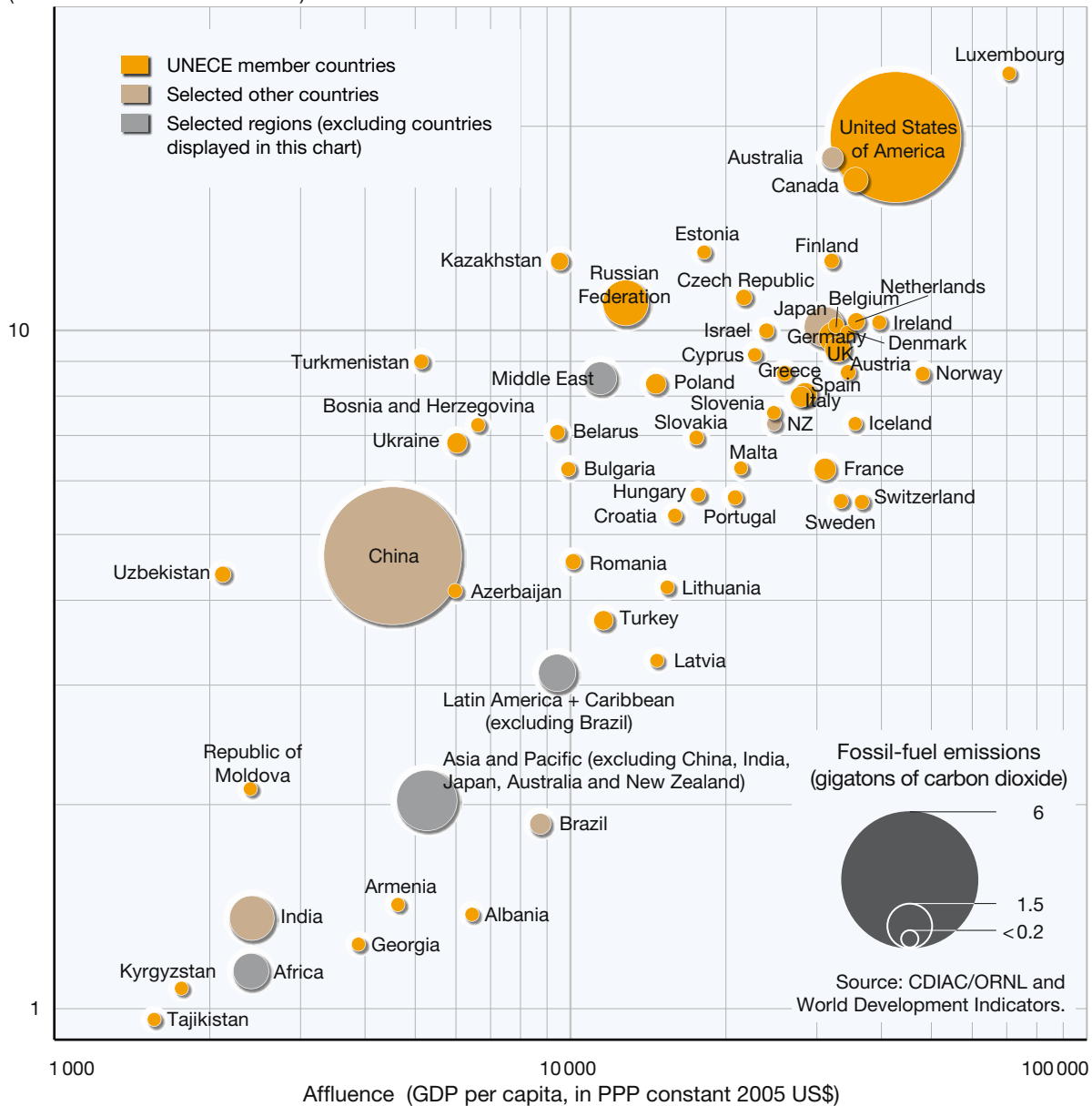
In 2007, total measured greenhouse gas emissions from the region, which make up the bulk of Annex I countries under the United Nations Framework Convention on Climate Change, reached 14.38 gigatons of carbon dioxide equivalent. At the same time, population growth has been flat, while economic output has been growing steadily, increasing by 34 per cent between 1995 and 2005.

Greenhouse gas emissions, GDP and population, 1990-2007



Relationship between emissions and affluence

Fossil-fuel emissions per capita
(metric tons of carbon dioxide)



The image shows two tall, grey industrial smokestacks. Each stack is topped with a metal cage-like structure. Large, billowing plumes of white smoke or steam rise from the stacks, filling much of the frame. The background is a clear, bright blue sky with some light, wispy clouds. The overall scene suggests industrial activity and its environmental impact.

**regional response to
the climate challenge**

Since 1992, when the international community negotiated the United Nations Framework Convention on Climate Change at the United Nations Conference on Environment and Development, a major step towards managing climate change, the region has led the global effort to reduce greenhouse gas emissions. The stated aim of the Convention is to stabilize greenhouse gas levels in the atmosphere to prevent “dangerous anthropogenic interference with the climate system”. Fifty-four of the 56 member States of UNECE are Parties to the Convention.

In 1997, the Convention’s Kyoto Protocol defined binding emissions reductions targets for industrialized countries for the period 2008–2012. It entered into force in 2005. A five-year commitment period, rather than a single year-deadline, allows countries to achieve their obligations averaged out over the five years. Thirty-seven countries in the region have committed to emissions reductions targets up to 2012.

The Kyoto Protocol has been instrumental in prompting countries to shift from voluntary aims to reduce greenhouse gas emissions to an agreement that Annex I Parties to adopt specific, legally binding targets to limit or reduce their emissions. Individual targets for Annex I Parties, shown in the table below, range from an 8 per cent reduction for the European Union as a whole, to a 1 per cent increase for Norway, relative to the benchmark year.

Binding emissions targets under the Kyoto Protocol

Country	Target
EU-15, Bulgaria, Czech Republic, Estonia, Latvia, Liechtenstein, Lithuania, Monaco, Romania, Slovakia, Slovenia, Switzerland	-8 %
Canada, Hungary, Japan, Poland	-6 %
Croatia	-5 %
New Zealand, Russian Federation, Ukraine	0
Norway	+1 %
	2008–2012, relative to benchmark year

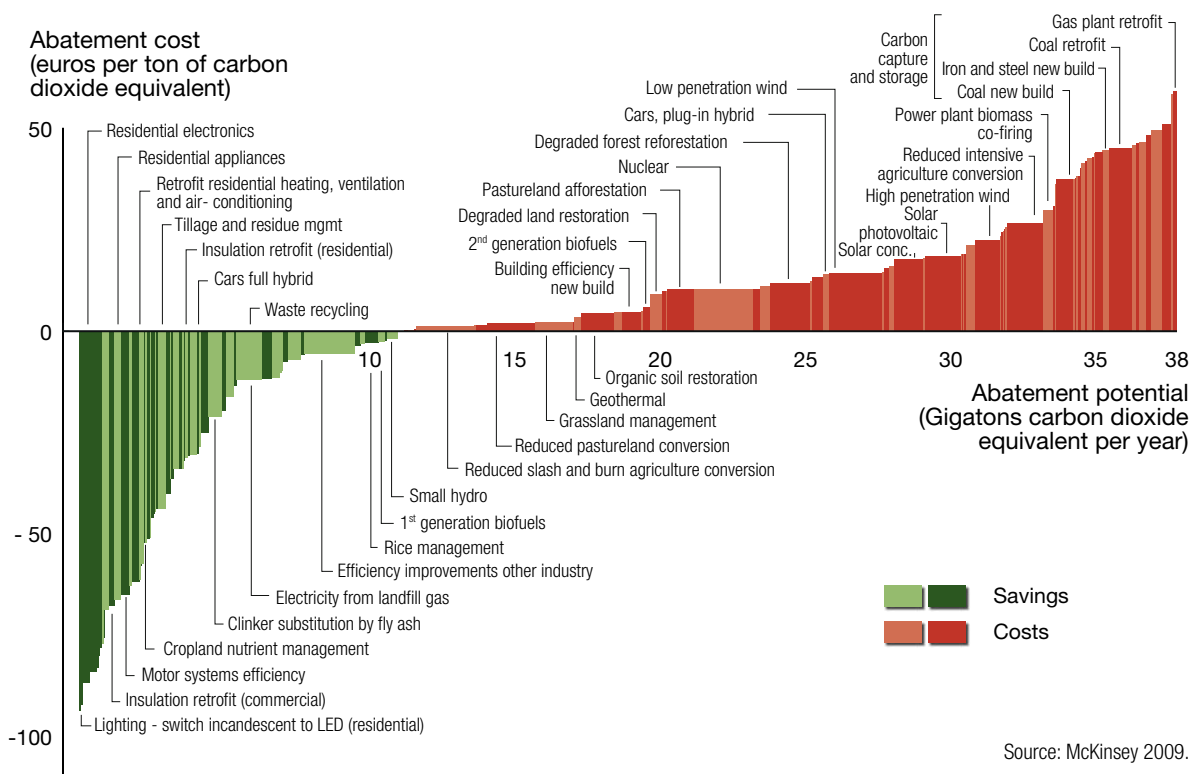
In addition to these binding targets, many initiatives have been adopted across the region that serve to curtail greenhouse gas emissions. In the European Union, these include the Emission Trading System, a cap-and-trade system which represents the largest existing carbon market in the world and currently covers 10,000 installations producing about half of the European Union's carbon dioxide emissions. The European Union's recent climate-energy legislative package is designed to achieve a 20 per cent reduction in greenhouse gases and a 20 per cent share of renewable energy in total energy consumption by 2020.

In North America, the Regional Greenhouse Gas Initiative, the first mandatory U.S. cap-and-trade system for carbon dioxide, was established in December 2005 and aims to reduce emissions by 10 per cent by 2018. The Western Climate Initiative seeks to reduce greenhouse gas emissions to 15 per cent below 2005 levels by 2020 and will cover 90 per cent of the region's emissions once fully implemented. Other key U.S. initiatives include a greenhouse gas emission limit for vehicles and a national standard for fuel in passenger vehicles. At the Federal level, the U.S. House of Representatives passed the American Clean Energy and Security Act, which would establish a greenhouse gas cap-and-trade system and measures to build a clean energy economy.

However, much more remains to be done if the region is to secure a low-carbon future. Huge abatement potential lies in the areas of energy efficiency, low-carbon energy supply, terrestrial carbon (agriculture, forestry), technology and behavioural change. The Global Abatement Cost Curve, developed by the consultancy McKinsey & Co., shows the cost in euros of reducing one ton of carbon dioxide equivalent through different measures, beyond a "business-as-usual" scenario. The graph's left-hand side shows that the highest potential for reductions exist in the building and transport sectors and from gaining electricity from refuse landfills (through methane capture), all highly relevant activities in the region.

The climate change mitigation and adaptation work of UNECE targets many of these areas—often referred to as “low-hanging fruit”—that can achieve large greenhouse gas reductions at a relatively lower cost than other measures. Its activities also address many of the major projected climatic impacts that will be felt across the region, such as water shortages and extreme weather events.

Global cost curve for greenhouse gas abatement measures, 2030



An aerial photograph of a modern residential building with a large array of blue solar panels installed on its roof. The building has a red and white facade and a balcony. The surrounding area is lush with green trees and a grassy lawn. In the background, a hillside with houses and a church spire is visible under a clear sky.

**onto a low carbon
pathway: mitigation
measures**

Reducing greenhouse gases and increasing energy efficiency

In 2004, the transport sector was responsible for roughly a quarter of world energy-related greenhouse gas emissions, with about three quarters coming from road vehicles. Over the past decade, greenhouse gas emissions in the transport sector have increased at a faster rate than any other energy-using sector. Trucks, not trains, still move most of the goods in Europe, and freight transport is set to grow even faster than passenger transport.

Improving energy efficiency in transport to mitigate greenhouse gas emissions holds great potential. The Fourth Assessment Report calculates that carbon emissions from light-duty road vehicles could be reduced by up to half by 2030 compared to currently produced models. This would rely on increased fuel economy through technological advances.

The United Nations Economic Commission for Europe is closely involved in efforts to green the transport sector. Its World Forum for the Harmonization of Vehicle Regulations is a unique global body for developing vehicle regulations. Two agreements on vehicle regulations (the 1958 and 1998 Agreements) adopted by the World Forum boast 53 Contracting Parties (including from the European Union) from five continents. These countries oversee the manufacture of more than four-fifths of vehicles worldwide.

The first global meeting of transport ministers in 2008 focused on the energy and climate change challenges relevant to the transport sector, especially carbon dioxide abatement through new, more fuel-efficient engine technologies, sustainable biofuels, improved transport infrastructure to ease road congestion, greater awareness of eco-driving and supporting legal instruments. They urged the World Forum to accelerate work on common methodologies, test cycles and measurement methods for vehicles, including carbon dioxide emissions.

In response, the World Forum has begun to develop harmonized global emissions tests for light vehicles and environmentally friendly vehicles.

The World Forum has established a number of climate change mitigation measures and is considering new requirements to improve fuel efficiency through new engine and vehicle technologies. It has considered a possible future emissions abatement strategy for the automotive sector up to 2040 which would encompass improved energy efficiency and the use of sustainable biofuels up to 2015, the development and market introduction of plug-in hybrid vehicles (2015–2025), and the development and market introduction of electric vehicles (2025–2040). To be effective, synergies with the energy sector are vital: results will be limited unless progress is made to attain environmentally sustainable and cost-effective electricity generation and hydrogen production.

The World Forum has already amended existing regulations to include a measurement method for vehicles' fuel consumption and carbon dioxide emissions, together with performance requirements for hybrid and electric vehicles, for biofuels and for alternative fuels such as liquid petroleum gas and compressed natural gas. Due to the complexity of hydrogen and fuel cell vehicles, the World Forum is currently developing new provisions on the installation of specific equipment in vehicles that use compressed or liquid hydrogen in their propulsion systems as well as on the safe storage of hydrogen in vehicles, including their crashworthiness as well as electric safety. The Forum expects to consider the first results on this area in 2012.

In the longer term, the World Forum will need to address some of the remaining challenges for the commercialization of electric vehicles. Currently, powerful rechargeable batteries are under development, but their weight and initial costs are still too high, the recharging time too long and their service lifetime too short, limiting the autonomy of electric cars to a range of only 200–300 km. A possible solution to improving electricity storage could be to transform it by hydrolysis to hydrogen, which could again be used for the propulsion of vehicles either by means of their combustion engine or fuel cells. In this case, the transportation of hydrogen and the infrastructure of refuelling service stations are the main challenges for which solutions will have to be developed, together with the safety and crashworthiness of such hydrogen and fuel cell vehicles.

UNECE is also working to minimize greenhouse gas emissions in the energy sector. The region is both a major energy producer as well as a consumer: it presides over 40 per cent of the world's natural gas reserves and 60 per cent of its coal reserves. The combustion of fossil fuels, the mainstay of the region's electricity generation, is a major source of greenhouse gas emissions.

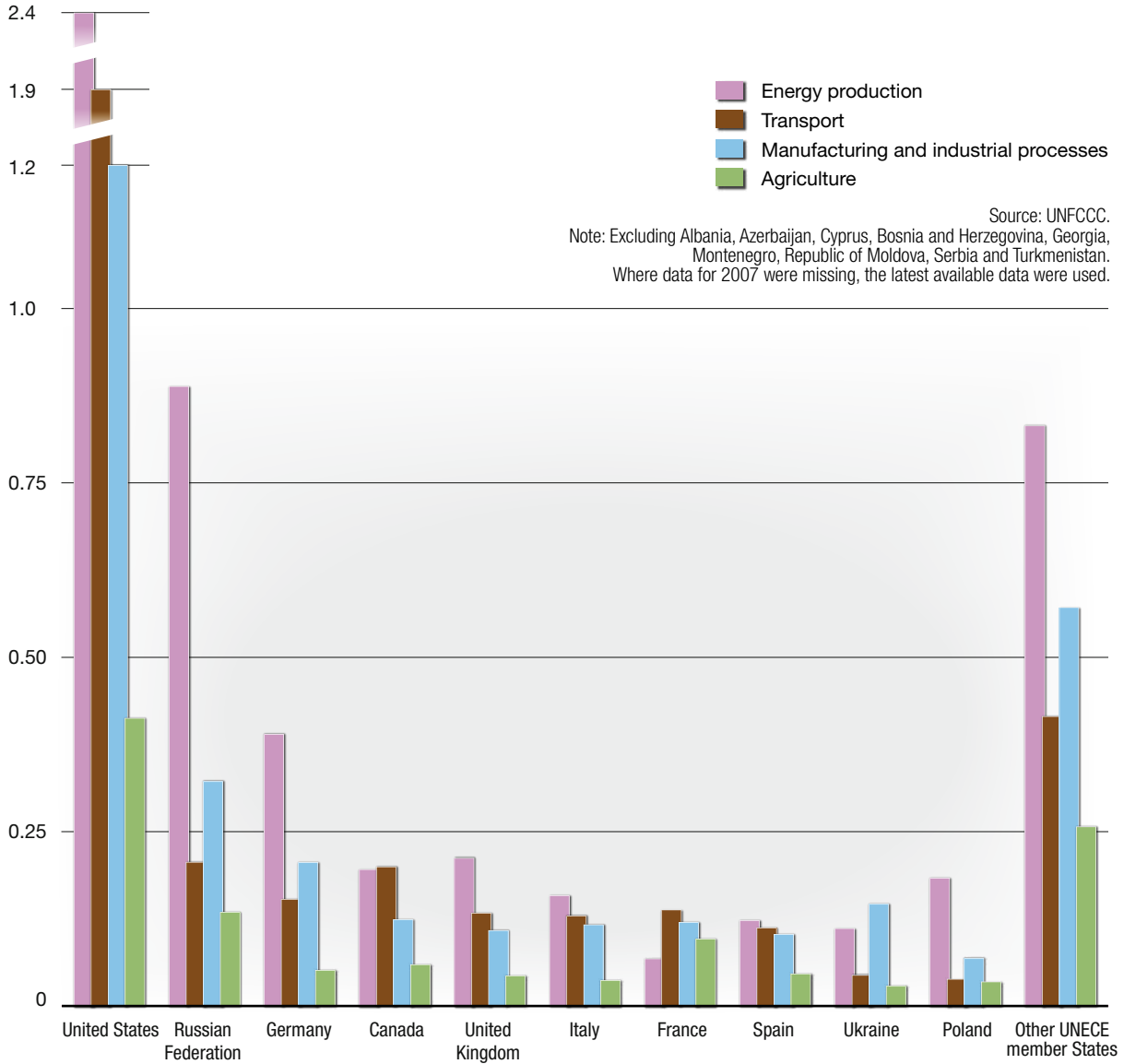
The sustainable energy projects of UNECE are helping to facilitate the transition to a more sustainable and secure energy future by improving operating efficiencies and energy conservation, including through energy restructuring and legal, regulatory and pricing reforms. They are also prompting the introduction of renewable energy sources and the use of natural gas while cleaner energy sources are being developed and made commercially available.

Energy efficiency can be achieved by focusing on more efficient production, conservation and the use of all energy sources to minimize greenhouse gas emissions. The Energy Efficiency 21 programme promotes regional cooperation to enhance countries' energy efficiency and reduce their greenhouse gas emissions, thus helping them to meet their obligations under multilateral environmental agreements. One Energy Efficiency 21 project, RENEUER, promotes sustainable development by overcoming regional barriers and creating favourable conditions for the introduction of advanced technologies, with a focus on the efficient use of local energy resources. The Global Energy Efficiency 21 project organizes outreach activities to other regional commissions in the context of energy efficiency for climate change mitigation. Its main goals are to create a systematic exchange of information on capacity-building, policy reform and project financing, to realize cost-effective energy efficiency improvements that will reduce air pollution, including greenhouse gases.

Other efforts include promoting the recovery and use of methane gas from coal mines (a very effective means to reduce emissions, as a reduction of one ton of methane yields reductions of 18 to 23 tons of carbon dioxide equivalent in the carbon markets), reviewing ways to produce cleaner electricity, and regulatory measures and incentives to promote

Greenhouse gas emissions by sector, 2007

Emissions
(gigatons of carbon
dioxide equivalent)



clean energy investment, including through carbon capture and storage technologies. Another area where efforts are being made to mitigate global warming focuses on improving the quality of our air. Air pollutants can either directly influence global warming by affecting the cooling or absorptive characteristics of the atmosphere, or influence it indirectly, for example through ozone formation. Cuts in black carbon, ozone and pollutants with a strong radiative forcing effect have considerable potential for lowering greenhouse gases in the short term. Recent studies have revealed important synergies between controlling air pollution and mitigating climate change, and have highlighted the economic and environmental co-benefits that are possible by tackling these issues in an integrated way.

The United Nations Economic Commission for Europe hosts the 1979 Convention on Long-range Transboundary Air Pollution, which aims to cut emissions of air pollutants such as sulphur dioxide and nitrogen oxides. The Convention now has 51 Parties and eight protocols that set national limits for various emissions.

The Convention's scientific bodies pursue four related activities. First, they monitor air quality, reporting and estimating emissions; in fact, the Convention's global monitoring network ranks as the largest of its kind. The reporting requirements of Parties to the Convention are harmonized with those of the United Nations Framework Convention on Climate Change. Second, the Convention uses models to analyse the environmental effects of air pollution and to calculate the necessary emission abatement and related costs. This makes it possible to find the most cost-effective strategies to achieve the desired environmental targets. Current models also measure synergies and trade-offs between emissions of air pollutants and greenhouse gases. Third, the Convention has a European network that tracks the effects of air pollution on a wide spectrum of areas, including water, forests, vegetation, buildings and human health. Finally, while keeping tabs on emissions, the Convention is also considering non-technical measures to curb emissions, such as ways to change behaviors at home, on the road and in the office.

Coal mine methane in the UNECE region

Coal mines are not only a major source of greenhouse gas emissions, but also a safety management challenge. By 2020, a total of 793 metric tons carbon dioxide equivalent of gas could be emitted from coal mines, over 95 per cent of which will come from underground mines. If international aspirations on climate change mitigation are to be achieved, these emissions must be reduced.

With UNECE member States producing 38 per cent of the world's coal and generating 40 per cent of coal mine methane emissions, successful project implementation will benefit the regional and global environment as well as the economies of the region. The main activities are related to the development and profitable recovery and use of coal mine methane and abandoned mine methane, with a specific focus on the three pillars of sustainable development: economic, social and environmental. As well as mitigating climate change, the recovery and use of coal mine methane improves mine safety and productivity, and generates revenues and cost savings.

The global coal mining industry is seen to lack a set of recommended principles and standards to guide mine operators, regulators, government officials and technical professionals in effectively managing the methane problem, especially in emerging economies. To address these gaps, the organizations supporting the initiative—the Methane to Markets Partnership, UNECE and the World Coal Institute—are contributing to the improvement of mine safety practices through the development of best practices for methane control. The report will detail the benefits, objectives and principles of coal mine methane drainage and utilization in order to reduce fatalities and injuries of mine workers, protect mine property, reduce greenhouse gas emissions and efficiently use valuable energy resources. The publication is expected to be ready in early 2010.

Residential and commercial buildings are another sector where substantial gains from achieving energy efficiency can be made relatively quickly and easily by reducing energy consumption and embodied energy in buildings. These savings can be realized by applying existing technologies for energy efficiency, which provide both reductions in carbon dioxide emissions and save on maintenance costs. Energy-efficient buildings can also be more resistant to the growing phenomenon of severe weather events.

The UNECE housing programme is geared to achieving maximal energy efficiency in the region's building stock. It acts as a forum in which countries can share experience and good practices with reducing energy consumption in the residential sector, both with existing building stock and new residential construction. This can improve energy performance in parts of the region where progress is hampered by limited capacity, a lack of knowledge about options to improve the thermal efficiency of existing buildings, and outdated building codes that prevent countries from embracing the latest energy-efficient construction techniques. Progress can already be seen in developments that range from solar energy for water and heat, to low-carbon construction, to high-efficiency lighting and appliances, to zero-energy and plus-energy buildings (the latter, for instance, return a surplus to the energy grid).

Sustainable land use and forests

The forest and timber sector contributes to climate change mitigation through carbon sequestration in forests, carbon storage in forests and harvested wood products, and through wood's potential to substitute for non-renewable construction materials such as plastics, steel or concrete. Forests store more than 80 per cent of terrestrial above-ground carbon and more than 70 per cent of the organic carbon in soil. They are also the source of wood energy that can substitute for fossil energy, thereby reducing greenhouse gas emissions.

The region's forests make up almost 40 per cent of global forests. Due to their size and the prevalence of sustainable management of forest, they are an important source of carbon removal and act as a natural carbon sink. In 2007, the volume of carbon dioxide removed from the atmosphere through the region's forests amounted to over 1.7 gigatons of carbon dioxide equivalent.

As part of its work on sustainable forest management, the UNECE Timber Committee monitors and analyses these trends and organizes policy forums to discuss how climate change is affecting the forest sector. The Committee collects basic data on forest resources (e.g. carbon sequestration and storage in forests) and the production of and trade in forest products (e.g. on harvested wood products and the substitution of wood for other more carbon-intensive materials). It reports on new approaches to sustainably managing forests and contributes to the *Forest Products Annual Market Review* on policy issues. Finally, the Timber Committee analyses wood availability and potential wood supply, two crucial aspects needed for policymaking with respect to climate change, renewable energy and the forest sector.

Future work by the Timber Committee will continue to build on its comparative advantage in areas such as data supply, analysing trends and policies, convening policy forums and exploring links with other sectors such as energy, human settlements and the environment. The ultimate objective is to provide policymakers with the tools necessary for informed decision-making, especially in terms of the necessary trade-offs between climate change efforts and forest goods and services.

Biomass enterprise development and trading

Related to this, UNECE has been directing a major cross-sectoral project for enterprises in the region's biomass sector. As one of the central tasks of climate change mitigation is to replace fossil fuels with alternative energy, the project aims to strengthen sustainable biomass supply from selected countries in the region to energy producers in the European Union. The focus is on agro- and wood residues, whose use is an important alternative to the use of (food) crops for fuel. The project also seeks to improve the logistics chain of biomass trade from producer to end-user, through improved inland transportation, port and trade logistics, and Customs cooperation on biomass imports and exports. It facilitates the exchange of good practice with the private sector and explores cross-sectoral approaches that take into account environment, energy, trade and transport issues.





**supporting adaptation
strategies**

Combating the threats of global warming requires more than just mitigation; it is equally important to reduce society's vulnerability to climate change through adaptation, as established by the United Nations Framework Convention on Climate Change's Nairobi work programme on impacts, vulnerability and adaptation to climate change, launched in 2005. Adaptation addresses the impacts of climate change, including climate variability and weather extremes, and seeks to reduce or minimize the risk of damage from climate change.

Integrated water resource management

Like the rest of the world, the UNECE region has become all too familiar with extreme weather events associated with climate change: droughts, flooding, heatwaves, melting glaciers, forest fires and crop damage. These phenomena have been coupled with water stress, particularly in the hotter countries of the region. Hydrometeorological records and climate projections provide abundant evidence that water resources are vulnerable and can be strongly affected by climate change, with wide-ranging consequences for human societies and ecosystems. Nevertheless, very few countries have developed adaptation strategies so far. The fact that in the region many water bodies cross boundaries means that risks and challenges are shared and that solutions need to be coordinated. Transboundary cooperation in developing adaptation strategies, however, is currently almost non-existent.

The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) is an important legal framework for the development of adaptation strategies, particularly in terms of helping countries work together to solve water-related issues.

The Convention's Parties recently completed the *Guidance on Water and Adaptation to Climate Change*. This marked the first attempt under any convention to frame a climate change adaptation strategy in the water sector with a particular emphasis on transboundary issues. The Guidance is based on the concept of integrated water resources management, which

seeks to coordinate the management of water, land and related resources, maximizing economic and social welfare equitably, yet without compromising the sustainability of ecosystems. Adopted in November 2009, the Guidance provides advice on how to assess the impacts of climate change on water quantity and quality, how to perform risk assessment (including to health), how to gauge vulnerability, and how to design and follow appropriate adaptation measures. Future work will focus on further boosting implementation and exchanging experiences through a programme of pilot projects and the creation of an information platform on adaptation of transboundary water management. Exchanging such experience is crucial to enhancing the adaptive capacity of countries both within the region and beyond.

Climate change also affects health, *inter alia* through the deterioration of water quality, the increase of disease, and the disruption of water supply and sanitation services arising from extreme weather events such as floods and droughts. The Convention's Protocol on Water and Health is the first legally binding instrument for the sustainable management of water resources and the reduction of water-related disease. It establishes joint or coordinated surveillance and early-warning systems, contingency plans, and mutual assistance to respond to outbreaks of water-related disease, especially those arising from extreme weather events related to climate change. Thus, the Protocol can be a powerful instrument for developing climate change adaptation strategies for health system managers, water resource managers and operators of collective systems. Work under the Protocol has focused on developing a guidance document on water supply and sanitation in extreme weather events. This project is expected to be completed by 2010.

Supporting design and implementation of adaptation strategies

As the Intergovernmental Panel on Climate Change has noted, climate change mitigation and adaptation need to be integrated into an overarching sustainable development strategy. Considering climate change impacts in development planning is important for boosting our capacity to adapt to it.

The UNECE Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) provides a framework for considering transboundary environmental impacts in national decision-making processes. The Convention's Protocol on Strategic Environment Assessment, not yet in force, will ensure that Parties integrate climate change considerations into their development plans and programmes at a very early planning stage.

Climate change can have a significant impact on public infrastructure and thus on the ability of Governments to provide public services to their citizens. Expected increased flooding and other climate change impacts mean that some existing infrastructure will be inadequate and that we will need novel, climate-proofed approaches when constructing new or maintaining already existing public infrastructure. Public-private partnerships are an important tools for developing infrastructure and providing public services. UNECE has a project to promote public-private partnerships for infrastructure development which ensures that sustainable development criteria are taken into account, thus supporting climate change adaptation.

A photograph of a dense forest with tall, thin trees and a dirt path leading through them. The trees are mostly deciduous with green leaves, and the path is a light brown color. The text "cross-sectoral activities" is overlaid in white, bold, sans-serif font at the bottom center of the image.

**cross-sectoral
activities**

UNECE pursues many other cross-sectoral programmes that strengthen both mitigation and adaptation. Two key activities are financial tools and multilateral environmental agreements.

Financing mitigation and adaptation and boosting technology transfer

Successful climate change mitigation and adaptation require fostering both financial and innovative capacity. Poorer countries in the region often lack access to the financing needed to adopt new technologies for emissions abatement or adaptation. Financial mechanisms that provide new sources of financing are therefore vital.

In line with the principle of “common but differentiated responsibility” and “respective capabilities” enshrined in the Framework Convention on Climate Change, the regions’ developed countries need to provide the financial, technical and policy support to enable other countries to make the transition to a low-carbon economy.

UNECE manages the Financing Energy Efficiency Investments for Climate Change Mitigation project, with a budget of some US\$ 7.5 million. The project seeks to promote an investment climate in which self-sustaining energy efficiency and renewable energy projects can be identified, developed, financed and implemented by local municipalities, factories and energy utilities. Participating countries include Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Kazakhstan, the Republic of Moldova, Romania, the Russian Federation, Serbia, the former Yugoslav Republic of Macedonia and Ukraine.

In the future, work on innovation and its related financing and intellectual property aspects will vitally inform climate change policy. UNECE conducts a policy dialogue in the region on how best to address climate change through innovation. It is also creating a supportive environment for the financing of eco-innovation, in particular that of early-stage

financing for innovative enterprises and the allocation of risk capital for eco-investment and policies needed to encourage private financing in this area. Through workshops and seminars, it explores how to enhance our understanding of technology diffusion, identifying possible barriers to take-up, and providing training and technical assistance to the region's Governments regarding their innovation policies.

Advocacy and access to information

Access to scientifically based information and public participation in decision-making on environmental issues are widely recognized as an important foundation for climate change action. The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention), with its Protocol on Pollutant Release and Transfer Registers, is the only legally binding instrument so far to implement principle 10 of the Rio Declaration on Environment and Development. The latter provides for the participation of citizens in environmental issues by giving them appropriate access to information on the environment held by public authorities, including access to judicial or administrative proceedings, redress and remedy.

UNECE plays an active role as well in publishing and disseminating relevant information on the environment and environmental issues, thus facilitating more informed policymaking. Its Environmental Performance Reviews, based on peer review, profile the state of the environment and environment-related institutions in specific countries in the region. They provide a comprehensive analysis of the context in which regional climate change mitigation and adaptation efforts are taking place, and are a way to share good practices and highlight gaps and a means to offer important policy recommendations.

Education for sustainable development is an essential way to shape knowledge and attitudes about climate change. The UNECE Strategy of Education for Sustainable Development, adopted by education and environment ministers from across the region, is working to integrate the

key themes of sustainable development into curricula at all levels. The Strategy constitutes the region's effort to implement the United Nations Decade of Education for Sustainable Development.

The Transport, Health and Environment Pan-European Programme, a joint programme of UNECE and the World Health Organization, works through awareness-raising to achieve more sustainable transport patterns and a better reflection of environmental and health concerns in transport policy. In particular, it promotes sustainable urban transport, including alternative modes of transport such as cycling and walking, in the region.

The global official statistics community still engages only in an ad hoc way with the issues of climate change. The Conference of European Statisticians is reviewing the possibility of setting up a task force to review the methodology for compiling greenhouse gas emissions in one of three possible sectors: housing, forestry or transport. Work undertaken by the Conference of European Statisticians would be carried out in close collaboration with United Nations Framework Convention on Climate Change, as well as within the global statistical action plan for climate change and official statistics coordinated by the United Nations Committee of Experts on Environmental-Economic Accounting and the United Nations Statistical Commission.

While as shown, UNECE is very active in combating the impacts of climate change in its region, more efforts are needed to slow global warming and to preserve the Earth's climatic system for current and future generations. Based on its mandate, UNECE is committed to supporting its member States in implementing the measures emanating from the United Nations Framework Convention on Climate Change.

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The UNECE region — which spans 56 countries — has a pivotal role in climate change. Historically it has been a large emitter of greenhouse gases that cause global warming and it will be particularly affected by a changing climate. The region is leading global efforts to combat climate change.



United Nations