

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT B
STRUCTURAL AND COHESION POLICIES



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**REGIONAL POLICY
AND CLIMATE CHANGE**

STUDY



DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

REGIONAL DEVELOPMENT

Regional Policy and Climate Change

STUDY

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AUTHOR

CSIL, Centre for Industrial Studies (Italy)

RESPONSIBLE ADMINISTRATOR

Ivana KATSAROVA
Policy Department Structural and Cohesion Policies
European Parliament
B-1047 Brussels
E-mail: poldep-cohesion@europarl.europa.eu

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ABOUT THE EDITOR

To contact the Policy Department or to subscribe to its monthly newsletter please write to:
poldep-cohesion@europarl.europa.eu

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Abstract

The purpose of this study is to provide a concise analysis of the potential contribution of EU Cohesion policy to combating climate change. On the basis of qualitative and quantitative secondary evidence (in particular EU Structural Funds budget in 2000-2006 and 2007-2013) and primary qualitative evidence (two case studies in Finland and Italy), the study highlights the great progress that has been made in the use of Structural Funds to tackle climate change. Recommendations are proposed to further strengthen the contribution of Structural Funds in the field.

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ACRONYMS

| | |
|-----------------------|---|
| BDC | Bio-energy Demonstration Centre |
| BTN | Bio-energy Technology Transfer Network |
| CDM | Clean Development Mechanism |
| CENER | National Renewable Energy Centre |
| CIEMAT | Research Centre for Energy, Environment and Technology |
| COP | Conference of the Parties |
| CO₂ | Carbon Dioxide |
| DGs | General Directorates |
| ECCP | European Climate Change Programme |
| ERDF | European Regional Development Fund |
| ESDP | European Spatial Development Perspective |
| ESPON | European Spatial Planning Observation Network |
| ETS | Emission Trading Scheme |
| FoI | Field of intervention |
| EU-12 | The 12 New Member States |
| EU-15 | The 15 EU Member States |
| EU-25 | The 25 Member States of the EU, 2004-2007 |
| EU-27 | The 27 Member States of the EU, after the integration of Romania and Bulgaria in 2007 |
| FoI | Fields of Intervention |
| GHG | Greenhouse gas |
| ICSU | International Council For Science |
| IPCC | Intergovernmental Panel on Climate Change |
| JI | Joint Implementation |
| LULUCF | Land Use, Land-Use Change and Forestry |
| MISE | Ministry of Economic Development |
| NSRF | National Strategic Reference Framework |
| OP | Operational Programme |
| R&D | Research and development |
| RCF | Region for economic change |

- RTDI** Research, Technological Development and Innovation
- SF** Structural Fund
- SMEs** Small and Medium enterprises
- UNFCCC** United Nations Framework Convention on Climate Change
- UNCED** United National Conference on Environment and Development
- UNEP** United Nations Environment Programme
- UN** United Nations
- WMO** World Meteorological Organisation

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EXECUTIVE SUMMARY

Background

Climate change has become a top priority in the world and EU policy agendas. Scientific evidence and public opinion concur in making the issue one of the greatest challenges ahead, not only in a policy perspective, but also in the wider socio-economic sphere. In particular, climate change is being seen as one instrument to spur economic recovery and pave the way for the transition to new bases of socio-economic development.

The EU has taken a lead in the field, adopting an ambitious long-term programme aimed at cutting greenhouse gas emissions (GHG). In this context, the EU Cohesion policy is expected to play an important role in helping to achieve the objectives set at European level, because regions are affected by climate change and, as such, they are expected to devise appropriate responses at their levels of competence. The expectations placed on the EU Cohesion policy in this respect are also high, inasmuch as the latter has supported sectors and countries which, in the past, have been identified as the greatest sources of GHG emissions.

Aim

The purpose of this study is to provide an in-depth analysis of the potential contribution of EU Cohesion policy to combating climate change. The two related objectives are:

- to give an accurate picture of the main approaches, strategies and specific measures and instruments adopted to tackle climate change in both the 2000-2006 and 2007-2013 programming periods;
- to assess the potential for improving the contribution of EU Cohesion policy in tackling climate change and to provide a set of operational recommendations.

Methodology

The methodology mobilised to carry out the study comprises a threefold approach:

- firstly, the study examines evidence of climate change and policy responses adopted at global and EU level on the basis of secondary evidence;
- secondly, the report makes use of statistical data on Structural Funds budgets in both the 2000-2006 and 2007-2013 programming periods. The aim is to identify the main features of the measures of Structural Funds programmes that tackle climate change (which policy areas are privileged, which Member States and regions are most active);
- finally, two case studies have been carried out in two Member States, Finland and Italy, considered to be representative of the challenges posed by climate change and of the policy responses adopted.

Findings

There is considerable scientific evidence from many sources that the climate of the planet is changing and some consensus that this trend is the result of human action. The main cause of climate change is identified as the emission of greenhouse gases. The five largest emitters of greenhouse gases in the EU-27 were all EU-15 Member States: Germany, the United Kingdom, Italy, France and Spain. Production of public energy and road transportation are the two activities responsible for the largest shares of greenhouse gas emissions (respectively 80% and 21%) of total EU-15 emissions. GHG are not the only effects of climate change, the risks of natural hazards are also relevant. European

vulnerability to natural hazards tends to decrease from east to west because of a lower coping capacity, associated with lower national GDP per capita.

A number of very ambitious policy initiatives have been promoted at EU level in order to cope with the risks of climate change. At the core of such initiatives is the EU commitment to a drastic reduction in greenhouse gas emissions and to transforming the European economy into a highly energy-efficient, low-carbon system, culminating in the January 2008 package that implements one of the most ambitious set of climate and energy targets. 'Cap-and-trade' systems based on the Kyoto protocol reduction quota at micro (company) and macro (Member State) levels are set, however, a major weakness of such schemes is that no penalty is foreseen for those not respecting the legally binding commitments.

European regions are particularly affected by climate change. It has direct and indirect effects that are differentiated across regions, and which should be taken into account when defining the future of EU Cohesion Policy.

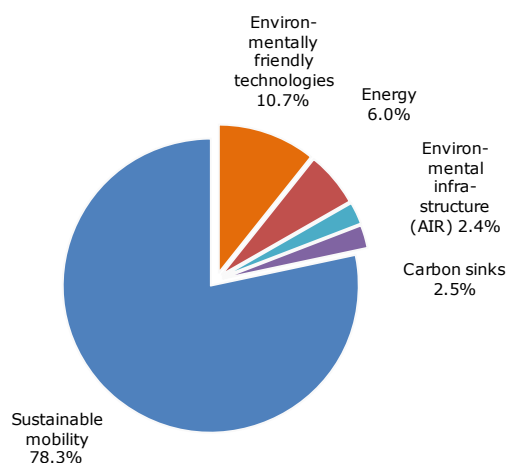
Cohesion policy should play a key role in supporting the achievement of the EU's climate and energy objectives. As a matter of fact, most of the sectors that are potentially important sources of GHG emissions are also traditional sectors of intervention of the EU Cohesion Policy (transport, construction, services, small and medium-sized enterprises, agriculture and waste management), and the main beneficiaries of EU Cohesion Policy are also the most important emitters of GHG (the four countries that have received the most EU Structural and Cohesion funds per capita – Spain, Portugal, Greece, and Ireland - have also witnessed the greatest increases in greenhouse gas emissions in the whole EU).

An entire chapter of the report is dedicated to an analysis of the Structural Funds expenditure mobilised to tackle climate change in the programming periods 2000-2006 and 2007-2013. It turns out that during the period 2000-2006, the Member States (EU-25) allocated about Euro 14 billion (6.4% of the total amount of Structural Funds) to measures related to climate change. As far as the 2007-2013 period is concerned, the scenario changes radically, since the European Union has planned to invest about Euro 51 billion (roughly 15% of the total Structural Funds) in measures aimed at achieving EU climate objectives and creating a low carbon economy. Poland (with more than Euro 10 billion), Italy and Spain are the countries with the largest amount of Structural Funds addressed to tackling climate change in absolute terms, while if the expenditure is analysed in relative terms the countries occupying the first positions are Greece (23.7%), Hungary (19.8%) and Slovenia (19.5%).

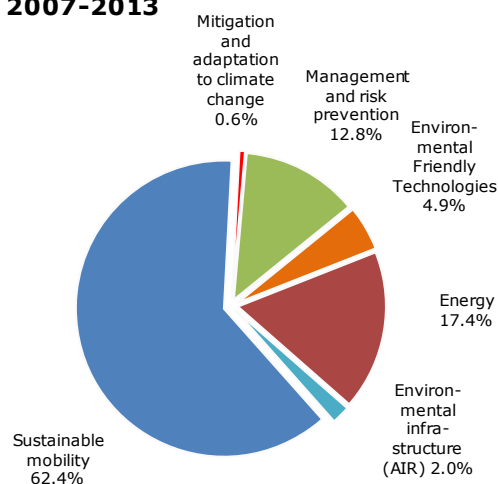
Expenditure has also been analysed by policy area. The Fields of Intervention considered as relevant for addressing climate change are: Environmentally-friendly technologies, Energy, Environmental infrastructure, Carbon sinks, Sustainable mobility, Mitigation and adaptation to climate change, and Management and risk prevention.

Composition of Structural Funds by policy area, 2000-2006 and 2007-2013

2000-2006



2007-2013



Source: Authors processing of DG Regio data

As illustrated in the figure above 'Sustainable mobility' is the area absorbing the highest share of resources in both programming periods. Of the total amount of resources invested to tackle climate change in the 2000-2006 budgetary period, 78% was devoted to enhancing sustainable mobility, 11% was for environmentally-friendly technologies, 6% for energy efficiency and renewable energies, 3% for measures concerning 'carbon sinks-pool' (like "reforestation") and 2% for the establishment of environmental infrastructures (air). In the current programming period the respective shares are: 62.4% sustainable mobility, 17.4% renewable energies and energy efficiency, 12.8% management and risk protection, 5% for assistance to SMEs for the promotion of environmentally-friendly products and production processes, and about 2% for environmental infrastructures related to air pollution.

However, Structural Funds interventions may have mixed effects on climate change. Some of the most common investments supported within the framework of the Cohesion Policy in fact, regard high-emission infrastructures. Fields of Intervention of this category are: roads, motorways, airports, electricity, gas, petrol and solid fuel. The analysis of the Structural Funds budget in these fields highlights that in the period 2000-2006 the share of such measures was higher than that of the climate-friendly ones (9.1% compared to 6.5%) while in the new period the opposite occurs (12.9% compared to 14.9%). It is clear that supporting such infrastructures (although perhaps necessary for the development of the region) increases the risk of being locked in traditional, high-emitting infrastructural systems for many years. Alternatives to these options and mitigating measures should be considered when feasible.

In order to investigate the potential contribution of the Structural Funds to reducing (or on the contrary increasing) GHG emissions a simple correlation analysis was carried out between the Structural Funds budget on climate related measures (net of climate-harming ones) and GHG emissions. Little or no correlation was found, and this suggests that, although an important source of funding, structural spending alone cannot significantly influence the main trends of climate change. At the same time it indicates that some of the

Member States are taking policy decisions that aren't always in line with the objective of meeting the Kyoto targets (sometimes even contributing to an increase in emissions).

Finally, two case studies were conducted in Italy and Finland to determine how climate change was addressed by Structural funding in two countries representative of different challenges arising from climate change and what specific responses were adopted. The aim of the analysis was to identify specific delivery mechanisms and highlight national and regional differences in policy choices and implementing mechanisms when delivering climate change-related initiatives. The main findings are:

- although most of the projects financed in the previous period could be broadly classified under the heading of environmental policy rather than under climate change as such, they indirectly contributed to the reduction of GHG (for example by promoting bio-energy production and use) and mitigating the effects of natural damage (by supporting interventions to reduce hydro-geological risks);
- the new generation of Structural Funds programmes are more dedicated to explicit climate change interventions and a shift is visible from more traditional broad environmental policies (water management, energy efficiency and waste treatment) to interventions more targeted to climate change (reduction of emission, risk prevention and renewable energy);
- Objective 2 regions allocate the largest share of funds to support firms in research and innovation initiatives for more sustainable products and production processes and environmentally-friendly technologies, while in Objective 1 regions infrastructural investments (sustainable mobility in particular) are still significant in financial terms;
- progress has been made also in terms of the use of monitoring indicators for reporting objectives in terms of CO₂ reduction, in project selection processes checking for the contribution to environmental policies and in the use of specific evaluation methods like Strategic Environment Assessment.

Conclusions and recommendations

- Despite a vast consensus of the opinion that the climate is changing not only because of natural variability, but also due to human activities, inaction and delays in tackling this change exist, are costly and vary across countries and sectors.
- Germany, the United Kingdom, Italy, France and Spain emit more than 60% of the EU-27 greenhouse gas emissions, public energy and road transportation being the main causes of it.
- Research-based projects show that the European vulnerability tends to decrease from east to west because of the better capacity to cope of the EU-15.
- Cohesion Policy offers a wide range of tools to regional and local economies to cope with the challenges of climate change. Climate-harming measures, however, absorbed a higher share of financial resources in the period 2000-2006 than the climate-friendly ones.
- In the new planning period policy awareness on climate change has risen, and the Operational Programmes financed take into account interventions in the fields of energy efficiency, sustainable mobility and support to firms in more direct and integrated ways, confirming that the new generation of Structural Funds programmes is more dedicated to explicit climate change interventions.

- Objective 2 regions allocate the largest share of funds to support firms' research and innovation initiatives for more sustainable products and production processes, while Objective 1 regions invest more infrastructural investments.

The report concludes with a set of recommendations:

- The EU should commit to more drastic and consistent actions towards the achievement of Kyoto targets:
 - sanctions for Member States not respecting their emission quota should be introduced for all legislative proposals (starting from ETS and the Effort Sharing Directive) committed to a reduction in GHG emissions. Inflows from penalties of non-complying Member States could be used for measures supporting adaptation to and mitigation of climate change;
 - by putting climate change as the top priority of its interventions and, at the same time, by avoiding supporting high emission interventions if alternatives are available. Targets should be set and agreed in each policy domain and proper evaluation methodologies should be put in place in order to assess whether the specific interventions and projects are consistent with this overwhelming objective.
- Regarding Cohesion Policy the Commission should:
 - more firmly commit Cohesion Policy programmes to promoting a shift to a low-carbon, energy-efficient economies for its beneficiaries, by earmarking at least 30% of the overall Structural Funds budget to climate-related measures in the period 2014-2021, and mainstreaming it in all its interventions. This means that any investment benefiting from Cohesion Policy financing, whatever the sector, should be assessed with the aim of measuring its contribution to climate change mitigation and adaptation;
 - require more suitable and specific instruments (such as climate proofing, pre-screening for potentially risky projects, etc.) to assess the impact on climate change of interventions supported by Structural Funding;
 - already for the period 2007-2013 support the shift of regional economies to low-carbon infrastructures by putting pressure on Managing Authorities to select only climate-friendly projects for the achievement of the objectives previously set.
- Member States should :
 - adopt comprehensive long term strategic plans in order to provide the proper legislative framework to meet the Kyoto targets. Policy results in terms of reduction of emissions should be monitored and properly assessed, and incentives should be given to local actors (private companies, municipalities and business associations) to firmly invest in this direction;
 - promote the use of Cohesion Policy resources for energy efficiency, sustainable mobility, mitigating and adapting to climate change, at the same time avoiding investing in high-emission measures if feasible cleaner alternative are available. Although Structural Funding alone cannot significantly influence the national emissions of GHG, nevertheless, it can provide useful financial and political leverage effects to implement interventions facilitating the shift of economic systems to low-carbon, low emission economies;
 - support research and technical assistance activities promoted at a regional level in order to help the decision-makers in charge of Cohesion Policy measures to implement more innovative strategies in tackling climate change. Scientific know-how

and technical capacity on climate-related measures should be further supported at the local level.

- Managing Authorities of Structural Funds programmes should:
 - invest Structural Funds resources in measures consistent with national long-term strategies. Sanctions could be decided for those not contributing to achieving those targets. Pilot measures in this direction could be implemented within the framework of Cohesion Policy interventions, in the light of the performance reserve exercise¹ that was introduced in the 2000-2006 programming period;
 - be more informed and aware of specific evaluation techniques and policy implementation practices for climate change that are well developed in different policy domains, thus they should facilitate cross-fertilisation among sectors while designing and promoting their interventions at a local level;
 - design an appropriate strategy for their specific degree of vulnerability, by exchanging good practices with regions facing similar challenges. They should be aware that territorial specificities at sub-regional level do matter (for example coastal vs. inner zones have totally different needs);
 - promote a more comprehensive monitoring system including at least indicators of GHG and CO₂ emissions at a regional level. The environmental horizontal priority should be more explicitly linked to the climate change issue and verifiable targets related to the reduction of emissions should be the basis for the environmental assessment of programmes and projects.

¹ According to art. 44 of Reg. 1260/1999 each OP and SPD has been the subject of a mid-term review on the basis of a list of monitoring indicators assessing effectiveness, management and financial implementation, to check if targets set ex-ante were met. Programmes achieving their targets were rewarded with an extra allocation from a reserve of 4% of the Structural Funds' budget not allocated at the beginning of the period. For the first time, there was a direct link between the allocation of part-financing and results.

INTRODUCTION

The objective of this study is to provide the Committee on Regional Development with a comprehensive analysis of the actual and potential impact of EU Cohesion policy in contributing to adapting and mitigating to climate change. In particular the study:

- provides an overview of the main approaches, strategies and specific measures and instruments adopted to tackle climate change in both the 2000-2006 and 2007-2013 programming periods;
- assesses the potential for improving the contribution of EU Cohesion policy in tackling climate change in particular by using the findings from case studies;
- suggests a set of operational recommendations.

The chosen approach includes a combination of methodologies based on primary and secondary sources of evidence: literature review, statistical analysis and case studies (fieldwork).

The study was organised in four different tasks:

- Task 1 – Theoretical and contextual background
- Task 2 – Analysis of approaches, measures and instruments mobilised by 2000-2006 EU Cohesion policy programmes to deal with climate change, and initial insights from the 2007-2013 programming period
- Task 3 – Assessment of the actual and potential contribution of EU Cohesion Policy to tackling climate change
- Task 4 – Conclusions and recommendations.

The outcome of Task 1 is presented in Chapter 1, while Chapter 2 and 3 describe Structural Funds interventions in the field of climate change on the basis of quantitative secondary evidence (statistical data on programmed Structural Funds expenditure) and primary qualitative evidence (two national case studies). The outcome of Task 4 is presented in the concluding chapter.

1. EUROPE AND CLIMATE CHANGE: THREATS, CHALLENGES AND POLICY

KEY FINDINGS

- Combating climate change and minimising its potential consequences by achieving stabilisation of GHG is a high priority for the European Union. The negative effects of climate change are, in fact, expected to significantly influence the economic and social lives of European citizens.
- The most important of all the initiatives carried out at EU level are the ratification of the Kyoto Protocol, the Emission Trading Scheme and the Effort Sharing Decision. Legally binding commitments for the reduction of greenhouse gases are the core of these initiatives, although none of them foresee penalties if Member States fail to comply with the commitments.
- The negative effects of climate change are unevenly distributed among the EU regions. Regional investment decisions in different sectors (energy, transport, agriculture and forestry) are required to mitigate and adapt to these effects, therefore the Cohesion Policy's role in tackling climate change is crucial.
- In the period 2007-2013 an increased share of funds is in fact committed to measures promoting energy efficiency, clean transport and eco-innovations for SMEs. Climate change is now a priority for the Cohesion Policy, and it is expected to play a relevant role also in the post-2013 period.

1.1. Nature, cause and consequences of climate change

According to IPCC (Intergovernmental Panel on Climate Change)² climate change is a *change in the state of the climate over time whether due to natural variability or as a result of human activity*.³

Scientific evidence describes climate change as the greatest challenge currently facing the planet. The increases in the global average air and ocean temperatures and the rise in the global sea-level are the main evidence of this threat.

There is a vast scientific consensus indicating that the main cause of climate change is the emission of greenhouse gases.⁴ These gases are almost transparent to sunlight because they allow it to enter the atmosphere freely. They absorb the solar radiation striking the

² The Intergovernmental Panel on Climate Change (IPCC) is a scientific intergovernmental body set up in 1988 by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP) to provide scientific technical and socio-economic information in a policy-relevant but policy-neutral way to decision-makers.

³ This usage differs from the definition in the first article of the UN Framework Convention on Climate Change (UNFCCC) where climate change is defined as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to a natural climate variability observed over comparable time periods".

http://unfccc.int/essential_background/convention/background/items/2536.php

⁴ There are also scientists opposing the mainstream scientific assessment of global warming expressing varied opinions concerning the causes of global warming. Some say that it has not yet been ascertained whether humans are the primary cause of global warming (e.g. Balling, Lindzen, and Spencer). Others attribute global warming to natural variation (e.g. Soon and Baliunas), ocean currents (e.g. Gray), increased solar activity (e.g. Shaviv and Veizer), cosmic rays (e.g. Svensmark) or unknown natural causes (e.g. Leroux).

Earth's surface and re-radiate it back towards space as infrared radiation. The rapid increase in atmospheric concentrations of the three main human-made greenhouse gases (carbon dioxide, methane and nitrous oxide) produce an increase in the average surface temperature of the Earth over time, because the amount of energy radiated back into space is more than that sent from the sun to the Earth's surface. Rising temperatures may, in turn, produce changes in precipitation patterns, storm severity and sea-level commonly referred to as "climate change."

Box 1: GHG Emissions in Europe

GHG EMISSIONS IN EUROPE

In 2006 the EU accounted for about 10.5% of global greenhouse gas emissions.⁵ The five largest emitters of greenhouse gases in the EU-27 were all EU-15 Member States: Germany, the United Kingdom, Italy, France and Spain. Together they accounted for more than 60% of EU-27 greenhouse gas emissions. Production of public energy and road transportation are the two activities responsible for the largest shares of greenhouse gas emissions. In 2006 the most important sector was energy, which accounted for 80% of total EU-15 emissions. The transport sector was responsible for 21%, agriculture for 9%, industrial processes for 8%, and waste for 3% of total GHG emissions.

The greenhouse emissions (EU-27) without Land Use, Land-Use Change and Forestry (LULUCF)⁶ decreased by 7.7% between 1990 and 2006. This reflects two distinct trends within the EU: over the same period in the EU-15 greenhouse gas emissions decreased by 2.2%, while in the EU-12 they decreased by more than 25%. The general EU GHG emission trend is dominated by Germany and the United Kingdom (the two largest emitters), which together achieved a significant gas emission reduction compared to 1990. This decrease was in part offset by the important increase of emissions in Spain, and, to a lesser extent, Italy. Large decreases in emissions occurred in the EU-12 and the former East Germany, in particular in the energy supply sector. In Central and Eastern Europe, due to the transformations of the inefficient heavy industry based manufacturing sector, strong economic growth but decreasing emissions were observed.

The GHG emission per capita is an interesting measure of the efficiency of the energy systems of a country. Being correlated to the energy intensity (primary energy consumption per capita) and the energy mix (affecting the level of emissions by energy unit produced) of each country, it shows significant differences across European countries. Higher energy consumption per capita stemming from increasing living standard leads to increasing per capita emissions, while improvements in energy efficiency and increasing shares of renewable energy sources in the energy mix of a country lead to decreasing per capita emissions.

Source: European Environment Agency, 2008, Greenhouse gas emission trends and projections in Europe 2008: Tracking progress towards Kyoto targets. Communication of the European Commission, COM(2008) 651 final/2.

⁵ Calculation based on the Intergovernmental Panel on Climate Change (IPCC) estimate of global anthropogenic greenhouse gas emissions of 49.0 gigatonnes CO₂-equivalent (Gt CO₂-equivalent) in 2004 (IPCC, 2007a). The rest of this section is based on the last report (5/2008) of EEA: 'Greenhouse gas emission trends and projections in Europe 2008'. See: http://www.eea.europa.eu/publications/eea_report_2008_5 and on the EEA Report No 6/2008: 'Energy and environment report 2008' see: http://www.eea.europa.eu/publications/eea_report_2008_6.

⁶ It is defined by the UN Climate Change Secretariat as "a greenhouse gas inventory sector that covers emissions and removals of greenhouse gases resulting from direct human-induced land use, land-use change and forestry activities".

Climate changes characterised as global warming are leading to large-scale irreversible damage on continental and global scales.

The effects of climate change in Europe are already visible: temperatures are rising, icecaps and glaciers melting and extreme weather are becoming more frequent and more intense. According to the Commission's Green Paper⁷ Europe has warmed by almost 1°C in the last century, faster than the global average. More frequent droughts have been observed in Southern Europe, whereas rainfall and snowfall has significantly increased in Northern Europe.

According to the IPCC study⁸ the higher water temperatures, the increased precipitation intensity, and the longer periods of low flows could exacerbate many forms of water pollution, including sediments, nutrients, dissolved organic carbon, pathogens, pesticides, salt and thermal pollution. It is expected that this process will have an impact on the ecosystems and human health.

1.2. The European response to climate change

Mitigation and adaptation to climate change

The terms "adaptation" and "mitigation" are two important terms in the climate change debate. Adaptation is necessary to address impacts resulting from warming, which is already unavoidable due to past emissions. Mitigation will avoid, reduce or delay the impacts of climate change.

Climate change presents the European Union with a dual challenge; and an appropriate response requires a twofold approach. First, in order to minimise the most crippling impacts of climate change, greenhouse gas emissions have to be reduced. Accordingly, transition to a low-carbon economy through measures to mitigate emissions constitutes a central pillar of the EU's climate change policy. Second, since climate change is already occurring, a policy based on mitigation must be coupled with measures that are designed to effectively adapt to the unavoidable impacts of climate change. The latter requirement motivated the European Commission's launch of a Green Paper on adaptation in 2007, which sought to initiate a debate on how to devise an efficient and coordinated adaptation strategy for Europe. Along the same line, the new Cohesion Policy (2007-2013) stresses the importance of mitigation and adaptation to climate change, which has now become a priority *per se*.

Many initiatives have been promoted at a global level in order to respond to climate change (see Box 2). The most important is the ratification of the Kyoto Protocol: it represents an important step towards a global reduction in GHG emissions and provides the essential architecture for any future international agreement on climate change.

⁷ Commission of the European Communities, Green Paper from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, 2007, Brussels. Adapting to climate change in Europe – options for EU action

⁸ IPCC Technical Paper VI, *Climate Change and Water*.

Box 2: Milestones of global initiatives

MILESTONES OF GLOBAL INITIATIVES

1972: the United Nations Environment Programme (UNEP) was established.

1979: the World Meteorological Organization (WMO) organised the first "World Climate Conference" in Geneva.

1985: a joint UNEP/WMO/ICSU conference on the "Assessment of the Role of Carbon Dioxide and Other Greenhouse Gases in Climate Variations and Associated Impacts" was organised.

1988: the WMO and UNEP established the Intergovernmental Panel on Climate Change (IPCC).

1992: the United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the UN Conference on Environment and Development UNCED held in Rio de Janeiro in 1992.

1995: the first meeting of the Conference of The Parties (COP-1) and year of publication of the Second Assessment Report by IPCC, which includes as a new subject area socio-economic aspect of climate change.

1997: the Third Conference of The Parties (COP-3) met in Kyoto. The Berlin Mandate led to the adoption of the Kyoto Protocol.

2001: The IPCC published the Third Assessment Report.

2007: the Fourth Assessment Report of IPCC was published.

Source: UNFCCC

The last (fifth) IPCC report, published in 2007, confirms the EU call for significant cuts in global greenhouse gas emissions. A long term strategy of commitment to reducing gases was in fact developed, and Several initiatives were put forward for actions to be taken in different sectors.

In March 2007 EU Heads of State and Governments agreed to cut emissions, based on three energy-related objectives, which are to be met by 2020.⁹ The aim is to reduce global emissions by 30% below 1990 levels by 2020, and by 60-80% below by 2050.

In December 2008 a climate and energy package with legally binding targets for 2020 on greenhouse gas emissions, share of renewable energy, and energy efficiency¹⁰ was approved. Other legislation on climate change, such as reducing CO₂¹¹ emissions from

⁹ 20% reduction in energy consumption through improved energy efficiency; 20% increase in renewable energy's share of the market (currently around 8.5%); 20% reduction in GHG emissions; as part of the renewable energy efforts, a 10% share for sustainably produced bio-fuels in petrol and diesel in each EU country.

¹⁰ Directive (2001/77/EC) on the Promotion of Electricity from Renewable Energy Sources in the Internal Electricity Market (RES Directive). The aim is to establish national renewable energy targets that result in an overall binding target of a 20% share of renewable energy sources in energy consumption in 2020, and a binding 10% minimum target for bio-fuels in transport to be achieved by each Member State.

¹¹ The biggest CO₂ storage projects of European companies are the Sleipner project in the North Sea (Statoil) and in the In Salah project in Algeria (Statoil, BP and Sonatrach). The European Platform on Zero Emission Fossil Fuel Power Plant (ETP-ZEP), a stakeholder initiative supported by the Commission, has identified some 15 full-scale demonstration projects that could go ahead once the necessary economic framework is in place. See the IPCC special report on CCS: http://arch.rivm.nl/env/int/ipcc/pages_media/SRCCS-final/IPCCSpecialReportonCarbonDioxideCaptureandStorage.htm and <http://www.zero-emissionplatform.eu/website/>

motor vehicles, increasing the energy efficiency of buildings and a framework for Carbon Capture and Storage are also being considered.

Specific measures have been addressed to tackle transport emissions. Legislation is under discussion in the European Parliament and Council to bring emissions from aviation into the EU ETS from 2011. The European Commission is also considering ways to address emissions from shipping. The Commission has also proposed new transport fuel quality standards that would reduce GHG emissions from the production, transport and use of petrol and diesel by 10% by 2020.

Under the Community's Seventh Framework Programme, the EU has substantially increased the budget for environment, energy and transport research for 2007-2013. This should help to promote the development of clean energy and transport energy and further strengthen knowledge of climate change and its impacts.

However, among all the initiatives carried out at EU level, the ratification of the Kyoto Protocol, the Emission Trading Scheme and the effort sharing decision are the most significant.

Box 3: The Kyoto Protocol

THE KYOTO PROTOCOL

The Kyoto Protocol is an international agreement committing industrialised countries to stabilising GHG emissions. The Protocol sets legally binding commitments for the reduction of four greenhouse gases for 37 industrialised countries and general commitments for all member countries. The achievable targets amount to an average of 5% against 1990 levels over the five-year period 2008-2012.

The Protocol was adopted in Kyoto, Japan, on 11 December 1997 and came into force on 16 February 2005. 184 Parties of the Convention have ratified the Protocol to date.

The Treaty recognised that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity. It reaffirmed the principle of common but differentiated responsibility.

The industrialised countries must take domestic action against climate change, but the Protocol permits them a certain degree of flexibility in meeting their emission reduction commitments through three innovative market-based mechanisms. These mechanisms are: Emission Trading (known as "the carbon market"), the Clean Development Mechanism (CDM) and Joint Implementation (JI). The former allows countries that have emission units to spare (emissions permitted them but not used) to sell this excess capacity to countries that are over their targets. The latter allows a country with an emission-reduction or emission limitation commitment under the Kyoto Protocol to implement an emission-reduction project in developing countries.

Source: UNFCCC

The ratification of the Kyoto Protocol

The ratification of the Kyoto Protocol was a significant step taken by the EU in its efforts to address climate change.¹² Under the Kyoto Protocol the EU-15 have taken on a common target of reducing emissions by an average of 8% between 2008 and 2012. This target is

¹² See *Council Decision 2002/358/EC* concerning the approval of the Kyoto Protocol on behalf of the EU.

shared among the 15 Member States under a legally binding 'burden-sharing agreement'. The EU-12 Member States have individual targets under the Kyoto Protocol (apart from Malta and Cyprus that have no targets).

The Kyoto Protocol gives an indicative list of policies and measures that might help cut emissions and promote sustainable development. Eleven EU Member States¹³ have decided to use the Kyoto mechanism to reach their target. The achievement by the EU-15 and EU-12 of their respective Kyoto targets by 2008-2012 would contribute to a reduction of 2.4% in the total GHG emissions of industrialised countries compared to 1990 levels.

The EU-27 does not have a Kyoto target but by 2010 total EU-27 GHG emissions are projected to be about 10.1% below base-year levels. This projection is based on estimates that take in account domestic policies and measures.

The European Climate Change Programme

In June 2000 the European Commission established the European Climate Change Programme (ECCP) to help identify the most environmentally-friendly and cost-effective measures and policies enabling the EU to cut greenhouse gas emissions. The first goal is to meet its target under the Kyoto Protocol, complementing Member States' efforts. The programme has sought to engage the full range of stakeholders, including representatives from Commission's different General Directorates (DGs), the Member States, industry and environmental groups, in the strategy development process. It has set-up a multi-stakeholder consultative process in which relevant players have worked together. The working group reflects a cross-sectoral approach. Through the ECCP Steering Committee the Commission is responsible for the general coordination of the Programme and it is a facilitator in the different working groups.¹⁴

One of the most innovative and significant initiatives of the First European Climate Change Programme is the EU Emission Trading Scheme (ETS) (see Box 4).

In October 2005 the ECCP II was launched at a major stakeholder's conference in Brussels. New working groups were established covering CO₂ emissions from light-duty vehicles, emissions from aviation, carbon capture and geological storage and adaptation to the effects of climate change. One working group was also to assess the implementation of the ECCP I policies and measures in the Member States.

The ECCP II will analyse further cost-effective options for reducing greenhouse gas emissions in synergy with the EU's 'Lisbon strategy' for increasing economic growth and job creation.

¹³ Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Slovenia and Spain

¹⁴ The First ECCP established 11 working groups, under the coordination of an ECCP Steering Committee, that operated in the following areas: energy demand, energy supply, energy efficiency in end-use equipment and industrial processes, transport, industry, research, agricultural, sinks in agricultural soils, flexible mechanisms, emissions trading, joint implementation and clean development mechanisms.

Box 4: The European Union Greenhouse Gas Emissions Trading Scheme

THE EUROPEAN UNION GREENHOUSE GAS EMISSIONS TRADING SCHEME

The European Union Greenhouse Gas Emissions Trading Scheme (ETS) is a Europe-wide scheme that aims to reduce emissions of GHG by putting a price on GHG emissions that businesses produce thus creating a market for latter.¹⁵ It is the world's first international company-level 'cap-and-trade' system of allowances for emitting carbon dioxide (CO₂) and other greenhouses gases and is building on the mechanism set up under the Kyoto Protocol. The EU ETS scheme was launched on 1 January 2005 and is divided into phases during which Member States must develop a National Allocation Plan approved by the European Commission, setting an overall 'cap' on the total amount of emissions allowed from all the installations covered by the scheme. The first phase – or trading period – ran for three years to the end of 2007 and was a 'learning by doing' phase to prepare the crucial second trading period. This second period began on 1 January 2008 and runs for five years until the end of 2012. The second period coincides with the first commitment period of the Kyoto protocol, during which the EU and other industrialised countries must meet their targets to limit or reduce GHG emissions. For the second trading period EU ETS emissions have been capped at around 6.5% below 2005 levels to help ensure that the EU as a whole, and Member States individually, deliver on their Kyoto commitments. The Commission design changes will apply as of the third trading period, after January 2013.

Source: DG ENVIRONMENT, ETS review

Effort Sharing Decision

The 'Effort Sharing' Decision was adopted by the European Commission in December 2008, in order to ensure the full compliance of the Community's greenhouses emission reduction commitment over the period 2013–2020. This agreement establishes Member States' targets to reduce gas emissions from sectors not covered by the EU ETS Directive (2003/87/EC), such as emissions from farming, the building sector and transport. Following this decision new agreements have been signed to regulate new automobile emissions and road fuel. It was decided that CO₂ emissions from most new cars should be reduced by 19% over a three-year period from 2012, and that 10% of transport fuels should be non-fossil.

Both the amended ETS Directive and the Effort Sharing Decision, aiming at reducing the EU's greenhouse gas emissions by 2020, foresee a linear annual emission reduction path. However, while the ETS is to be run on a Europe-wide basis, the effort-sharing targets are to be prescribed nationally. The decision establishes, in fact, that the contribution of each Member State to gas emission reduction should be based on its relative wealth.¹⁶ The

¹⁵ The scheme is based on Directive 2003/87/EC, which came into force on 25 October 2003.

¹⁶ Art 8. "Member States' reduction efforts should be based on the principle of solidarity between Member States and the need for sustainable economic growth across the Community, taking into account the relative per capita GDP of Member States. Member States that currently have a relatively low per capita GDP, and thus high GDP growth expectations, should be allowed to increase their greenhouse gas emissions compared to 2005, but should limit this greenhouse gas emission growth to contribute to the independent reduction commitment of the Community. Member States that currently have a relatively high per capita GDP should reduce their greenhouse gas emissions compared to 2005". Decision of the European Parliament and of the Council on the effort of member states to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

national emission targets range from -20% for richer Member States to +20% for poorer ones. According to this mechanism, for example, Bulgaria has the right to increase its emissions from the non-ETS sectors by 20%, while Ireland, Luxembourg and Denmark are asked to make the biggest reduction efforts. Moreover, Member States should limit their non-ETS emissions annually in a linear manner, progressing towards the overall 2020 reduction target.

Some flexibility has been added to this system. Member States can borrow a limited amount from the following year's quota or bank any over-achieving of their targets. During the years 2013 to 2019, they can also carry forward from the following year a quantity of up to 5% of their annual emission quota. On the contrary, if a Member State's annual emissions are below its quota, it can carry over the difference to any subsequent year up to 2020. In this case it may also transfer (or sell) up to 5% of its annual emission quota to other Member States.

This system recalls also the Kyoto Protocol reduction mechanism. In particular it introduces flexibility, by allowing the use of certified emission reductions resulting from clean development mechanism projects under Article 12 of the Kyoto Protocol and resulting from emission reduction activities in third countries to implement this effort. It establishes that the use of these credits should be consistent with the EU's goal of generating 20% of its energy from renewable sources by 2020, promoting the EU's energy security and promoting innovation and EU competitiveness.

However, it is important to stress that the two legislative proposals from the European Commission, the amended ETS Directive and the Effort Sharing Decision, do not introduce specific direct compliance and penalty provisions against Member States. In the Effort Sharing Decision, Member States are only required to report on emissions and progress to achieve their reduction targets.¹⁷

1.3. Regional disparities in facing climate change

The pressure resulting from climate change is not equally distributed across regions and it is therefore crucial for the European Union to recognise it and promote measures also at regional and local levels, especially in regions with low GDP per capita, and with lower capacity for adaptation to climate change.

Evidence¹⁸ shows, in fact, that while the implications of rising temperature vary in different parts of Europe, climate change will bring about a fundamental change in the basis of economic activity.

In particular South-Eastern Europe, the Mediterranean and Central Europe are the most vulnerable regions to climate change. The large increases in temperature and reduced precipitation could exacerbate the already acute water shortage problem in these areas. In Central and Eastern Europe, summer precipitation is projected to decrease, causing higher water stress. The habitats and coastal eco-systems could be profoundly affected by the increase in the sea level and changes in the frequency and/or intensity of storms. Some

¹⁷ Art. 24 *Progress in implementing commitments under this Decision should be annually evaluated on the basis of reports submitted under Decision No. 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol. Every two years an assessment should be made of the projected progress and a full evaluation of the implementation of this Decision should be made in 2016.* Decision of the European Parliament and of the Council on the efforts of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

¹⁸ The Fourth Assessment Report of the IPCC and the results of the ESPON projects.

benefits, for example, in terms of increased crop yields and forest growth, could be observed in the Northern countries.

The vulnerability of the European regions to climate change and the impacts on economic activities were investigated by ESPON¹⁹ projects 1.3.1 and 3.2.

ESPON project 1.3.1 – The Spatial Effects and Management of Natural and Technological Hazards in Europe has mapped a number of hazards²⁰ from a European perspective and produced maps showing the regional diversity. The data set of the project covers floods and other natural hazards of great concern, such as drought and forest fires. The risk of hazards is defined as the result of the hazard potential and vulnerability. European vulnerability²¹ tends to decrease from east to west because of a lower capacity to cope, associated with lower national GDP/capita (see figure 1).

Statistics elaborated in the context of the ESPON studies also show a significant increase in the number of catastrophic events and the extent of the damage. The number of disastrous events costing more than US\$1 billion (considering only insured losses) rose from only one prior 1987 to 34 between 1990 and 2000.

The ESPON report argues that if “it were possible to conclude that recent catastrophic natural hazard events were within the natural climatic variability, the implication would be that society is already today not fully prepared to cope with such events even without the additional strain introduced by a changing climate”.

The ESPON projects show also that large parts of Europe will see a shift towards temperature extreme conditions that now occur mainly in the Mediterranean, North Africa and the south-western Iberian Peninsula. The projections showed that large parts of Europe will have a warming of 5°-8°C during warm extremes. Natural hazards that might be influenced by climate change focus on three selected hazards: drought potential, floods and forest fires. This requires, firstly, an integrated approach where several policy sectors are involved in dealing with the hazard risks, such as the environment, transport and planning. Secondly, hazard management and prevention needs coordination between policymakers at the European national, regional and city levels to make living conditions and economic potentials secure from risk.

The ESPON 1.3.1 project final report also shows that the number of floods in the EU-27 has increased every decade since the 1960s, while at the same time the costs associated with them have risen substantially also as result of built-up areas continuing to expand in areas prone to flooding. If this continues, it could increase the frequency and scale of flood disaster because of its effect in reducing the amount of water that the soil can absorb. Climate change is likely to lead to more extreme weather patterns and itself increase the frequency of floods (see figure 2).

Around 7% of people in the EU-27 live in areas at high risk of flooding. This proportion varies from around 2% in Denmark to 12-13% in Austria and Slovakia. In 44 of the 1,275 NUTS 3 regions for which data are available, over 20% of the population is at risk. Thirty of

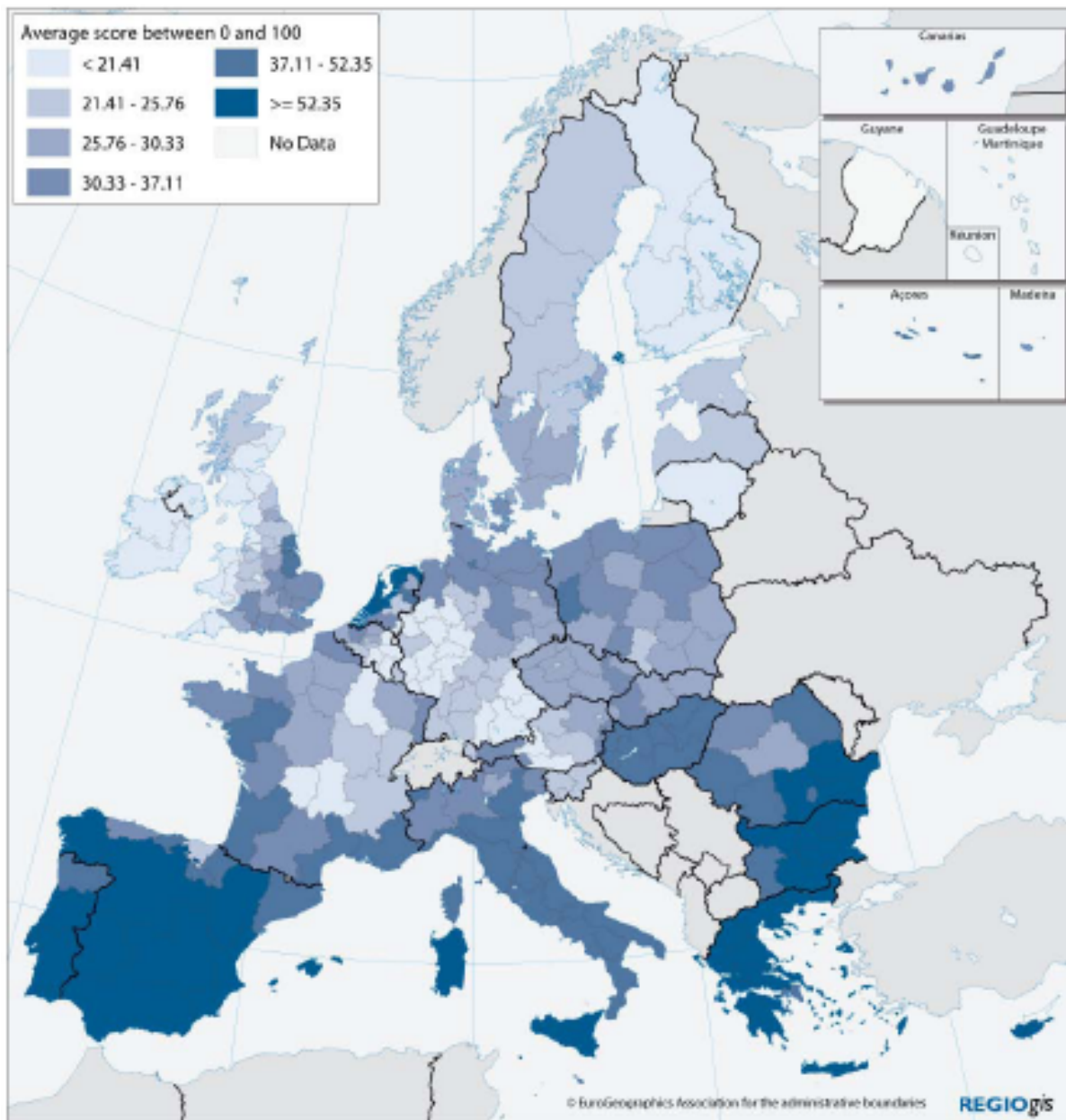
¹⁹ The European Spatial Planning Observation Network is an applied research programme part-financed by the European Regional Development Fund, Interreg III and the 25 EU Member States + Norway and Switzerland. It supports policy development in relation to the aim of territorial cohesion and a harmonious development of the European territory. Its objective is to provide policy makers at the European national and regional level with systematic and new knowledge of territorial trends and the impacts of policies that affect regions and territories within Europe. The ESPON programme is established outside the traditional research programmes of the European Commission.

²⁰ Natural hazards are extreme natural events that can lead to threats and damage among the population, their property and their possessions (definition contained in ESPON report).

²¹ The Vulnerability Index is based on a weighted combination of population, GDP and the proportion of fragmented natural area over all natural areas.

these regions are in Germany, five in Austria, three in Italy and two in Spain, France and Romania.

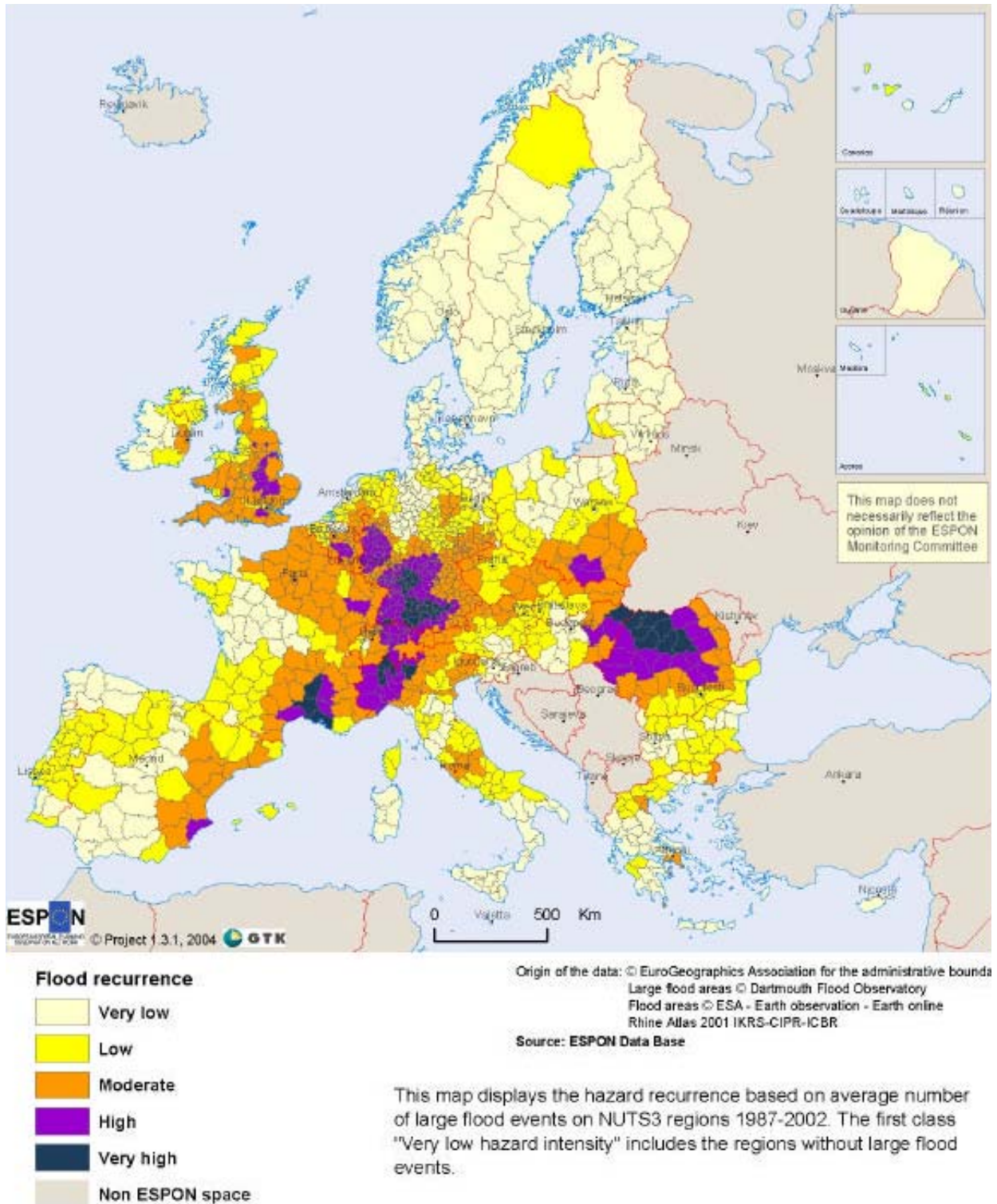
Figure 1: Climate change vulnerability index



Note: Index based on change in population affected by river floods, population in costal areas below 5 metres, potential drought hazard, vulnerability of agriculture, fisheries and tourism, taking into account temperature and precipitation changes.

Source: Eurostat, JRC, DG Regio

Figure 2: Flood recurrence between 1987-2002 in NUTS 3 regions



Source: ESPON projects

The ESPON Project 3.2 – Spatial Scenarios and Orientations in relation to the European Spatial Development Perspective (ESDP) and Cohesion Policy have elaborated a large number of scenarios²² concerning the future territorial development of Europe with a time horizon of 2030. In a trend perspective, the impacts of climate change are detrimental to numerous rural regions in the southern half of Europe. Agricultural activities will be abandoned in areas where irrigation is no longer possible and where alternative agricultural production could not be successfully envisaged. Forest fires will generalise and permanently destroy traditional landscapes, adding to the drought problems, because of the reduction of the humidity retention capacity of the soil in mountainous areas. Indirect negative impacts will strike the hydro-power production and rural and coastal tourism. On the face of it, rural areas of the northern half of Europe will benefit from these changes. Demand for rural tourism will increase, as well as for specific agricultural productions. A new growth impetus will benefit rural regions in the northern parts of Central and Eastern Europe (Poland, the Czech Republic, Slovakia, the Baltic States and East Germany in particular).

1.4. Climate change and Cohesion Policy

Based on the evidence and forecasts provided so far, it is clear that EU policies play a crucial role in adaptation to climate change. EU spending programmes on regional and rural development, research and other areas should have a climate change dimension, and actions at local, regional and national level should be coordinated. Clearly, there are benefits in approaching adaptation to climate change in an integrated, coordinated manner at EU level.

Furthermore, in many areas adaptation could require a cross-boundary approach, e.g. on river basins and bio-geographic regions. Moreover, certain sectors (e.g. agriculture, water, biodiversity, fisheries, and energy networks) are largely integrated at EU level through the single market and common policies and it makes sense to integrate adaptation goals directly into them.

The EU's Structural Funds have the power to influence investment decisions in eligible regions. They could be used in relation to adaptation in two key ways:

- to fund climate change adaptation-related policies and initiatives;
- to ensure that investments in all the sectors take climate change into consideration, thus ensuring that EU Structural Funds are spent on climate change resilient projects.

Climate change was not yet on the political agenda when the 2000-2006 Cohesion Policy was designed and the regulations and programmes adopted, hence it was not generally explicitly addressed in the programming documents for that period. The only reference to climate change issues in the Regulation is found in art. 36²³ of the EAGG fund, stating that interventions financed had to take into account the specific problems of climate change.

Nevertheless, a number of initiatives broadly classified under the headings of energy and environment infrastructures contributed to directly or indirectly addressing climate change issues.

²² Two different scenarios were formulated around two extreme policy standpoints on climate change: "face consequences as they come" or "prepare for the worst". In the first scenario only weak measures are taken, whereas in the second scenario all will be done to reduce emissions.

²³ While forestry measures should be adopted in light of the undertakings given by the Community and the Member States at international level and be based on Member States' forestry plans, such measures should also take into account the specific problems of climate change. Council Regulation (EC) No 1257/1999 of 17 May 1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repealing certain Regulations

According to the Fourth Cohesion report for the 2000-2006 period over 13% of the Funds went to environmental objectives, expenditure being concentrated in Objective 1 regions and Cohesion countries. In particular a wide range of activities for renewable energy were supported by contributing directly to reducing greenhouse gas emissions.²⁴ Other measures addressed at safeguarding coastal areas, reducing hydro-geological or desertification risks, or related to water supply helped to mitigate and reduce the potentially negative effects resulting from climate change.

Box 5: Example of a renewable energy project financed in the 2000-2006 period

THE NATIONAL RENEWABLE ENERGIES CENTRE

Built with the help of ERDF funding, the National Renewable Energy Centre (CENER) is a technology centre in Sarriguren (ES), specialising in applied research and the development and promotion of renewable energies. It is highly rated and has acknowledged national and international prestige.

It began its activity in 2002 under the auspices of the Government of Navarra, the Ministry of Education and Science and the Research Centre for Energy, Environment and Technology (CIEMAT), which followed the approach of the Kyoto Protocol.

With its bio-climatic architecture entirely designed to minimise energy consumption (60% of which is already provided by renewable sources, with the plan to increase this to 100%), of the central CENER building is one of the international reference constructions in this field. With ultra-modern equipment including laboratories for the characterisation of thermal and photovoltaic solar panels, biomass analysis and testing, wind generator certification and an energy accumulation laboratory, it has everything it needs to conduct R&D activities related to renewable energies in five specific fields: wind power; solar energy (thermal and photovoltaic); biomass energy; bio-climatic architecture; electronics and power electronics, and the use of hydrogen for energy storage.

Apart from its impact locally on the economy of Navarre, in its four years of intensive activities, having mobilised a staff of 120 people in April 2006, most of whom were researchers, CENER has already acquired a solid reputation both nationally and internationally, with contracts in five continents.

Source: DG Regio – Success Stories

Recently, climate change came strongly to the fore and it is now a top priority for the Cohesion Policy, having been identified as one out of the four main challenges the EU regions will face in the future.²⁵ The Barca report underlines that all programmes supported by the Cohesion Policy had to contribute to the targets set by the European Union with the climate and energy package – by taking the price of carbon into account in the analysis of their net benefits; by actively contributing to the rebalancing of energy sources; by considering the possible effects of climate change on the returns from infrastructure and the feasibility of constructing it.

²⁴ Renewable energies were assessed in a recent study (Strategic evaluation on environment and risk prevention, GHK, Ltd, ECOLAS, IEEP, 2006) to be a potentially major factor in combating climate change and containing EU dependency on oil and gas.

²⁵ See *Regions 2020*, DG REGIO.

In the 2007-2013 programming period climate change is explicitly addressed more often and comprehensive strategies to tackle it have been adopted. The new Structural and Cohesion Funds regulations put greater emphasis than in the past on the environmental aspects of sustainable development. The general regulation mentions them in Article 3 about the definition of the Fund's objectives and missions while Article 17 places the action of the Fund entirely within the framework of sustainable development and within the aim of protecting and improving the environment. Moreover, the specific regulations of the Funds define the environmental measures eligible for funding and reiterate the objective of strengthening economic and social cohesion with a view to sustainable development. Among the eligible actions "energy efficiency and renewable energy" are specifically mentioned.

The environment in general and, more specifically, climate change issues have also been taken in account in the 2007-2013 Community Strategic Guidelines on Cohesion, when they call for:

- the need to expand the transport infrastructure (Action 1.1.1) and improve the environmental performance of modes of transport and their balanced distribution;
- improved energy-efficient and low energy-intensity development models (Action 1.1.3), and the promotion of renewable energies (RE) as well as alternative technologies;
- eco-innovations and the introduction of environmental management systems (1.2.3).

As confirmed by the evidence provided in the following chapter, a move in this direction has been included in the current allocation of Cohesion Policy funds for the 2007-2013 period, with increased resources (compared to the previous period), committed to renewable energy, increasing energy efficiency and other uses directly impacting on climate and "clean" modes of transport (such as railways and cycle paths). At the same time, however, a large share of funds is also allocated to investments in motorways and other roads.

1.5. A glance at the future

Cohesion Policy has an important responsibility in contributing to reaching the target of reduced GHG emissions at national and European level. Spain, Portugal, Greece and Ireland received the largest share of EU Structural and Cohesion Funds per capita in the 2000-2006 period, but also witnessed the greatest increase in greenhouse gas emissions in the whole EU.²⁶

A Cohesion Policy consistent with EU climate and energy objectives will have to focus on promoting low-carbon development in Member States and Regions. There is a broad consensus today that economic development with drastically reduced greenhouse gas emissions is technically and economically feasible, and that its benefits greatly outweigh the costs.

On the question regarding the scope for financing adaptation activities under Cohesion Policy after 2013, the work is only now beginning. For the next programming period (after 2013) making EU funding supportive of EU climate and energy goals requires:

- more balanced allocation of funds for transport: less funding for roads and more for public transport and railways;

²⁶ See: EU cash in climate clash: How the new Member States' structural funding plans are shaping up to fuel climate change. Comparative analysis of the 2007-2013 structural funding allocations for energy and transport in the new Member States. CEE Bankwatch Network and Friends of the Earth Europe, April 2007. http://www.bankwatch.org/documents/EU_cash_climate_clash.pdf

- increased and broadened support for energy efficiency and renewable energy.

Apart from direct funding for energy efficiency and renewable sources, it is equally important to ensure that the activities are, as a horizontal priority, integrated as much as possible into all other investments. For example, any investments of EU funds in buildings should be conditional on ambitious energy-saving standards and systematic integration of renewable energy technologies. Specific energy criteria and requirements going beyond the minimum legal norms would have to be stated in the Operational Programmes, the implementing documents, the calls for project proposals and the project selection criteria.

1.6. Concluding remarks

The EU plays a crucial role in facing climate change. The Structural Funds are expected to significantly contribute to the endeavours on two main grounds. First, the traditional fields of intervention of the EU Cohesion Policy can make a difference with respect to climate change. Important sectors not covered by the European Trading System such as construction and transport are important emitters of GHG. Also, the countries that are the most important beneficiaries of the EU Cohesion Policy are also important sources of GHG. Through explicit strategies, Structural Funds can significantly reduce their potentially negative impact on climate change. Second, the EU Cohesion Policy can promote a more proactive and positive approach dealing with climate change by raising awareness, implementing innovative approaches to reduce greenhouse gas emissions and encouraging initiatives to limit risks or mitigate effects of climate change that are, for the time being, inevitable.

2. ANALYSIS OF MEASURES AND INTERVENTIONS MOBILISED BY COHESION POLICY TO DEAL WITH CLIMATE CHANGE

KEY FINDINGS

- Although in the 2000-2006 programming period Member States already engaged a significant share of their Structural Funds budget in climate change-related policies (an overall Euro 14 billion, i.e. 6.4%), in the current 2007-2013 period the efforts are three times greater, the average share of Structural Funds spending rising to almost 15%.
- In the 2000-2006 programming period, no explicit strategy was adopted with respect to climate change. Measures contributed either to reducing greenhouse gas emission (GHG) or to mitigating and reducing the potentially negative effects resulting from climate change. In the current programming period, climate change is an issue explicitly addressed and comprehensive strategies are being implemented.
- Climate-harming expenditure (non-environmentally-friendly categories of interventions in transport and energy) has also been significant in the two programming periods, their share being higher than the climate-friendly ones in the 2000-2006 period. In the 2007-2013 period, however, a shift in the relative weight between climate-harming and climate-friendly measures was noted.
- Sustainable mobility (shifting to low emission modes, especially from road to rail transport) remains the top priority in terms of type of spending, accounting for more than 60% of spending in both periods, but the relative share decreased from the previous to the current period. Energy efficiency and renewable energy is the second top priority in terms of allocation of funds.
- There is no clear quantitative evidence that Structural Funds interventions can affect climate change – positively or negatively. This suggests that a comprehensive approach combining different sources of funding is needed and that the specific contribution of Structural Funds in the field of climate change is best appreciated qualitatively.

2.1. Introduction and methodology

This section presents an analysis of the Structural Funds expenditure mobilised to tackle climate change in the programming periods 2000-2006 and 2007-2013. The aim is to have a picture of how Cohesion Policy instruments deal with and can contribute to achieving the European goals in the field of climate change. The analysis here is presented in four different parts and consists of:

- a broad overview of the commitments to climate change issues at the European level in the two programming periods;
- an investigation of the composition of the above expenditure. The analysis identified seven policy areas to better understand how resources have been allocated in different sectors of planning;

- a correlation analysis of the relation between expenditure from Structural Funds and greenhouse gas (GHG) emissions, in order to illustrate the potential contribution of the Funds to the reduction of GHG emissions.

The methodology used relied on DG Regio data available on the programmed expenditure for both the 2000-2006 and the 2007-2013 programming periods. The dataset contains data on planned expenditure from the financial tables of approved Operational Programmes, at the national and regional level, in each Member State at the beginning of the two programming phases. For each Programme, it was possible to identify the expenditure allocated to single measures by priority, even if a full comparison between the two periods is not straightforward due to some limitations on data availability²⁷.

Table 1: Climate-related policy areas

| Policy area | FoI ²⁸ (2000-2006) | Codes ²⁹ (2007-2013) |
|---|---|--|
| Environmentally friendly technologies | 152 Environmentally-friendly technologies, clean and economical energy technologies 162 Environmentally-friendly technologies, clean and economical energy technologies (SMEs) | 06 Assistance to SMEs for the promotion of environmentally-friendly products and production processes |
| Energy | 332 Renewable sources of energy (solar power, wind power, hydro-electricity, biomass) 333 Energy efficiency, cogeneration, energy control | 39 Renewable energy: wind 40 Renewable energy: solar 41 Renewable energy: biomass 42 Renewable energy: hydro-electric, geothermal and other 43 Energy efficiency, co-generation, energy management |
| Environmental infrastructure (AIR) | 341 Air | 47 Air quality |
| Carbon Sinks | 126 Afforestation of non-agricultural land 127 Improving/maintaining the ecological stability of protective forests | N.A. |
| Sustainable mobility | 311 Rail 317 Urban Transport 318 Multimodal Transport | 52 Promotion of clean urban transport 16 Railways 17 Railways (TEN-T) 18 Mobile rail assets 19 Mobile rail assets (TEN-T) 26 Multimodal transport 27 Multimodal transport (TEN-T) |
| Mitigation and adaptation to climate change | N.A. | 49 Mitigation and adaptation to climate change |
| Management and risk prevention | N.A. | 48 Integrated prevention and pollution control 53 Risk prevention |

Source: Authors

²⁷ In particular, Cohesion Fund is not included in the 2000-2006 calculations, since data are not consistent with the classification adopted in Reg. 438/2001

²⁸ Commission Regulation (EC) No. 438/2001 of 2 March 2001

²⁹ Categorisation of funds assistance for 2007-2013, Codes for the priority theme dimension, Annex II, Commission Regulation (EC) No. 1828/2006.

In order to identify the sectors in which the Structural Funds invested resources to tackle climate change during the two programming periods, the study team carried out a selection of the Fields of Intervention (FoI) considered to be more relevant for the scope of this study. Although a lot of them are not exclusively devoted to climate change issues and also relate to other environmental interventions - such as air quality management or biodiversity protection - nevertheless, the selected FoI can be directly connected to some aspects of climate change and are therefore useful to better understand the impacts of Funds on it.³⁰

Table 1 illustrates the selection of FoI proposed and the correspondence between the 2000-2006 and 2007-2013 categorisation of expenditure. As a result of this exercise, Structural Funds expenditure has been included in the following policy areas:

- Environmentally-friendly technologies;
- Energy;
- Environmental infrastructure;
- Carbon sinks (relevant only for the 2000-2006 period);³¹
- Sustainable mobility;
- Mitigation and adaptation to climate change (relevant only for the 2007-2013 period);
- Management and risk prevention (relevant only for the 2007-2013 period).

2.2. Comparative analysis of 2000-2006 and 2007-2013 Structural Funds budget on climate change

During the 2000-2006 period, the Member States (EU-25) allocated about Euro 14 billion (6.4% of the total amount of Structural Funds³²) to measures related to climate change. Spain, Italy and Greece account for the largest amount of resources devoted to climate change in absolute terms, while Denmark and Slovenia have planned no investments in this field by means of Structural Funds. However, when considering the relative shares of total resources, a high percentage of investments towards climate change and environmental issues is observed in Lithuania (14% of total expenditure), Poland (13%) and Latvia (12%). Fewer resources were invested in Member States such as Sweden, Belgium and Luxembourg (see Table 2).

In the 2007-2013 period the picture changes radically, since Member States have planned to invest about Euro 51 billion (more than 14% of the total Structural Funds envelope) on climate change related measures. This amount is almost three times greater in absolute terms than that allocated in the 2000-2006 budgetary period and more than double in relative terms. Poland (with more than Euro 10 billion), Italy and Spain are the countries with the largest amounts of Structural Funds addressed to tackling climate change in absolute terms, while the countries occupying the first positions if the expenditure is analysed in relative terms, are Greece (23.7%), Hungary (19.8%) and Slovenia (19.5%). (see Table 3).

³⁰ Note that in Regulation 438/2001, natural hazards and flood control were not identified as specific Fields of Intervention, even though specific actions regarding these themes were implemented in the programmes.

³¹ Note that carbon sinks are no longer considered in the current programming, which, in contrast, foresees two new fields concerning climate change: management and risk prevention and a specific field called 'Mitigation and adaptation to climate change'. The introduction of these specific and dedicated policy areas is very important since it is a sign of the growing significance of the climate change issue in the European political agenda. Besides, this type of measure continues to be implemented through rural development programmes.

³² This figure does not include Cohesion Fund (see also footnote 27 and 28). Should Cohesion Fund be included (to the extent possible given the available disaggregation of data) this figure would become 9.0%. However this should be taken with care being not fully consistent with the FoI classification of Reg. 483/2001.

Table 2: Structural Funds³³ budget for climate change in 2000-2006 by country

| Country | Total Budget (€M) | % of total |
|---------------------------|-------------------|------------|
| Lithuania | 126.5 | 13.9 |
| Poland | 1,087.3 | 12.9 |
| Latvia | 76.5 | 12.1 |
| Ireland | 376.9 | 11.5 |
| Malta | 7.4 | 11.5 |
| Greece | 2,339.0 | 10.2 |
| Czech Republic | 146.8 | 9.1 |
| Slovakia | 96.5 | 8.4 |
| Italy | 2,555.0 | 8.1 |
| Spain | 3,651.1 | 7.6 |
| Portugal | 1,458.8 | 7.0 |
| Austria | 74.1 | 4.2 |
| Cyprus | 2.1 | 3.9 |
| Germany | 1,130.9 | 3.6 |
| Finland | 63.2 | 3.0 |
| Hungary | 55.9 | 2.8 |
| United Kingdom | 439.7 | 2.6 |
| France | 367.4 | 2.2 |
| Netherlands | 45.5 | 1.6 |
| Estonia | 6.0 | 1.6 |
| Sweden | 18.3 | 0.8 |
| Belgium | 13.1 | 0.6 |
| Luxembourg | 0.5 | 0.6 |
| Denmark | 0 | 0.0 |
| Slovenia | 0 | 0.0 |
| Cross Border and Interreg | 329.4 | 5.2 |
| EU-25 | 14,467.9 | 6.4 |

Source: Authors processing DG Regio data

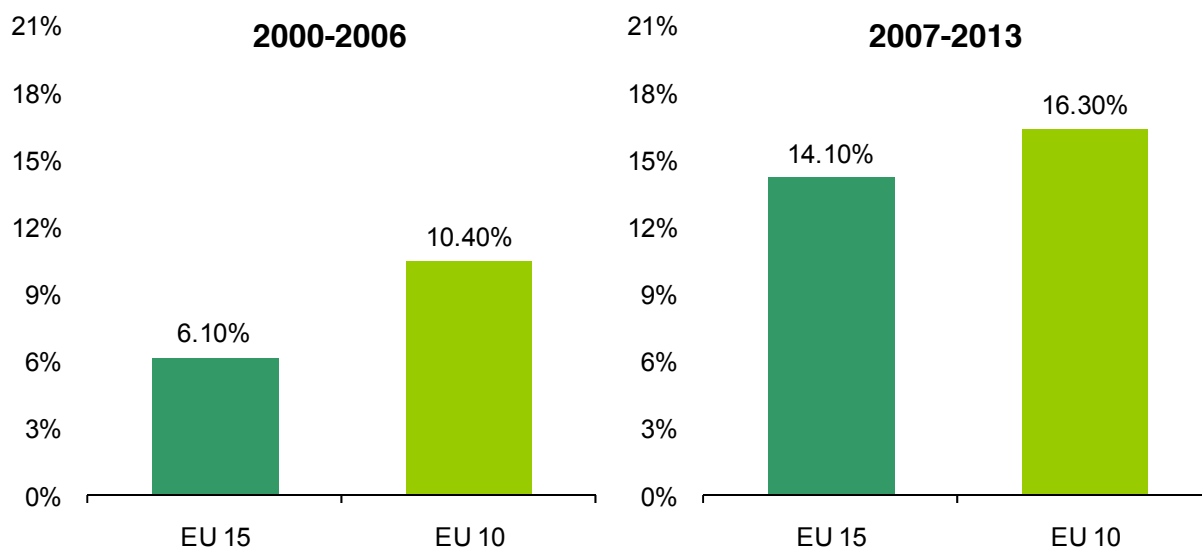
³³ Objectives 1,2,3 and Community Initiatives. It does not include Cohesion Fund.

Table 3: Structural Funds budget for climate change in 2007-2013 by country

| Country | Total Budget (€M) | % of total |
|----------------|-------------------|-------------|
| Greece | 4,784.6 | 23.7 |
| Hungary | 4,934.2 | 19.8 |
| Slovenia | 800.3 | 19.5 |
| Italy | 5,364.0 | 19.2 |
| Czech Republic | 4,964.5 | 18.9 |
| Poland | 10,256.3 | 15.7 |
| Slovakia | 1,761.2 | 15.5 |
| Spain | 5,261.0 | 15.2 |
| Romania | 2,804.0 | 14.6 |
| Bulgaria | 962.9 | 14.4 |
| Lithuania | 973.8 | 14.4 |
| Malta | 106.4 | 12.7 |
| France | 1,678.5 | 12.5 |
| Portugal | 2,380.7 | 11.1 |
| Latvia | 408.9 | 9.0 |
| Estonia | 306.0 | 9.0 |
| United Kingdom | 862.0 | 8.7 |
| Sweden | 135.2 | 8.3 |
| Germany | 2,068.3 | 8.1 |
| Ireland | 60.8 | 8.1 |
| Finland | 111.5 | 7.0 |
| Austria | 74.6 | 6.2 |
| Luxembourg | 3.0 | 6.0 |
| Cyprus | 35.7 | 5.8 |
| Netherlands | 95.5 | 5.3 |
| Denmark | 26.0 | 5.1 |
| Belgium | 53.4 | 2.6 |
| Cross Border | 1,221.0 | 15.7 |
| EU-27 | 51,273.3 | 14.9 |

Source: Authors processing DG Regio data

In both the 2000-2006 and the 2007-2013 programming periods the EU-12 (EU-10 in the previous period) devoted a larger share of funds to measures on climate change than the EU-15. However, while in the previous period this imbalance was quite significant (about 10.4% of total resources compared to 6.1%), this has been balanced in the new programming period (16.3% and 14.9%, respectively).

Figure 3: Climate change expenditure of EU-12 and EU-15: 2000-2006 and 2007-2013

Source: Authors processing DG Regio data.

An interesting corresponding analysis can be carried out to try to assess how much of their total financial resources the Structural Funds allocated to measures negatively impacting on climate change. In fact, the allocations of funds that lead to the detriment of climate protection are relatively high in both the programming periods considered.

In 2000-2006 the EU allocated around Euro 20.1 billion to 'non-environmentally-friendly' interventions in transport and energy.³⁴ In the current programming period (2007-2013) the amount for these interventions³⁵ is around Euro 43.5 billion in absolute value, doubling the value of the previous period.

This means that in the 2000-2006 period the percentage of funds allocated to climate harming measures was 9.1%, while 6.4% was allocated for climate protecting measures. The situation improved in the 2007-2013 period, where the percentage of funds allocated to climate harming measures is lower, but still relevant, than that devoted to adapting to and mitigating climate change (respectively 12.9% and 14.9%). In the period 2007-2013 EU-12 countries are the major investors in climate harming measures.

These figures are very significant because, although of course the blame cannot be put on EU funding, and given that these investments may be beneficial to the development of the region, this has somehow contributed to the trend of rising emissions especially by financing road infrastructures and supporting an energy-intensive economic growth model.

The EU transport policy is not fully consistent with this strategy. About Euro 76 billion of EU funding (28% of the total) is allocated for transport in the current programming and more than half (55%) will be invested for the construction of motorways and roads. This is a real issue in the EU-12 where more than a half of all the EU funds for transport are to be invested in roads and motorways.

This makes it clear that besides funding direct measures for climate change, a drastic shift in the long-term development strategies of the beneficiary countries, especially in the

³⁴ FoI (Fields of Intervention) considered: 312 Roads; 313 Motorways; 314 Airports; 331 Electricity, gas, petrol, solid fuel.

³⁵ Codes considered: 20 Motorways; 21 Motorways (TEN-T); 22 National roads; 23 Regional/local roads; 29 Airports; 33 Electricity; 34 Electricity (TEN-E); 35 Natural gas; 35 Natural gas (TEN-E); 37 Petroleum products.

transport and energy sectors, should be promoted and supported, especially for such interventions where an alternative to high emission infrastructures is available and feasible.

Table 4: Structural Funds budget for climate-harming measures in 2000-2006 by country

| Country | Total Budget (€M) | % of total |
|---------------------|-------------------|------------|
| Ireland | 780.4 | 23.8 |
| Greece | 4,424.8 | 19.2 |
| Malta | 11.1 | 17.1 |
| Slovakia | 172.8 | 15.1 |
| Spain | 6,471.9 | 13.6 |
| Poland | 996.2 | 11.9 |
| Hungary | 233.8 | 11.5 |
| Lithuania | 86.0 | 9.5 |
| Czech Republic | 150.7 | 9.3 |
| Germany | 2,668.8 | 8.6 |
| Portugal | 1,753.9 | 8.4 |
| Latvia | 48.4 | 7.6 |
| Italy | 1,553.3 | 4.9 |
| Cyprus | 1.7 | 3.0 |
| France | 430.0 | 2.6 |
| United Kingdom | 285.2 | 1.7 |
| Estonia | 2.8 | 0.8 |
| Finland | 13.3 | 0.6 |
| Netherlands | 8.7 | 0.3 |
| Belgium | 3.3 | 0.2 |
| Austria | 1.3 | 0.1 |
| Denmark | 0 | 0.0 |
| Luxembourg | 0 | 0.0 |
| Sweden | 0 | 0.0 |
| Slovenia | 0 | 0.0 |
| Cross border | 409.6 | 6.5 |
| EU-25 | 20,508.1 | 9.1 |

Source: Authors processing DG Regio data

Table 5: Structural Funds³⁶ budget for climate-harming measures in 2007-2013 by country

| Country | Total Budget (€M) | % of total |
|---------------------------|-------------------|-------------|
| Poland | 16,773.1 | 25.3 |
| Greece | 4,134.3 | 20.5 |
| Bulgaria | 1,114.9 | 16.7 |
| Slovakia | 1,965.1 | 17.3 |
| Romania | 3,054.7 | 15.9 |
| Malta | 133.1 | 15.9 |
| Czech Republic | 3,870.5 | 14.7 |
| Hungary | 3,439.1 | 13.8 |
| Latvia | 594.0 | 13.1 |
| Slovenia | 464.9 | 11.3 |
| Lithuania | 795.7 | 11.7 |
| Germany | 1,974.4 | 7.2 |
| Estonia | 293.3 | 8.6 |
| Spain | 2,528.4 | 7.3 |
| Portugal | 1,068.5 | 5.0 |
| Cyprus | 33.2 | 5.4 |
| Ireland | 20.0 | 2.3 |
| Italy | 821.4 | 2.9 |
| France | 156.5 | 1.2 |
| United Kingdom | 212.6 | 2.2 |
| Belgium | 14.2 | 0.7 |
| Sweden | 12.1 | 0.8 |
| Finland | 12.4 | 0.8 |
| Netherlands | 5.6 | 0.3 |
| Luxembourg | 0 | 0.0 |
| Denmark | 0 | 0.0 |
| Austria | 0 | 0.0 |
| Cross border and Interreg | 321.9 | 4.1 |
| EU-27 | 43,492.3 | 12.9 |

Source: Authors processing DG Regio data

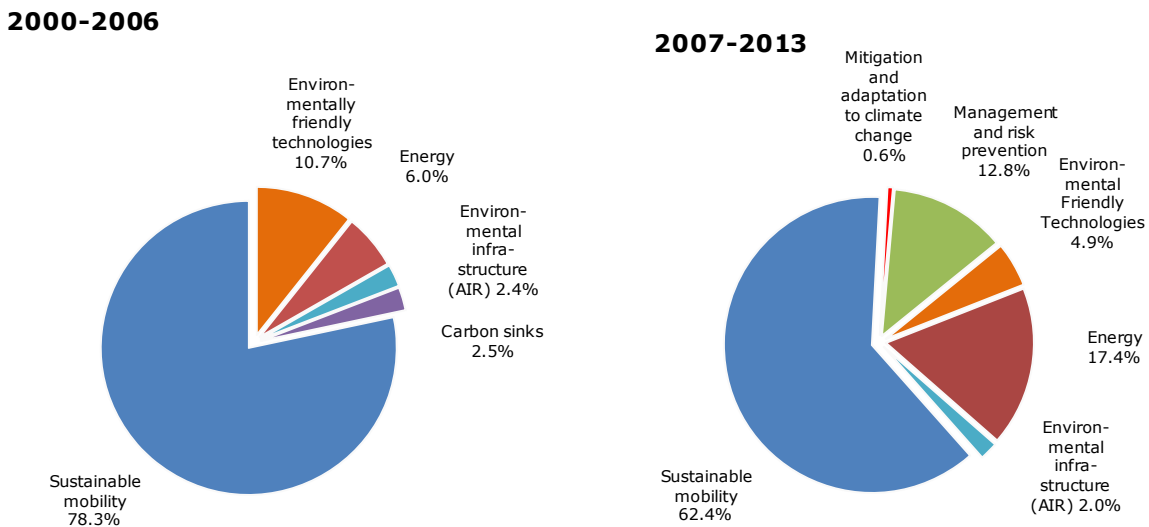
³⁶ Objectives 1, 2 ,3 and Community Initiatives. It does not include Cohesion Fund

2.3. Composition of Structural Funds budget for climate change

In order to deepen the analysis of the Structural Funds budget for climate change, it is useful to further analyse the breakdown of the planned budget by Fields of Intervention. The aim here is to identify the strategic sectors in which resources can be invested to tackle climate change.

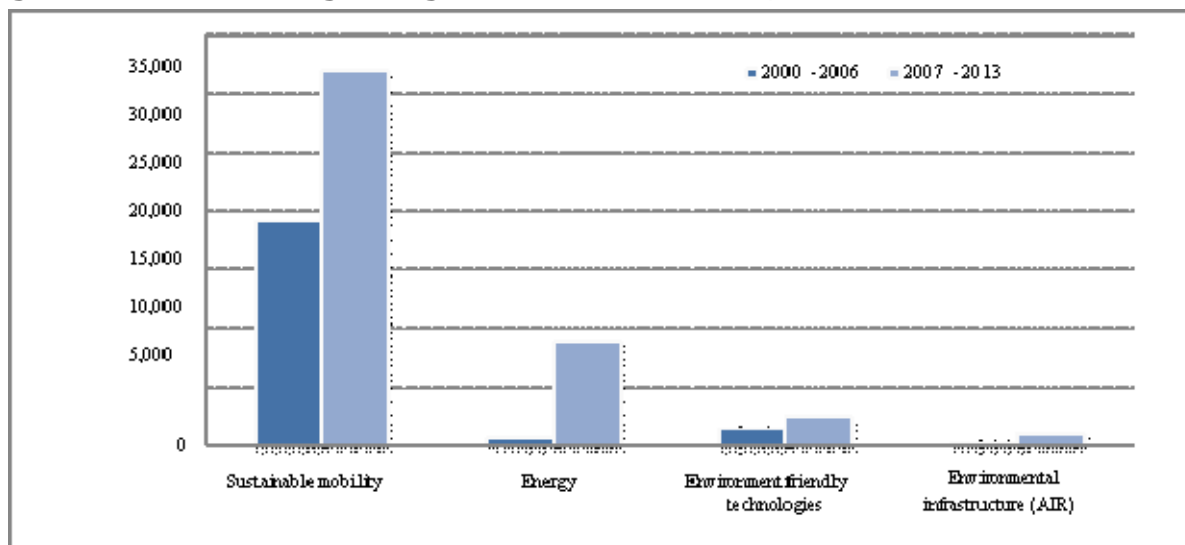
'Sustainable mobility' is the area absorbing the largest share of resources in both programming periods (78% in 2000-2006 and 63% in 2007-2013).

Figure 4: Composition of climate change budget by Fields of Intervention, % on Total.



Source: Authors processing DG Regio data

If absolute values are considered, however, the boost in some specific FoI from one period to the other is even more evident. The analysis can be carried out only for the four FoI common to both the periods. Data show that the major increase in percentage terms related to investments in the energy sector, where financial resources for the period 2007-2013 are almost six times greater than the previous period. However, all the sectors under investigation had their financial resources almost doubled from one period to the other.

Figure 5: Climate change budget of Structural Funds, Million Euro

Note: Only FoIs common to the two periods are taken into account here (carbon sinks, mitigation and adaptation to climate change, management and risk prevention are not considered).

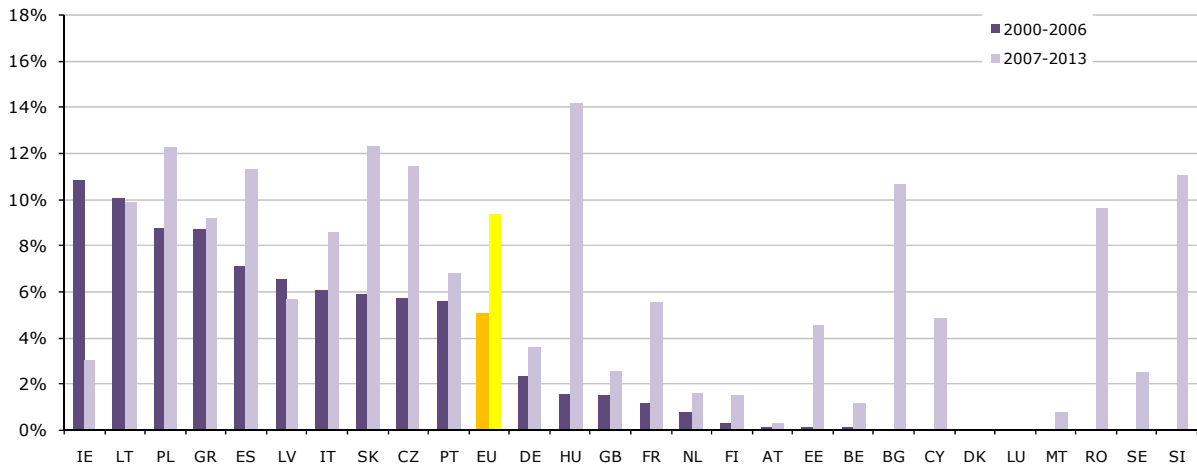
Source: Authors processing DG Regio data

Sustainable mobility

As already highlighted in Chapter 1, transport is the fastest growing source of greenhouse emissions: while the other GHG emissions have been generally decreasing, CO₂ emissions from transport have been soaring intensively. In particular, this is true for the EU-12, where CO₂ emissions increased by 40% over the 1995-2004 period. A strategy of shifting towards transport modes that produce lower GHG emissions and consume less energy is therefore crucial to achieve the climate change challenges. Transport emissions can be partly reduced through increased fuel efficiency and alternative fuels, but this is not sufficient even to offset the projected growth of transport volumes, which is faster than the expected efficiency gains. Thus, it is necessary to enhance the use of no-emission modes, such as for example rail. EU funds can help this mainly by modernising public transport and railways in order to provide an alternative to car and lorry transportation.

In the 2000-2006 period the whole EU had planned about Euro 14 billion in sustainable mobility through the Structural Funds; in particular, the largest share of funds was devoted to improve the rail network. Ireland and Lithuania are the countries investing the largest share - about 10% - of total Structural Funds in actions related to sustainable mobility. Spain has also reserved more than Euro 3 billion for this field, the largest share being for railway projects

In the 2007-2013 period, about Euro 76 billion was devoted to improving Member States' transport infrastructures. Of this, about Euro 32 billion - equivalent to 28% of the total Structural Funds - were for the promotion of clean, sustainable mobility.

Figure 6: Share of Structural Funds for sustainable mobility: 2000-2006 and 2007-2013

Source: Authors processing DG Regio data

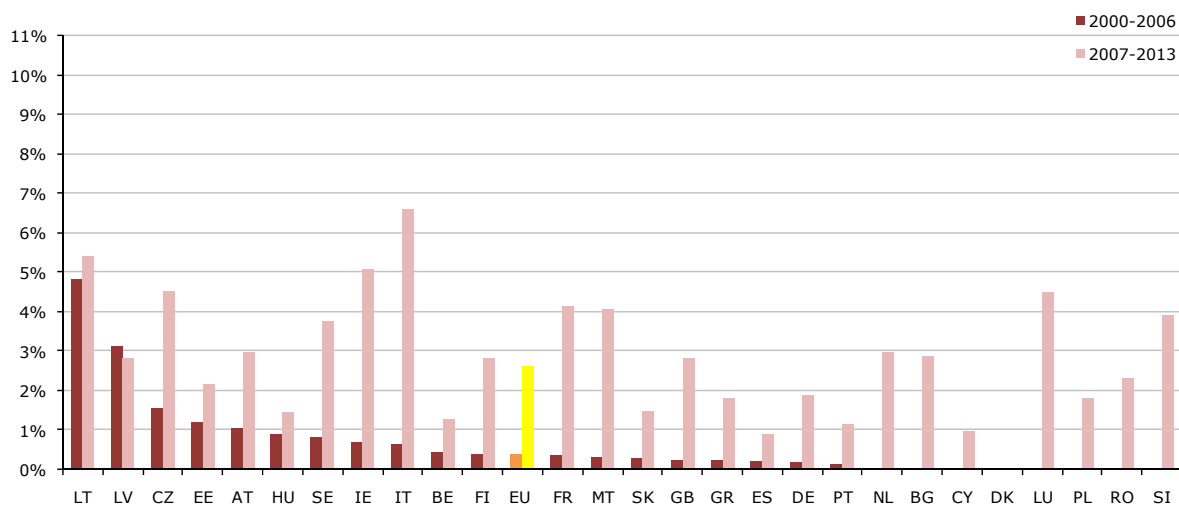
Energy

The energy sector is a crucial policy area since the benefits of efficient and renewable energy sources are widely known. However, in the 2000-2006 period the majority of EU Member States devoted only a negligible share of the Structural Funds to promoting renewable sources of energy such as solar power, wind power, hydro-electricity, and biomass: the average share allocated to this priority at the European level was only 0.4%.

Energy efficiency and renewable energy are today at the top of the European political agenda and are emphasised as one of the 12 priority areas for the Structural Funds investment by the Community Strategic Guidelines for Cohesion 2007-2013. The importance of energy efficiency and renewable energy within Cohesion Policy was further reinforced by the so-called Lisbonisation of Cohesion Policy.

This tendency is immediately visible when analysing the composition of the expenditure in the new programming period. The EU-27 have indeed devoted a total amount of Euro 9 billion to energy efficiency and renewable energy sources, which represents 2.6% of total funds. In the EU-12 the share is slightly lower, standing at 1.5%. This funding is split more or less equally between energy efficiency and renewable sources of energy.

Figure 7: Share of Structural Funds for energy efficiency and renewable energy: 2000-2006 and 2007-2013



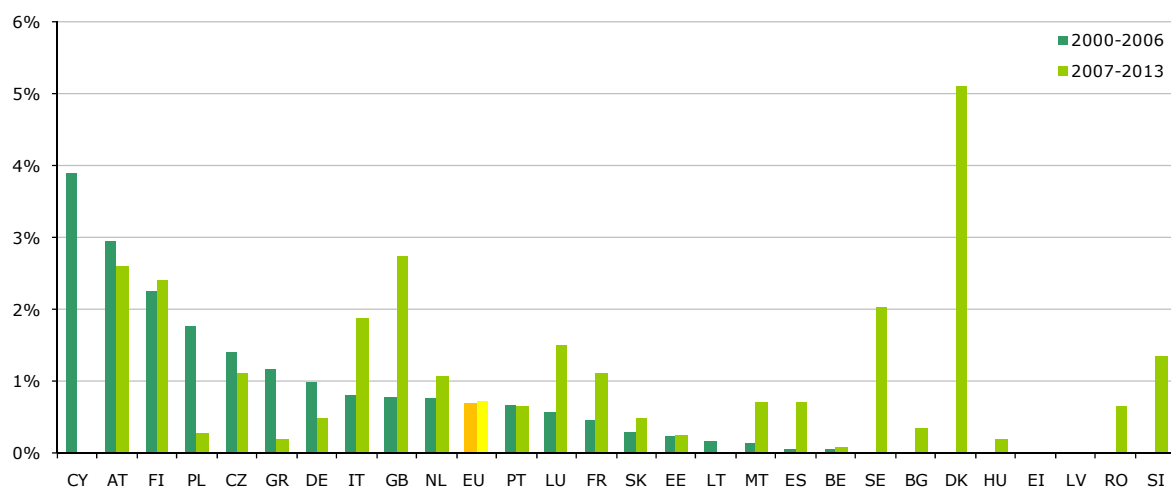
Source: Authors processing DG Regio data

Environmentally-friendly technologies

The Cohesion Policy provides the opportunity to promote environmentally-friendly products and production processes for both large companies and SMEs. Under the broad heading of business support, this is still an innovative form of support, compared to more traditional measures of physical capital investment and business services. Germany, with around Euro 313 million, is the country that spent most in absolute terms.

The picture does not change radically if we analyse the relative expenditure for the period 2007-2013. The Cohesion Policy will still provide a relatively significant amount of financial resources for the promotion of environmentally-friendly products and production processes in SMEs. However, only 11 countries decided to devote more than 1% of their resources to measures in this field, e.g. the promotion of eco-innovation and new “green-collar” jobs, especially in small and medium-sized enterprises (SMEs).

Figure 8: Share of Structural Funds for environmentally-friendly technologies: 2000-2006 and 2007-2013

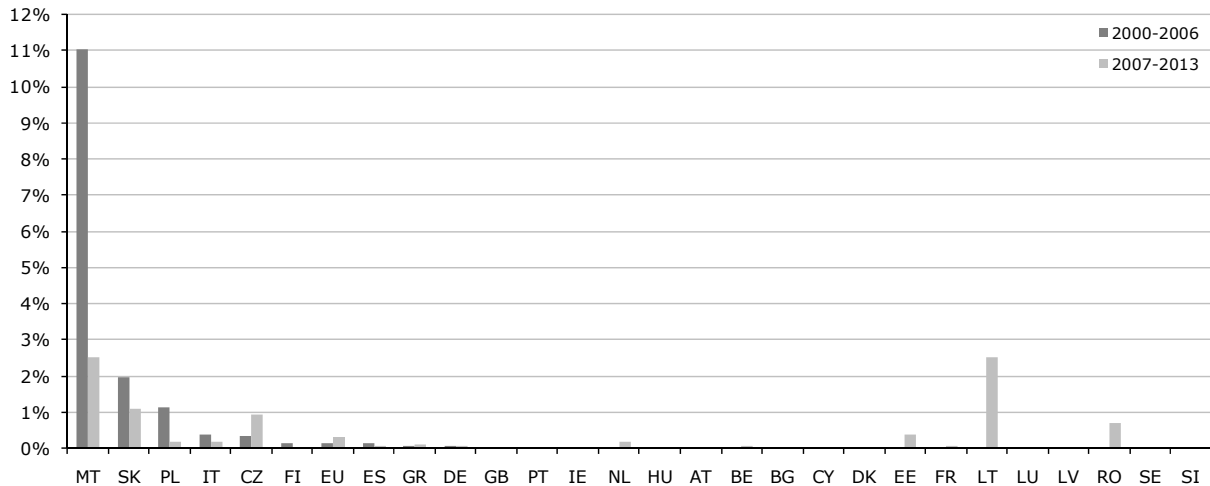


Source: Authors processing DG Regio data

Environmental infrastructures (AIR)

In the period 2000-2006 the EU-25 earmarked about 3% of the total Structural Funds for Environmental infrastructures - air. Malta allocated a high share of resources (11%), but this corresponds to only about Euro 7 million, the country that devoted the highest amount was Italy with more than Euro 121 billion.

Figure 9: Share of Structural Funds for environmental infrastructures (AIR): 2000-2006 and 2007-2013



Source: Authors processing DG Regio data

Also during the period 2007-2013 a marginal expenditure was programmed for interventions aimed at improving environmental infrastructures related to air pollution. Only 15 countries planned actions within this policy area.

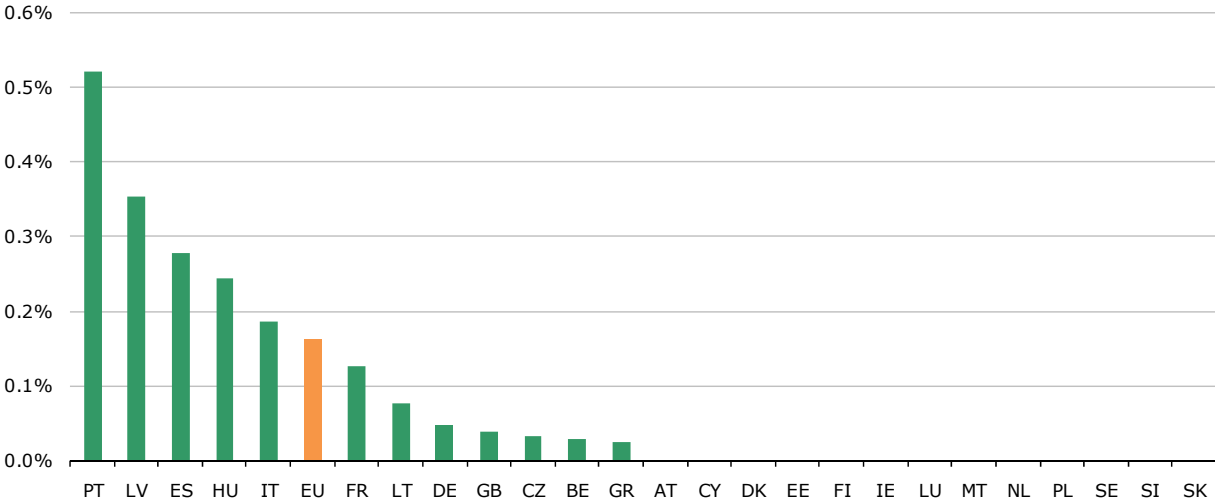
Carbon sinks

There are two important links between forests and climate change. First, forests play an important role in regulating the earth's temperature and weather patterns by storing large quantities of carbon and water. Second, climate change is believed to affect up to two-thirds of existing forests, thereby exacerbating deforestation and its associated problems. Forests are considered natural carbon sinks³⁷. Moreover, events such as forest fires have an even more negative effect, since the destruction of forests increases the amount of carbon dioxide in the atmosphere. It is clear that 'afforestation' of non-agricultural lands and improvement and maintenance of the ecological stability of protective forests³⁸ are important elements for climate change adaptation actions. But, at the same time, the analysis of the 2000-2006 expenditure also highlighted that the efforts towards these measures could be improved. In fact, during the 2000-2006 period, no country planned a share of the total Structural Funds above 0.6% for this priority.

³⁷ The concept of carbon sinks is based on the natural ability of trees, other plants and the soil to soak up carbon dioxide and temporarily store the carbon in wood, roots, leaves and the soil. Source: <http://www.fern.org/pages/climate/carbon.html>

³⁸ FoI 126 and 127 of the programming period 2000-2006

Figure 10: Share of Structural Funds for carbon sinks: 2000-2006



Source: Authors processing DG Regio data

This is also confirmed by Table 6, showing that almost all of the Structural Funds were allocated to measures aimed at directly reducing greenhouse emissions (about 97% of the total funding dedicated to climate change) rather than to actions oriented to increasing the sinks of greenhouse gases.

In the 2007-2013 budgetary period measures related to carbon sinks were partly included in the new field "Mitigation and adaptation to climate change" and are partly financed under the rural development programmes, which are no longer under the Structural Funds.

Table 6: Structural Funds budget on carbon sinks vs. reduction in GHG emissions, 2000-2006

| 2000-2006 | Total budget for climate change (Euro) | Budget for carbon sinks (% of total climate change) | Budget for GHG emissions reduction (% of total climate change) |
|------------------|---|--|---|
| Spain | 3,651.1 | 3.6 | 96.4 |
| Italy | 2,554.9 | 2.3 | 97.7 |
| Greece | 2,338.9 | 0.2 | 99.8 |
| Portugal | 1,458.8 | 7.4 | 92.6 |
| Germany | 1,130.9 | 1.3 | 98.7 |
| Poland | 1,087.3 | 0.0 | 100.0 |
| United Kingdom | 439.7 | 1.5 | 98.5 |
| Ireland | 376.9 | 0.0 | 100.0 |
| France | 367.4 | 5.6 | 94.4 |
| Czech Republic | 146.8 | 0.3 | 99.7 |
| Lithuania | 126.5 | 0.5 | 99.5 |
| Slovakia | 96.5 | 0.0 | 100.0 |
| Latvia | 76.5 | 2.9 | 97.1 |
| Austria | 74.1 | 0.0 | 100.0 |
| Finland | 63.2 | 0.0 | 100.0 |
| Hungary | 55,9 | 8.8 | 91.2 |
| Netherlands | 45.5 | 0.0 | 100.0 |
| Sweden | 18.3 | 0.0 | 100.0 |
| Belgium | 13.1 | 4.2 | 95.8 |
| Malta | 7.4 | 0.0 | 100.0 |
| Estonia | 5.9 | 0.0 | 100.0 |
| Cyprus | 2.1 | 0.0 | 100.0 |
| Luxembourg | 0.5 | 0.0 | 100.0 |
| Denmark | 0 | 0.0 | 0.0 |
| Slovenia | 0 | 0.0 | 0.0 |
| EU-25 | 13,784.5 | 2.6 | 97.4 |

Source: Authors processing DG Regio data

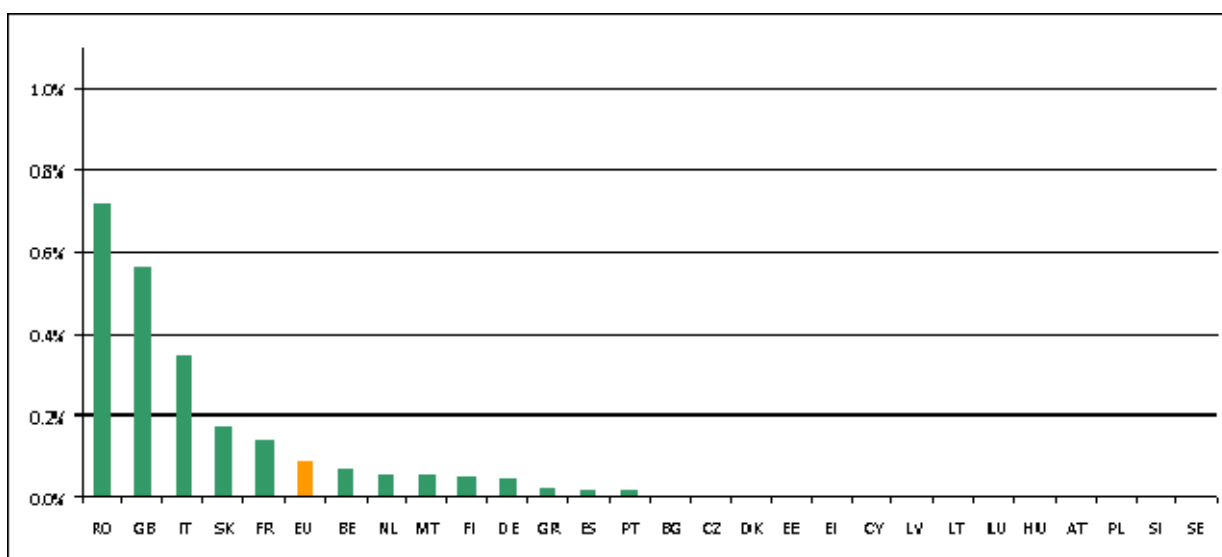
Management and risk prevention

Extreme weather events (hurricanes, storms, flooding, drought and heat waves) are likely to become more common, more widespread spatially and of increased severity. Melting glaciers will increase flood risks during the wet season and reduce dry season water supply. Ocean acidification will have major effects on marine ecosystems and fish stocks could dwindle. Crop and livestock production patterns and productivity will be impacted by changing climate and expected changes in pests and diseases. As ecosystems change a growing number of plant and animal species will probably face extinction, and some ecosystems might disappear or be radically transformed.

Many countries are now taking measures to prevent risks that could derive from the impact of floods, droughts and tropical cyclones on climate change. Other types of measures are related to the prevention and the control of pollution. This type of measure has been introduced in the current programming period because it is now clearer that it is important to strengthen the integration between adaptation to climate change and disaster reduction into policy, capacity-building, and sustainable development programme-design. If not appropriately managed, some of the risks deriving from climate change could have potentially irreversible consequences on a scale that could threaten social stability and have international repercussions.

The average Structural Funds expenditure at the European level on management and risk prevention is 0.09% of the total resources.

Figure 11: Share of Structural Funds for management and risk prevention: 2007-2013

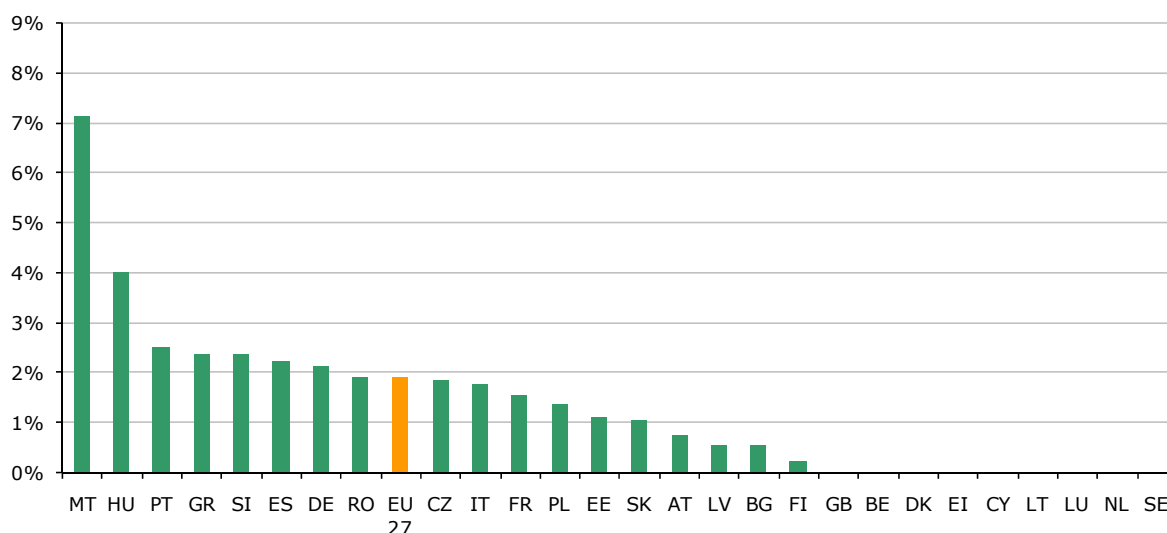


Source: Authors processing DG Regio data

Mitigation and adaptation to climate change

This Field of Intervention was introduced in the period 2007-2013 in order to capture the Structural Funds investment directly addressed to climate change measures. It witnesses the strategic importance that was given to this issue in the new planning period. However, in terms of relative share, only 0.1% of the Funds will be used to finance projects directly linked to this priority and only 11 countries have planned to invest some resources in this field (almost always less than 1%).

Figure 12: Share of Structural Funds devoted to mitigation and adaptation to climate change: 2007-2013



Source: Authors processing DG Regio data

2.4. Relation between Cohesion Policy budget and green house gas emissions

After this overview about how much the Structural Funds invest in measures affecting climate change, it is useful to scrutinize if any relation exists between the Structural Funds budget on climate-related measures and the performance of the Member States in terms of efforts to reduce greenhouse gas emissions. A very simple statistical analysis of possible correlations is presented in this section. The aim here is not to find a causal relationship, which is impossible given the data available, but to investigate whether consistent policy choices were made and if improvements are advisable in this sense.

Since many regions and States did not implement advanced monitoring systems for climate change issues, a useful indicator available at EU level is GHG emissions, which could be considered as a proxy of national efforts to address climate change issues. Although an analysis at a regional level would be by far more appropriate for a Structural Funds assessment, it should also be considered that the level of GHG emissions is the only indicator available with a clear policy target fixed at a European level (the Kyoto target). This indicator is analysed here together with the Structural Funds budget for climate change in each Member State.

Member States were analysed on the basis of the dynamics assumed by two variables:

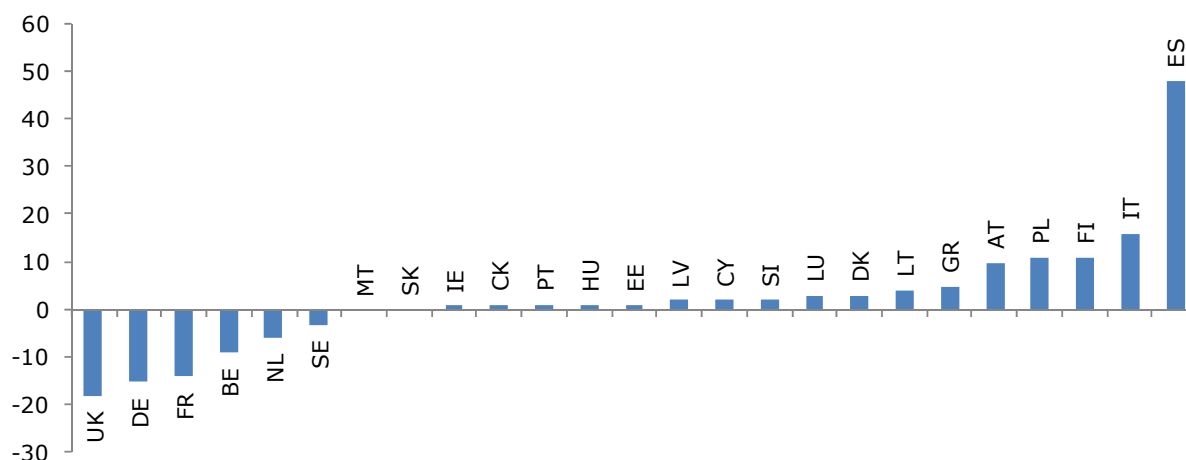
- the variation in GHG emissions between 2000 and 2006;
- the net Structural Funds budget for climate-friendly measures in 2000.³⁹

The time span of the analysis allows us to compare the situation at the time the policy decision was taken (1999) with the situation at the time the effects of the decision could be observed (2006).

³⁹ The Structural Funds budget was calculated as the share of funds devoted to climate friendly measures net of the funds devoted to climate harming interventions. For the identification of the Fields of Intervention selected for both climate-friendly and climate-harming measures see par. 2.1.

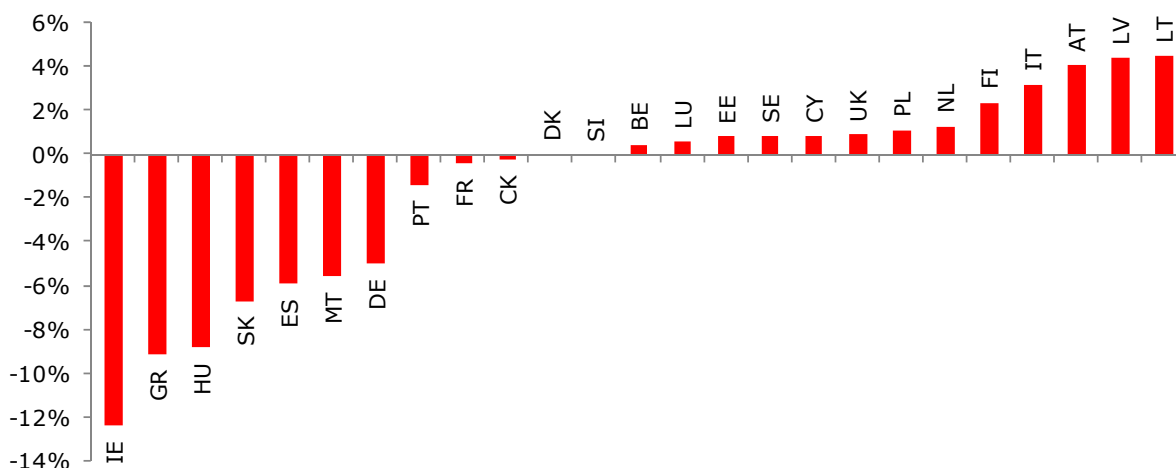
Figures 13 and 14 below show the Members' performances according to changes in GHG emissions and the net Structural Funds budget for climate-friendly measures.

Figure 13: Change in GHG emissions in EU-25 Member States, 2006-2000



Source: IPCC

Figure 14: Net share of Structural Funds budget on climate-friendly measures 2000-2006*



*Negative shares mean higher budget for climate harming than for climate friendly measures

Source: Authors' processing of DG Regio data

In order to investigate potential correlations between GHG reductions and the Structural Funds budget, countries are ranked in terms of their performance in GHG reduction and the budget allocated in favour of tackling climate change. By means of the calculation of the cumulative distributions, three categories of countries⁴⁰ are identified corresponding to high, medium and low performances.⁴¹ A table bringing together the dynamics of the two variables was thus produced.

⁴⁰ The 'low' group corresponds to 30% of the distribution, 'medium' is between 30% and 70%, and 'high' is above 70%

⁴¹ With regard to the GHG emissions, high performing countries are those with the greater negative variations, i.e. showing a reduction in emissions.

When a country with a high (or low) level of net Structural Funds budget in measures tackling climate change records, at the same time, a high (or low) performance in GHG emissions - i.e. it significantly reduced (or increased) its emissions - it can be inferred that there is a positive correlation between Structural Funds interventions and reduction of emissions. Even without attempting to infer a causal relation (which this exercise would not identify with sufficient reliability, in any case), this simple exercise allows one to determine if there is consistency between regional policy strategies and effects on emission trends.

Table 7: Classification of Member States according to regional strategy tackling climate change and the reduction of GHG emissions

| | | Regional strategy tackling climate change (net share of Structural Funds budget) | | |
|----------------------------|--------|--|--|--------------------------------|
| | | High | Medium | Low |
| Reduction of GHG emissions | High | Netherlands United Kingdom | France Belgium Sweden | Germany Malta Slovakia |
| | Medium | Latvia | Czech Republic Estonia Denmark Slovenia Cyprus Luxembourg | Ireland Hungary Portugal |
| | Low | Lithuania Austria Poland Finland Italy | | Greece Spain |

Legend:

| | | |
|---|---|---|
| Positive relation: high (low) budget and high (low) reduction | Negative relation: low (high) budget and low (high) reduction | No relation |
|---|---|---|

The results highlight that only for 10 countries out of 23, there is consistency between policy choices regarding Structural Funding and impact on climate change. For example, for the period 2000-2006 Greece and Spain show a negative net expenditure on climate-friendly measures (more climate-harming measures than climate-friendly ones were implemented). This, in turn, is reflected in a negative variation (increase) in emissions. At the same time, the Netherlands and the United Kingdom show an opposite trend, with a high reduction in emissions correlated with a high share of investments in mitigating climate change. Countries like Denmark and the Czech Republic are placed in a mid-way situation. For some countries this relation is negative: high budgets for climate-friendly measures are coupled with low reductions in emissions, and the opposite if vice versa. In some countries (Latvia, Austria, Poland, Finland and Italy) the greater the Structural Funds budget allocated to actions addressing climate change, the higher the emissions of GHG. In contrast in countries such as Germany GHG emissions were consistently reduced, despite a low budget dedicated to tackling climate change. Explanations may be that somehow Structural Funds strategies do not reflect major policy choices influencing GHG emissions at a national level, or that they have a negligible influence over the national performance in terms of GHG reduction.

For all the other countries it is not possible to find any kind of relationship (and therefore consistency) between GHG emissions and the regional strategy adopted.

Such results confirm the difficulty in demonstrating that the interventions implemented under the framework of the Cohesion policy had an identifiable effect on the mitigation of climate change at a national level.

Some elements that can explain the lack of correlation between financial support from Funds to actions addressing climate change issues and GHG emissions are:

- the financial contribution of Structural Funds to tackling climate change issues is still limited and not able to produce relevant effects in terms of prevention and reduction of emissions;
- the financial contribution of Structural Funds to development and economic growth is very limited in many members of the Union (in terms of percentage of GDP);
- a longer time span is necessary before tangible results can be produced in terms of GHG emissions.

Previous conclusions do not imply, however, that at the regional or project level Structural Funds are disconnected from GHG emissions. As a matter of fact, many case studies demonstrate the strong link between Structural Fund expenditure and the reduction of emissions or the mitigation of natural hazards due to climate change. However, such links - maybe evident at a territorial level - do not support a statistical significance at a more aggregate (i.e. national) level.

2.5. Concluding remarks

- Climate change is a classic example of a cross-border problem best tackled at the European level and, although Structural Funds are only one of the instruments available to tackle climate change, their role is crucial. The descriptive statistical analysis has shown a significant increase in EU funding dedicated to climate change in the new programming period (almost four times greater than the funding addressed at contrasting climate change in the previous period).
- This, however, may not be sufficient to reach the ambitious targets set by the EU (to reduce GHG emissions by 20% by 2020 and to increase the share of renewable energy supply to 20% and the share of bio-fuels consumed in transport to 10%), also considering that a still significant share of Funds are at the same time invested in climate-harming measures (15% of budget compared to 13% for climate-friendly measures).
- In decision-making an increasing consideration of adaptation interventions is expected to lead to the development of new assessment tools and to more integrated adaptation measures. Most climate change impacts are indeed adverse, and generally expected to worsen, so there is a general need for countries to also adapt to climate change. Adaptation options are already available, and are usually location- and sector-specific. Adaptation is seldom undertaken for the sake of climate change alone, and is generally integrated into cross-cutting and precautionary policy actions, such as disaster preparedness, coastal zone management, rural development, health services, spatial planning and regional development, ecosystem and water management.
- If the EU wants to meet its ambitious climate change targets then it needs to consider the coherence and potential contribution of all of its policies and instruments. Future European Union expenditure is an essential element of a successful response, and

additional public investment is required to tackle climate change. The current EU budget may well increase rather than reduce GHG emissions, due to investments in high carbon transport and energy infrastructures and the impact of intensive farming practices. In transport, for example, the Trans-European Networks have contributed to increasing carbon dioxide emissions and, despite their initial purposes, they have been used primarily by local and regional traffic. This trend seems destined to continue. Energy efficiency and renewable energy account for just 3% of proposed Structural Funds investment and transport policy is overwhelmingly focused on roads and motorways without any particular references to the climate implications in Member States' plans.⁴²

- Many studies (like the Stern report) show that the international community needs to increase public and private investments in low carbon solutions in order to avoid external costs later. A reorientation of public expenditure may, therefore, be an indispensable part of an effective global response, both to reducing greenhouse gas emissions (mitigation) and to adapting to unavoidable climate change. Within this framework, great importance is assumed by the shift towards environmental-friendly modes of transport, which seems to be one of the most effective tools in mitigating climate change.

⁴² A study has affirmed the conviction that motorways are essential to regional development and employment creation but, as the European Federation for Transport and Environment puts it: "Building road infrastructure inflates transport demand just as printing money creates inflation". From *Transport and Economy: the Myths and the Facts*. European Federation for Transport and Environment (T&E) and Stichting natuur en milieu, 2001

3. EVIDENCE FROM TWO CASE STUDIES: FINLAND AND ITALY

KEY FINDINGS

- National case studies on the use of Structural Funds to address climate change confirm that in the new planning period policy awareness on climate change has risen, and the Operational Programmes financed over the period 2007-2013 take into account in a more direct, explicit and integrated way interventions in the fields of energy efficiency, sustainable mobility and support to firms
- The new generation of Structural Funds programmes are more dedicated to explicit climate change interventions and a shift is visible from the more traditional broad environmental policies (water management, energy efficiency and waste treatment) to interventions targeting climate change (reduction of emissions, risk prevention and renewable energy).
- Although most of the projects financed in the previous period could be broadly classified under the heading of environmental policy rather than under climate change as such, they indirectly contributed to the reduction of GHG (for example by promoting bio-energy production and use) and to mitigating the effects of natural damage (by supporting interventions to reduce hydro-geological risks).

This chapter reports the main findings of two case studies on how climate change is addressed by Structural funding in Finland and Italy, respectively. The choice of these two countries and the selection of the specific programmes and projects that were the subject of in-depth study were made on the basis of the statistical analysis presented in Chapter 2. As a matter of fact, the two countries are representative of different challenges arising from climate change (see Annex I), they are both quite active in the field, at least judging by the expenditure committed, and they have been implementing programmes and measures in different areas representative of the different possible policy options. Overall, the aim of the analysis is to identify specific delivery mechanisms and highlight national and regional differences in policy choices and implementing mechanisms when implementing climate change-related initiatives.

Below the national frameworks dealing with climate change in both Finland and Italy are first briefly presented in order to acknowledge the fact that Structural Funds do not operate in a policy vacuum, but rather draw from national experiences. An overview of how Structural Funding dedicates resources to climate change issues in the two countries is then proposed, before an in-depth analysis of the programmes and projects is carried out.

3.1. Policy instruments and strategies adopted at national and regional level to tackle climate change

National policy frameworks in the field of climate change vary greatly. In this respect the policy in place in Finland is more structured and wider-ranging than that in Italy.

Finland followed the common position of the European Union in international climate negotiations. Together with the other EU countries, Finland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994 and the Kyoto Protocol in 2002. Finland is committed under the Kyoto Protocol to bringing national average annual emissions down to their 1990 level over the period 2008–2012.⁴³ Moreover, in the framework of the decision concerning climate and energy policy adopted by the European Council in 2007, which has legally enforceable targets divided equitably between Member States, Finland committed itself to a 16% reduction for its sectors not covered by the emissions trading scheme (non-ETS sectors). This reduction of emissions was based on 2005 levels.

In 2001 the Finnish Government prepared a National Energy and Climate Strategy containing a programme of measures designed to meet Finland's Kyoto targets over 2008–2012. This strategy was updated in 2005 when the Government finalised a revised National Climate and Energy Strategy. According to the Strategy, the programme promoting renewable energy, energy taxation and the energy conservation programme are essential means in order to reduce greenhouse gas emissions. The implementation of the Climate Strategy is coordinated by the Ministry of Employment and the Economy.

An updated version of the National Energy and Climate Strategy outlines measures to enable Finland to meet the targets for greenhouse gas emissions set by the Kyoto Protocol. More detailed information on existing policies and measures is given in the Annex. Confirming the cross-cutting nature of the climate change issue, many different Ministries in Finland engaged in some initiatives on the theme (see Box 6 below).

In 2006 Finland published the Fourth National Communication under the UNFCCC. This National Communication was prepared jointly by numerous governmental bodies. The work was coordinated and the report compiled by the government agency Statistics Finland. The Finnish Government prepared a Foresight Report on climate and energy policy and submitted it to Parliament in November 2008.⁴⁴ The aim of this report is to outline long-term climate and energy policies and to propose measures for action. The report covers both the control of climate change and the adaptation to its effects until 2050.

⁴³ Finland is implementing the Kyoto Protocol. 2008. Ministry of the Environment, Finland. (The next three sections are also based on this document.)

⁴⁴ Pitkän aikavälin ilmasto- ja energiastrategia. Valtioneuvoston selonteko eduskunnalle 6. päivänä marraskuuta 2008. Työ- ja elinkeinoministeriö.

Box 6: Finnish initiatives at Ministry level**FINNISH INITIATIVES AT MINISTRY LEVEL**

In 2003 the Ministry of Agriculture and Forestry coordinated the preparation of the National Strategy for Adaptation to Climate Change.⁴⁵ The need to draft a programme for adaptation was identified in Parliamentary responses to the National Climate Strategy, which was submitted to Parliament in 2001. FINADAPT (assessing the adaptive capacity of the Finnish environment and society under a changing climate) was a consortium of 11 partner institutions studying adaptation to the potential effects of climate change in Finland. Studies were carried out in 2004-2005 as part of the Finnish Environmental Cluster Research Programme, which was coordinated by the Ministry of the Environment. The Ministry of Agriculture and Forestry is coordinating the Climate Change Adaptation Research Programme ISTO. The purpose of this programme is to support the implementation of the National Strategy for Adaptation to Climate Change.⁴⁶

The Ministry of Transport and Communications published the National Programme for Climate Policy in March 2009. The programme outlines the concrete climate targets in this sector, the activities required to reach them and an assessment of the activities for omission reductions and costs. The activities of the programme concentrated on road transport, especially on passenger transport.⁴⁷

Source: Case study report

Compared to other countries, and to Finland in particular, Italy has not yet prepared a comprehensive and integrated national strategy to tackle climate change issues. In the national Sustainable Strategy, approved in 2002,⁴⁸ climate change is one of the chapters dedicated to environmental protection, but it has no clear objectives in terms of policy instruments and financial resources. However, some sectoral policies have been implemented in the last decade mainly in the field of energy saving, energy efficiency (for example the action plan for energy efficiency in 2007) and renewable energy promotion with obvious effects in terms of CO₂ emissions reduction and prevention. These policies are mainly based on fiscal incentives.

Other policies, not directly linked to CO₂ reduction (thus not directly complying with Kyoto targets), but dealing with prevention and adaptation to the effects of climate change have also been implemented at sectoral and territorial levels. An example of an initiative dealing with the prevention of natural hazards and risk management is a law adopted in 1989 (law no. 152/89), regarding flood control and river basin management.

⁴⁵ Ilmastonmuutoksen kansallinen sopeutumisstrategia (Climate change national adaptation strategy). 2005. MMM:n julkaisuja 1/2005. Maa- ja metsätalousministeriö.

⁴⁶ Finland is implementing the Kyoto Protocol. 2008. Ministry of the Environment, Finland. (The next two sections are also based on this document.)

⁴⁷ Liikenne- ja viestintäministeriön hallinnonalan ilmastopoliittinen ohjelma 2009-2020. Liikenne- ja viestintäministeriö. 17.3.2009.

⁴⁸ Resolution no. 57 of the CIPE (Interministerial Committee for Economic Planning).

Box 7: Italian energy policies

ITALIAN ENERGY POLICIES

The Italian normative background promotes renewable energy sources, such as solar energy, wind, geothermal and hydro-power through fiscal incentives and direct subvention to energy producers. For example, Green certificates (see the law of 19 February 2007) are distributed to allow renewable energy producers to sell electricity to power distributors at good prices (higher than conventional electricity prices). Direct subvention to renewable energy plants (based on the power produced) is also fixed for individuals (for small plants). In Italy energy saving for buildings was promoted by law no. 192/2005, through specific measures concerning the insulation and renovation of buildings. For example, fiscal incentives have been implemented to reduce the charges paid by individuals for building renovation. In the field of energy efficiency (law of 20 July 2004), White certificates (based on the same model as the Green certificates) are distributed to individuals and public bodies who may then exchange such certificates at a fixed price. Note that the law of 8 February 2007 also promoted combined power generation (cogeneration of heat and power).

Source: Case study report

3.2. Overview of how climate change issues were taken into account in the two programming periods 2000-2006 and 2007-2013

Over the 2000-2006 programming period themes such as sustainable development, energy efficiency, and natural preservation were given one of two levels of priority in Structural Fund programmes:

- they were included as final objectives of the programme strategy: the natural environment and the use of resources was seen as an asset as such and its valorisation and conservation a final regional development objective;
- they were instrumental objectives, useful to reach higher productivity or better attractiveness, or they were a cross-cutting priority.

Case studies confirm that the programmes over the 2007-2013 period were more concerned with climate change issues than the previous generation of programmes, and more attention was given to those issues at the final objectives level. Moreover, a shift is observable from more traditional environmental policies to more specific interventions tackling the effects of climate change (global warming, reduction of emissions, risk prevention, mitigation and adaptation).

In addition, project selection procedures made systematic use of the thematic assessment of environmental criteria, and monitoring systems improved the use of thematic indicators, also in the light of the lessons learned in the previous period.

Programme priorities

In the programming period 2000-2006 typical Finnish projects addressing climate change issues in Objective 1 and Objective 2 regions were:

- improving water and sewerage systems and waste management;
- developing waste management systems;
- improving water quality (in rivers, lakes and around sea coasts);
- developing nature reserves and leisure routes.⁴⁹

According to the evaluations undertaken for Objectives 1, 2, and 3 in 2000-2006, the strategies selected by the Finnish government were well matched to the local and regional needs. Sustainable development was usually considered to be well addressed and environmental concern was addressed at both the preparatory and implementation stages. Criticism has been voiced, however, concerning the definition of the concepts 'environmentally friendly' and 'environmentally neutral', and the current indicators used were deemed to be incapable of identifying the negative effects (a feature in part corrected in the current programming period).⁵⁰ Also the environmental indicators selected were seen as insufficient since the environmental dimension was expected to require a broader analysis. Most Finnish regions have introduced SEA-groups, which are considered to be useful.⁵¹

The Finnish NSRF 2007-2013 pays heed to climate change and the risks associated with it, in particular as the latter relate to biodiversity and pollution due to climate change. Versatility and biodiversity are considered to be essential elements for national and regional competitiveness, as they are assets for developing tourism and other industries. Avoiding all risks associated with the dangers caused by emissions is addressed by increasing the sustainable utilisation of natural resources. In addition, the strategy outlines objectives addressing the decrease of emissions and increase in energy saving. Special reference is made to preparing for risks associated with climate change, such as flooding. Therefore, a clean environment is considered to be a competitive advantage that needs to be fostered. The climate change theme is addressed in Finland in the following ERDF programmes:

- Southern Finland: effective and well-functioning spatial structures, including sustainable living environments. The objectives include improving the quality of the environment, which can also contribute to regional competitiveness. Management of environmental issues in general, and risks in particular, is seen to demand particular attention. The promotion of renewable energy sources and eco-efficient energy systems is expected to strengthen spatial competitiveness.⁵²
- Western Finland: the promotion of sustainable development is referred to in the general guiding principles, covering the various aspects of sustainability from the ecological to the economic and social dimensions. Energy efficiency is addressed as a particular priority theme.⁵³
- Eastern Finland: good quality living environments are included under Priority 3, addressing themes such as improving the physical infrastructure, living environments and accessibility of regions. Good quality living environments are seen as an asset in

⁴⁹ Ex Post Evaluation of Cohesion Policy Programmes 2000-2006 financed by the European Regional Development Fund in Objective 1 and 2 Regions. Work package 1: Coordination, analysis and synthesis. Task 4: Development and achievements in Member States: Finland.

⁵⁰ See Kallio 2008, 26.

⁵¹ Suomen kansallinen alue- ja rakennepoliittinen strategia 2007-2013. Sisäasiainministeriö. Alueiden ja hallinnon kehittämissosasto. EU:n alue- ja rakennepoliittikan strategiatyöryhmä. (The next four sections are also based on this report.)

⁵² Etelä-Suomen EAKR-toimenpideohjelma 2007-2013. CCI 2007 FI 2 PO 004 Alueellinen kilpailukyky- ja työllisyystavoite. Euroopan unioni. Euroopan aluekehitysrahasto.

⁵³ Länsi-Suomen EAKR-toimenpideohjelma 2007-2013. CCI 2007 FI 2 PO 003 Alueellinen kilpailukyky- ja työllisyystavoite. Euroopan unioni. Euroopan aluekehitysrahasto.

seeking to make Eastern Finland more attractive for tourists, businesses and residents alike.⁵⁴

- Northern Finland: priority 3 emphasises the importance of improved accessibility and utilization of renewable energy sources, as well as risk management and regional attractiveness. The objective here is to prevent the negative impacts on business and industrial activity, as well as the negative effects on and risks for the natural environments. Ecologically sustainable, aesthetically high quality and interaction-promoting environments are seen as an asset for innovative industrial activity.⁵⁵

In the Italian Regional OPs 2000-2006 climate change prevention, mitigation and adaptation were among the environmental objectives and the majority involved the promotion of renewable energy like solar and wind power; while the main objectives of the programmes were waste and water management, biodiversity protection (Natura 2000 area management) and natural hazard management. Some of them dealt with climate change (the latter) but very often only in an indirect way (i.e. it was not a main objective of the measures).

The most active programmes in the field of climate change were financed by the ERDF. Activities more directly linked to climate change issues in Italian Regional OPs in the programming period 2000-2006 were developed in the following areas:

- energy and energy saving;
- natural hazard management;
- sustainable transport;
- environmentally-friendly technology.

Other measures, with lower financial resources, dealt with the promotion of carbon sinks (in Objective 1 regions). The interventions concerning energy, transport and risks did not only directly address climate change issues. In fact, many of them also dealt with traditional environmental policy concerns, such as water and soil management, energy independency and forest management (see Table 8 for details).

The Italian regional programmes for the 2007-2013 programming period take into account climate change issues in a more direct and integrated way than programmes implemented during the 2000-2006 programming period. Some evidence comes from:

- the objectives of the programmes (with measures dedicated to climate change and specific objectives);
- the indicators reporting clear objectives in terms of CO₂ reduction;
- the categories of expenditures (e.g., the specific category "Mitigation and adaptation to climate change");
- the total amount of financial resources allocated to climate change issues (more than Euro 5 billion).

In the case of Italy the financial support (in both programming periods) to sustain measures tackling climate change issues consists of:

- support through direct contributions from public bodies (Regions, Provinces and Municipalities) for energy, environmental infrastructures (air), natural hazards and sustainable transport;

⁵⁴ Itä-Suomen EAKR-toimenpideohjelma 2007-2013. CCI 2007 FI 2 PO 001 Alueellinen kilpailukyky- ja työllisyystavoite. Euroopan unioni. Euroopan aluekehitysrahasto.

⁵⁵ Pohjois-Suomen EAKR-toimenpideohjelma 2007-2013. CCI 2007 FI 2 PO 002 Alueellinen kilpailukyky- ja työllisyystavoite. Euroopan unioni. Euroopan aluekehitysrahasto.

- state aid for SMEs and enterprises for investments in environmental-friendly technology.

Table 8: Financial data by regional programme and type of commitment 2000-2006

| | Environmental Friendly Technologies | | Energy | | Environmental Infrastructure (AIR) | | Carbon Sinks | | Sustainable Mobility | | Total Climate Change | | Total Programs |
|-----------------------|-------------------------------------|--------------|--------------------|---------------|------------------------------------|--------------|-------------------|--------------|----------------------|--------------|----------------------|--------------|-----------------------|
| | Amount (€) | % of total | Amount (€) | % of total | Amount (€) | % of total | Amount (€) | % of total | Amount (€) | % of total | Amount (€) | % of total | Amount (€) |
| Basilicata | 0 | 0.00% | 14,161,792 | 1.67% | 0 | 0.00% | 9,522,350 | 1.12% | 17,529,692 | 2.07% | 41,213,834 | 4.86% | 848,035,000 |
| Calabria | 11,546,375 | 0.54% | 23,141,300 | 1.09% | 0 | 0.00% | 30,683,940 | 1.44% | 142,835,500 | 6.70% | 208,207,115 | 9.77% | 2,131,043,000 |
| Campania | 15,158,400 | 0.35% | 91,928,500 | 2.15% | 80,750,000 | 1.89% | 1,535,821 | 0.04% | 376,277,382 | 8.79% | 565,650,103 | 13.21% | 4,280,561,000 |
| Puglia | 0 | 0.00% | 19,500,000 | 0.67% | 37,342,800 | 1.28% | 7,516,668 | 0.26% | 519,112,882 | 17.82% | 583,472,350 | 20.03% | 2,912,644,735 |
| Sardinia | 0 | 0.00% | 10,941,500 | 0.52% | 0 | 0.00% | 2,478,030 | 0.12% | 82,385,190 | 3.89% | 95,804,720 | 4.52% | 2,118,293,000 |
| Sicily | 27,766,326 | 0.65% | 14,843,938 | 0.35% | 0 | 0.00% | 4,578,988 | 0.11% | 182,631,500 | 4.26% | 229,820,752 | 5.37% | 4,283,580,000 |
| Abruzzo | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 29,853,571 | 15.43% | 29,853,571 | 15.43% | 193,509,363 |
| Emilia Romagna | 2,232,926 | 1.74% | 2,287,292 | 1.79% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 4,520,217 | 3.53% | 128,033,372 |
| Friuli-Venezia Giulia | 747,000 | 0.28% | 1,739,617 | 0.65% | 0 | 0.00% | 0 | 0.00% | 4,301,188 | 1.62% | 6,787,805 | 2.55% | 266,103,021 |
| Lazio | 0 | 0.00% | 5,145,750 | 1.33% | 0 | 0.00% | 0 | 0.00% | 25,929,474 | 6.69% | 31,075,224 | 8.02% | 387,641,244 |
| Liguria | 8,193,316 | 4.07% | 2,538,474 | 1.26% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 10,731,790 | 5.33% | 201,443,238 |
| Marche | 6,950,987 | 5.32% | 3,611,913 | 2.76% | 0 | 0.00% | 0 | 0.00% | 8,777,435 | 6.72% | 19,340,335 | 14.80% | 130,709,071 |
| Piedmont | 11,877,889 | 2.33% | 0 | 0.00% | 3,786,562 | 0.74% | 0 | 0.00% | 0 | 0.00% | 15,664,451 | 3.07% | 509,755,570 |
| Toscana | 7,963,866 | 2.37% | 8,272,281 | 2.46% | 0 | 0.00% | 2,074,049 | 0.62% | 12,772,100 | 3.80% | 31,082,296 | 9.24% | 336,429,061 |
| Trento | 0 | 0.00% | 1,442,282 | 8.19% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 1,442,282 | 8.19% | 17,607,702 |
| Umbria | 4,883,000 | 3.11% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 4,883,000 | 3.11% | 157,029,427 |
| Veneto | 544,259 | 0.18% | 9,553,797 | 3.20% | 0 | 0.00% | 0 | 0.00% | 29,725,701 | 9.96% | 39,823,757 | 13.34% | 298,429,274 |
| Bolzano | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 33,819,823 |
| TOTAL | 97,864,343 | 0.51% | 209,108,435 | 10.89% | 121,879,362 | 0.63% | 58,389,846 | 3.04% | 1,432,131,615 | 7.45% | 1,919,373,601 | 9.98% | 19,234,666,901 |

Source: Authors processing of DG Regio data

Typology of interventions

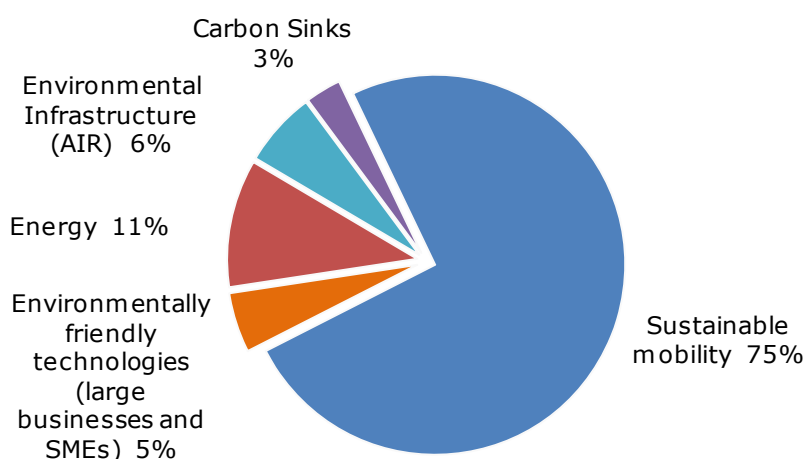
Within Objective 1 regions in Finland the bulk of funding (approximately 40% of all interventions) directly targets enterprises, with RTDI and innovation being the next most important in terms of volume (15.2% and 11.1%, respectively). Less than 10% targets infrastructure. In Objective 2 regions 47.3% is direct support to firms, 26% targets RTDI and various forms of innovation, while infrastructure plays an important role in terms of financial allocation (24.8%), and the local environment (e.g. waste management) also figures prominently (12.9% share).⁵⁶

Water management and waste systems were particularly central in terms of the environmental projects implemented and budget shares allocated by the Finnish government.

Analysing data for 2000-2006 (see Figures 19 and 20), it is possible to say that:

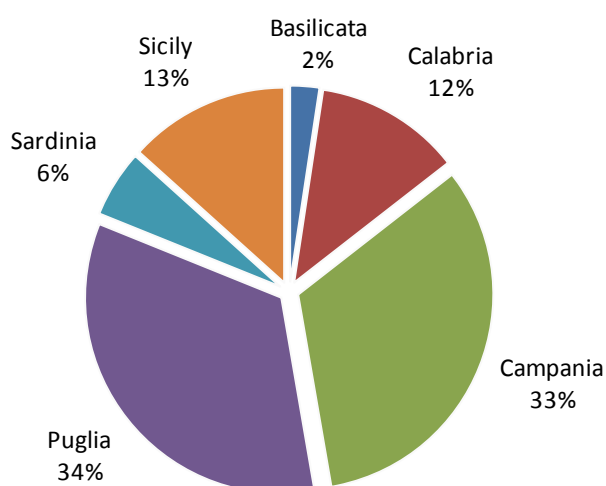
- environmental measures regarding climate change represent 10% of the total Italian financial plan, with a clear emphasis on sustainable mobility (more than 7% of total financial resources devoted to rail, multimodal transport and urban transport). In Objective 1 regions risk management and prevention was fixed at Euro 1.49 billion, around 4.6% of total programme resources;
- in Italy financial resources addressing climate change are concentrated in Objective 1 regions (around 90% of the total resources), with particular regard to sustainable mobility, carbon sinks and environmental infrastructures; while Objective 2 regions invest more in environmentally-friendly technology and energy;
- the Objective 1 regions most committed to climate change are Campania and Puglia, in terms of the relative financial weight of sustainable transport on the total budget. For Objective 2 regions investments are concentrated in Tuscany, Liguria and Veneto (more than 50% of the total investments in Objective 2 regions).

Figure 15: Climate Change: financial resources by type



Source: Authors processing of DG Regio

⁵⁶ Source: Ex Post Evaluation of Cohesion Policy Programmes 2000-2006 financed by the European Regional Development Fund in Objective 1 and 2 Regions. Working Package 1: Coordination, analysis and synthesis. Task 4: Development and achievements in Member States, p. 18

Figure 16: Climate Change: financial resources by Objective 1 regions

Source: Authors processing of DG Regio

In the ROP there was no real overall strategy that addressed climate change issues in an integrated manner; very often measures and instruments were indirect and implicit and, when directly addressing climate change issues, concentrated on promoting renewable energy and energy efficiency to public and private bodies.

There is clear evidence that during the 2007-2013 programming period Structural Funds invest more in measures tackling climate change and environmental prevention and protection. Even if the total financial resources allocated to the Structural Funds decreased during the period for Italy, the financial resources allocated to energy were fixed more than Euro 1.8 billion (compared to about Euro 213 million in the previous programming period). Transport measures represent roughly 45% of the total budget (compared to more than 78%) and risk prevention around 7.5%. A new category of expenditure directly coping with climate change was introduced, with an initial allocation of Euro 96 million. Globally the resources allocated to measures addressing climate change issues increased by about 60% (also considering the new categories of expenditure introduced in the new programming cycle).

Monitoring arrangements

The monitoring system implemented in Finland in line with the SOVA/SEA legislation defines a number of sustainability indicators ranging from the reduction in emission levels to the quality of living environments, consumption levels, etc.

In Italy in the 2000-2006 programming period there were no horizontal monitoring arrangements between Managing Authorities and other competent authorities to address climate change issues. Nevertheless, the activities of the network of environmental authorities and the central evaluation unit of the Ministry (*Ministero per lo Sviluppo Economico*, MISE - Ministry of Economic Development) produced guidelines for implementing environmental measures in national and regional OPs. In the guidelines the network asked the Managing Authorities to integrate environmental issues in all the phases of the programming cycle, from project selection to the conclusion of the interventions.

During the implementation the OP will monitor CO₂ emissions as a transversal priority. Some indicators concerning climate change issues, such as emission indicators, were identified in an ex ante programming phase and the methodology of calculation was expected to be defined by the authorities at regional and national levels. Finally, it is

important to note also the reinforcement of environmental strategic evaluation in ex ante phases, where the OP identified the methodology for reducing emissions and mitigating the environment and societal effects of climate change.

Project selection

In the 2000-2006 programming period the environmental dimension was taken into account by the Finnish government during the assessment of project proposals to be financed and the setting of environmental goals (Berninger 2002; Savola 2001).⁵⁷ Environmental issues are brought into a more central focus due to the SEA-legislation.⁵⁸

For Finland the Environmental Impact Assessment forms an integral part of the evaluation in assessing the eligibility of projects.⁵⁹ The four ERDF programmes also implement the Finnish Strategic Impact Assessment legislation, in line with the EC (2001/42/EC), according to which all programmes and projects are assessed for their environmental impacts. This involves public hearings and drafting a written assessment of the potential environmental impacts. The impacts are already assessed during the preparatory stages of the programme.⁶⁰

The current Finnish legislation focuses particular attention on the ways in which negative impacts can be diminished and positive effects enhanced. The criticism aimed at previous SEA-legislation was that it appeared to be incapable of meeting this challenge. Both the organisation/individual submitting a project proposal and the organisation/authority assessing it are expected to conduct an assessment of the environmental effects of the project to be funded. This practice was similar to that in the previous programming period. The main difference is that all the funding authorities use the same electronic form.

3.3. In-depth analysis of one selected programme and one selected project 2000-2006

In order to further investigate the implementation of programmes and projects under the climate change heading, two initiatives were selected in Finland and Italy that are illustrated in the following section. The findings show that although the projects financed in the previous period could be broadly classified under the heading of environmental policy rather than under climate change as such, they indirectly contributed to the reduction of GHG (by promoting bio-energy production and use) and to mitigating the effects of natural damage (by supporting interventions to reduce hydro-geological risks).

Analysis of Bio-energy Technology Transfer Network (BTN) project

Within the Baltic Sea region INTERREG III B Neighbourhood Programme 2000–06 the “Bio-energy Technology Transfer Network (BTN)” was implemented (5.6.02 to 4.9.05). The overall objective of the BTN project was to contribute to sustainable development at the local level. The purpose was to make the research data on bio-energy concrete and accessible in practical terms through R&D to serve the needs of companies.

⁵⁷ Berninger, K. 2002. Ympäristömyönteisyys ja sen mittaaminen EU:n aluekehitysohjelmissa. Ympäristöministeriö.

Savola, A. 2001. Ympäristönäkökulma EU:n tavoite 1 ja 2 -ohjelmissa 2000-2006. Selvitys väliarviointia varten. Ympäristöministeriön moniste 82.

⁵⁸ Kallio, T. 2008. Ympäristönäkökulma EU:n rakennerahasto-ohjelmien toteutuksessa. Suomen ympäristökeskus. 20.10.08. (The next two sections are also based on this report.)

⁵⁹ Suomen rakennerahastostrategia 2007-2013. CCI 2007 FI 16 UNS 001. 30.7.07. (The next one section is also based on this report.)

⁶⁰ The ESF projects do not have to undergo a similar assessment, as this is deemed to be irrelevant for them, however, the ex ante has addressed sustainability issues and environmental impacts as well.

The BTN project consisted of:

- developing cooperative initiatives for R&D in bio-energy, from production and treatment to use;
- training and education of different stakeholders (from entrepreneurs to decision-makers).

The BTN project's target groups were bio-energy SMEs, regional decision-makers and development organisations. It was of particular benefit to the companies located in the partner areas who, through technology pilot actions, for example, gained more information about the export possibilities. This was an innovative element of the project, together with the actual ability to promote investments. Pilot and development actions resulted in more efficient fuel and heat production methods and technology. An innovative multiple-use mobile dryer for wood and agro-fuels was developed.

Outcomes of the BTN project included:

- a strategy for bio-energy;
- bio-energy centres developed and supported;
- training programmes for universities;
- small-scale investments in local and regional companies;
- promotion campaigns for bio energy.⁶¹

BTN activities have:

- helped the decision-makers to gain a better understanding of regional bio-energy resources;
- increased the awareness of the positive impacts of bio-energy utilisation on the regional economy and on employment;
- increased the know-how about available and future technologies;
- identified and cleared bottlenecks in the chain of bio-energy utilisation. As a result bio-energy markets have developed in participating regions.

The regional strategies and plans associated with this activity provided important background information and a knowledge base for activities that have since come to fruition. This was particularly beneficial for the regional authorities and the larger companies involved.

The resources, production and use of bio-energy in partner regions were analysed and bottlenecks in the chain of bio-energy utilisation were identified. The results are documented in the publication "Äänismaa, P. & Nummi, M. (eds.) 2005. Bio-energy Environment and Development, Regions of Central Finland, Finland; Hadeland, Norway; Brandenburg, Germany. Publications of Jyväskylä Polytechnic 44/2005."

⁶¹ COWI. 2008. Evaluation Study on "Use of Outcomes Produced in the Baltic Sea Region, INTERREG III B, Neighbourhood Programme, Final Report".

Box 8: Bio-energy Development Centres**BIO-ENERGY DEVELOPMENT CENTRES**

One of the key achievements of the BTN project was the establishment of an international network of Bio-energy Development Centres (BDCs). This is a hub of bio-energy training, applied research and development, and distribution of information. The mission of the network is to put research findings and innovation into practice through close co-operation with research institutions and companies.

The project's activities were partly continued after the project finished. The regional bio-energy strategies and development plans were the basis for the investments that have since been realised. This has benefitted the larger companies and the regional authorities. Many interest groups involved in the training were educated in the scenarios in the other countries. After the project ended, the BDCs continued to implement regional bio-energy strategies, in cooperation with companies and other R&D and educational organisations.

In Finland the BDC Network located in Saarijärvi played a stronger role, it became a regional development unit. It was opened in May 2003 and since then its integrated R&D, training and exhibition facilities have been further developed to support the development of a bio-energy cluster in the region.

The Energy Farm as a Bio-energy Demonstration Centre (BDC) for Norway generally, and for the Hadeland bio-energy region in particular, has been improved with more demonstration activities and further theoretical training programmes. CEBra GmbH established the Brandenburg BDC (Wood Energy Centre Eberswalde) in August 2005. The BDC is located on the premises of the Brandenburg Forestry Authority at the wood campus of the University of Applied Sciences Eberswalde. As a result of the close collaboration between Jyväskylä Polytechnic (Finland) and the Energy Farm (Norway) a one-year training programme on wood energy (WFE) started in September 2004.

The preparation and the analysis of the regional bio-energy strategies have increased the understanding of the spatial planning procedures in partner regions.

Source: Case study report

The initiative for the project came from Central Finland. The project network was made up mainly of Finnish actors. The other partners also had an influence on the project content.

The lead partner in the BTN project was JAMK, Institute of Natural Resources. The other six partners were: Jyväskylä Science Park (FI, Coordinator), Energigården (NO), CEBra GmbH (DE), Energidalen i Sollefteå (SE), Luua Forestry College (EE) and ZAB (Zukunft Agentur Brandenburg GmbH, DE).

The steering group, in which the project partners were represented, met a few times each year. In addition there were several meetings of the local steering groups each year. The local authorities were involved in these groups. The project activities were meaningful and the project achieved the main aims that it had set. The organisation of the project promoted the accomplishment of the aims. The evaluation of the project implementation was carried out by the steering group. The external evaluation was commissioned by the financing organisation.

The project was concentrated in three regions: Brandenburg in Germany, the province of Central-Finland, and Hadeland in Norway. These regions are different, not only as far as

area, population and biomass resources are concerned, but also in their operational environments. There were also regions in Viro and Sweden that took part in the BTN project, but their role diminished. Cooperation and networking among project partners and other contributors functioned quite well.

Quantitative evidence on the BTN is lacking. Many of the effects are, at least for the time being, qualitative in nature and relate in particular to the continuing need for knowledge and information transfer. Bio-energy is produced and used in a considerably more efficient manner. Though the countries may have similar cultural backgrounds, there are major differences in the operational environments.

The project had prepared for the transfer and utilisation of project outputs by appointing a home organisation for each of them, whose responsibility was to further develop and transfer the results. The project also produced an English-language publication and was active in disseminating good practice through the project website and in the form of international seminars. The methods involved can be circulated and used in any context.

Analysis of the Lazio Programme 2000-2006

The Lazio region is essentially a monocentric region with Rome as the main centre of attraction. In fact, most of the regional population is concentrated in the province of Rome, which hosted 5,112,000 inhabitants according to the Italian Central Statistics Office (ISTAT) Census of 2001.

The 2000-2006 programme aimed to:

- strengthen infrastructural networks;
- improve business competitiveness;
- develop the value of cultural and environmental assets through the implementation of four priority axes (see Table 9).

Table 9: Lazio OP: a synthesis

| Priority/axes | Objective | Budget (€) |
|--|---|-------------------|
| <i>Priority 1: Environmental improvement</i> | The overall objective of this first priority is to guarantee the essential conditions of environmental quality through the reduction of waste production and harmful emissions and to enhance the production and use of energy resources. | 103,102,999 |
| <i>Priority 2: Strengthening of physical and non-physical networks</i> | This second priority addresses the strengthening of network infrastructures in order to improve road, water and information exchange networks. | 243,256,124 |
| <i>Priority 3: Upgrading of local structures</i> | This priority aims to develop different local systems in the region as areas with a high level of manufacturing specialisation or potential for economic development, and settlement areas capable of supporting business. | 309,526,302 |
| <i>Priority 4: Improving Business Competitiveness</i> | The competitiveness of the region's firms is directly sustained in order to support SME investment, to promote the creation of new enterprises, and to encourage the distribution of commerce and the promotion of the internationalisation of regional production. | 213,279,721 |

Source: Programming document

Climate change issues are presented directly and indirectly in the document in the following sections:

- context analysis, with a clear paragraph dedicated to energy and air quality;
- strategy, where some points were introduced regarding the promotion of renewable energy;
- the set of programme indicators, with an indicator of impacts dealing with CO₂ emissions avoided (Measure 1.4);
- specific actions implemented within Measures I and II, dedicated to energy and sustainable transport.

Regarding measures tackling climate change, the programme finances actions for reducing emissions through:

- the promotion of renewable energy (Measure I.3);
- initiatives addressing natural hazard prevention and management (Action I.1.1 of Measure I.1);
- multimodal transport interventions (Action II.1.3 of Measure II.1).

The amount of financial resources allocated to climate change (energy, natural hazard management and multimodal transport) is estimated to be around Euro 108 million, which is roughly 12.2% of the total budget. The types of financial support granted by the programmes to single beneficiaries are:

- support to public investment in renewable energy for solar plants;
- support to public bodies (municipalities) for interventions to prevent and mitigate flooding;
- support to public bodies for investment in multimodal transport systems.

At 31.12.06 the energy measure was in an intermediate state of realisation in terms of expenditure and output; note, however, that commitments for around 90% of the total budget were allocated to the interventions during the period 2000-2004; while the measure addressing natural hazard management demonstrates a better financial and physical performance, with monitored values exceeding the target (see Table 10). Finally sustainable mobility (multimodal transport) demonstrates a good state of implementation with, for example, commitments for 94% of total resources.

Table 10: Financial and physical performances

| Intervention | Budget (€) | Commitments (€) | Expenditure (€) | Output |
|------------------------------|------------|-----------------|-----------------|--|
| Renewable energy sources | 10,291,500 | 4,904,578 | 4,441,7833 | New plants: 42 (56% of target) |
| Flood control and mitigation | 46,038,730 | 60,653,134 | 52,280,638 | New project: 81 (124% of target) |
| Multimodal transport | 52,824,467 | 49,042,992 | 23,702,960 | New projects (parking): 22 (73% of target) |

Source: Programming documents

In the 2007-2013 programming period the areas of intervention are: energy, natural hazard prevention and management, and sustainable mobility. Compared to the previous programming period, the 2007-2013 OP proposes a new measure related to sustainable mobility (intelligent transport systems and clean urban transport). Note also the specific

indicator of the impact “reduction of CO2 emissions” (not present in the 2000-2006 OP), which requires a monitoring of emissions for the four priority axes identified at programme level. In any case, the global strategy remains unchanged between the two programming periods, although - from a financial point of view - the resources invested in environment and climate change issues are higher in the new programming period (51% of the total budget). This particularly high increase is due mainly to the resources allocated to clean urban transport (around Euro 226 million).

Table 11: Total budget and interventions

| Intervention | Total financial budget (€) |
|---------------------------|----------------------------|
| Renewable energy | 75,000,000 |
| Natural hazard management | 36,000,000 |
| Sustainable mobility | 272,000,000 |

Source: Programming documents

Analysis of the projects of the municipalities of Bagnoregio and Celleno

The two projects analysed in the present section were implemented on two sites with a high level of risk exposure in the municipalities of Bagnoregio and Celleno, both located in the province of Viterbo, Lazio Region. Bagnoregio has a population of 3,639 (2001) with a decline of 5.7% compared to 1991. Celleno has a population (2001) of 1,339 with an increase of 5.4% compared to 1991.

The projects refer to Measure 1.1 of Axis 1, SPD 2000-2006 of the Lazio Region, eligible for Objective 2 area. The general objective of Axis 1 deals with the need to ensure the quality and safety of environmental and territorial conditions. Both projects are best practices in terms of innovativeness, effectiveness, sustainability and partnership. Furthermore, they promoted environmental protection, sustainable services for municipalities and positive economic results.

The project of the municipality of Bagnoregio aimed to consolidate the southern side of the crop. The intervention consisted of the realisation of specific activities aimed at protecting the environment and reducing the risk of another landslide, after the event of 1997. The estimated cost was Euro 413,165.52, totally financed by the SPD. The actual cost was Euro 323,049.79 at the end of the works.

The other project concerned the medieval centre of the municipality of Celleno. The consolidation of the historical centre of Celleno was conceived to reduce the risk of deterioration and the instability of the cliff, where the built-up area has its foundations. The deterioration is motivated by demographic withdrawal and has been exacerbated by lack of maintenance. The estimated cost was Euro 337,977, totally financed by the SPD. However, the intervention actually cost Euro 337,060.15 at the end of works.

After the selection procedure in March 2001, only one firm - Valentina S.A, one of the few with solid expertise in the field of naturalistic engineering - was awarded and concluded the works on both sites by November 2003. In both cases the direct beneficiaries were the inhabitants of the two villages, in particular the ones living in high environmental risk areas.

The two projects were not directly selected on the basis of parameters related to climate change issues, but were included in a larger programme of integrated land management which considered all kinds of factors that have an impact on natural hazards (including changing conditions in the atmosphere). For this reason these two projects are very

relevant as operational experiences of prevention and mitigation of potential negative effects of climate change at a territorial level. Both interventions employ naturalistic engineering to prevent and reduce the impacts of flood events, which are relevant impacts in terms of the promotion of biodiversity, involvement of stakeholders, and sustainability from the social and ecological points of view.

Both projects are consistent with the global policy design and European and national regulations. Furthermore, interventions were planned according to Law 267/98 – modifying article 9 of Law 266/1999 – and were inserted in the Extraordinary Plan and programme of interventions of removal of the situations with high hydro-geological risk, selecting projects co-financed by the Structural Funds.

Both projects promoted mainstreaming objectives of environmental protection and technological innovation through an effective management of the utilisation of the soil and the use of naturalistic engineering (see Box 9).

Box 9: Naturalistic Engineering

NATURALISTIC ENGINEERING

Naturalistic Engineering is characterised by:

- the goal of risk prevention and preservation of local specificity;
- the utilisation of raw and common materials, available in the territory of the municipality;
- respect for the specific local landscape in the project phase;
- the promotion of local biodiversity through the utilisation of local seeds (in particular in the intervention in Bagnoregio).

Naturalistic engineering was first used in Italy in 1996 in post-flood interventions in Versilia and Garfagnana, in Tuscany.

Source: Case study report

This intervention tool was already included in the Lazio regional framework through:

- Law 4340 of 28 May 1996, concerning criteria for the implementation of soil interventions;
- Law 53 of 11 December 1998, dealing with the organisation of soil protection;
- the publication about the methods of utilisation and guidelines.

Both projects were characterised by a partnership between public bodies: the Lazio Region – financing and promoting naturalistic engineering – and the two municipalities. Both projects impacted on all human activities regarding:

- the use of the territory;
- agricultural activities and basic infrastructures;
- the reduction of soil erosion;
- the management of the water cycle and environmental protection;
- negative impacts were transitory and exclusively connected to the period of works.

To sum up the general results of the projects, it is possible to highlight:

- positive economic returns in terms of agro-tourism;
- positive impacts in terms of the quality of life and of economic activity after the consolidation of the historic centre (municipality of Celleno);
- the safeguarding of valuable historical heritage and of cultural identity through the revitalisation of the economic functions and abandoned public spaces;
- the conservation of environmental resources thanks to the reduction in land erosion and natural reforestation.

Concerning financial aspects, the cost of the intervention in Bagnoregio and Celleno are almost similar. As regards effectiveness, all expected objectives were successfully achieved. In spite of the generally positive results and the high level of effectiveness and efficiency, no jobs were created in the management phase of the interventions and only eight full time employees worked during the period of the interventions.

The evaluation of sustainability takes into account the capacity of interventions to produce medium-long term effects. This can be discussed either in a general sense or at a specific level. In a general sense the main aspect of the sustainability of the interventions is the objective of "creating a city atmosphere", through the regeneration of the conditions for activities and services (exhibitions, public spaces, conferences, new laboratories and commercial spaces). As a result, both projects represent a long-term investment for the future of the local communities.

After the consideration of general sustainability of the projects, it is possible to evaluate the situation at a more specific level:

- in terms of economic sustainability the projects reinforced the conservation and valorisation of the historic centre, the safeguarding of economic activities, and development: agro-touristic for Bagnoregio and agricultural for Celleno;
- environmental sustainability was promoted through the lasting reduction of landslides and the protection of the landscape and the territory;
- with regard to institutional sustainability, the low cost of maintenance will make it easy for municipalities to maintain the quality of the services provided.

Both projects can be considered best practices in terms of the protection of the environment and soil. They have performed well in terms of:

- consistency with the programme;
- active partnership and administrative procedures;
- use of innovative techniques;
- sustainability and economic impacts;
- efficiency and effectiveness;
- technological innovation in the conservation of the soil.

In order to transfer the lessons learned in these two projects and improve the regional standard in the field of naturalistic engineering, it is important to:

- develop local firms' skills in the field of soil protection;
- carry on promoting and informing local bodies potentially interested in this type of intervention;
- promote interventions of prevention and publicise the usefulness and efficiency of low environmental impact techniques.

3.4. Concluding remarks

Both case studies in Italy and Finland confirm the increased importance given to the climate change theme in the new programming period. However, they also illustrate how distinct initiatives were already put in place during the previous programming period, even if in an implicit manner and connected to the wider “environment” theme (Italy). They also illustrate different delivery mechanisms addressing quite different challenges related to climate change that characterise the two countries. In this way, these cases show how versatile Structural Funds can be in addressing the various possible facets of climate change.

4. CONCLUSIONS AND RECOMMENDATIONS

Climate change is a top priority on the world and EU policy agendas. In particular:

- There is a vast scientific consensus of the opinion that the climate is changing not only because of natural variability, but also due to human activities, mainly the emission of greenhouse gases. Inaction or even delays in tackling this change are extremely costly, but the benefits of a resolute action will compensate its cost. However, since the cost of climate change varies greatly across countries and sectors, a high degree of coordination is needed.
- European regions are particularly affected by climate change, whose consequences, such as extreme natural weather events, may have serious effects on regional development and growth. Germany, the United Kingdom, Italy, France and Spain emit more than 60% of the EU-27 greenhouse gas emissions; public energy and road transportation being the main causes of it. On the other hand, the greenhouse gas emissions of the EU-27 decreased by 7.7% over the period 1990-2006, mainly thanks to the efforts of Germany, the UK and the EU-12.
- A number of very ambitious policy initiatives have been promoted at EU level in order to cope with the risks of climate change. The core of such initiatives made the EU committed to a drastic reduction in the greenhouse gas emissions and to transforming the European Economy into a highly energy-efficient, low-carbon economy. 'Cap-and-trade' systems based on the Kyoto protocol reduction quota at micro (company) and macro (Member State) levels have been set. Research-based projects have also been promoted by the EU in order to collect harmonised statistics at a regional level to report on the regional disparities in risk exposure to climate change. The findings show that the European vulnerability tends to decrease from east to west because of the better capacity to cope of the EU-15.
- Since climate change dramatically influences regional development and calls for prompt investment decisions in some core sectors, Cohesion Policy may play an important role in supporting a climate-friendly development path. Climate change was not yet a policy priority for Cohesion Policy when the 2000-2006 regulations and programmes were approved, but the current period has put great emphasis on tackling climate change, and in the debate of the post-2013 Cohesion Policy climate change has already been identified as a key priority.

The future Cohesion Policy will have to carefully consider the different effects at regional and territorial levels of the disparities brought about by the implications of climate change. The analysis of the Cohesion budget shows that:

- Although Member States had already invested a significant share of their Structural Funds budget in climate change-related policies in the period 2000-2006 (an overall Euro 14 billion), in the current 2007-2013 period the efforts are four times greater in financial terms, the average share of Structural Funds spending rising from 6.4% of the previous period to almost 15%.
- Worryingly, the climate-harming measures absorbed a higher share of financial resources in the period 2000-2006 than the climate-friendly ones. In the current period this relation has been adjusted in favour of the latter, however Structural Funds are still investing a large amount of money in interventions such as roads, motorways and non-clean energy production, which are the main sources of fossil-fuel based emissions.

- The Cohesion Policy offers a wide range of policy tools to regional and local economies to cope with the challenges of climate change. Sustainable mobility (shifting to low emission modes, especially from road to rail) remains the priority in terms of type of spending, accounting for more than 60% of spending in both programming periods. Energy efficiency and renewable energy is the second priority in terms of share of funds allocation, but with a major increase in percentage terms compared to the previous period.
- In the new planning period new fields of intervention addressing climate change have emerged that were not in place the 2000-2006 period. At least they are now explicitly acknowledged and financial resources are directly invested on it. Figures for the new programming period show that 13% of total Structural Funds spending is now invested in management and risk prevention measures, while still a negligible share is invested in mitigation and adaptation to climate change, due also to the only recent entrance of the dual strategy principle (mitigate while adapting) into the policy discussion.
- Although an important source of funding, structural spending alone cannot significantly positively influence the main trends of climate change, the opposite may even occur. Other funding sources should be committed and more substantial efforts at national and regional level are needed in order to actually observe the drastic improvements expected to cope with the objectives.

National case studies on the use of Structural Funds to address climate change confirm that in the new planning period policy awareness on climate change has risen, and the Operational Programmes financed in the period 2007-2013 take into account interventions in the fields of energy efficiency, sustainable mobility and support to firms in more direct, explicit and integrated ways. National and regional experiences, however, differ:

- Although most of the projects financed in the previous period could be broadly classified under the heading of environmental policy rather than under climate change as such, they indirectly contributed to reducing GHG emissions (for example by promoting bio-energy production and use) and mitigating the effects of natural damage (by supporting interventions to reduce hydro-geological risks).
- The new generation of Structural Funds programmes is more dedicated to explicit climate change interventions and a shift is visible from more traditional broad environmental policies (water management, energy efficiency and waste treatment) to interventions more targeted at climate change (reduction of emissions, risk prevention and renewable energy).
- Objective 2 regions allocate the largest share of funds to support firms' research and innovation initiatives for more sustainable products and production processes, and environmentally-friendly technology, while in Objective 1 regions infrastructural investments (sustainable mobility in particular) are still significant in financial terms.
- Progress has also been made in the use of monitoring indicators to report objectives in terms of CO₂ reduction and in the project selection process, by checking for the contribution to environmental policies and use of specific evaluation methods like Strategic Environment Assessment.

In the light of these conclusions, a set of recommendations is put forward.

A drastic shift to a climate-friendly development model is required. Climate change effects are visible and worrying enough that the EU has committed to very ambitious long-term targets for the reduction of greenhouses gas emissions. Direct measures supporting

mitigation and adaptation are not enough if the climate change priority is not mainstreamed into all the policy domains, especially in the transport and energy sectors. Not only should interventions such as energy efficiency or sustainable mobility be supported, but climate-harming investments should be firmly discouraged when cleaner technological alternatives are available in order to avoid being locked into a high-emission infrastructure for many years to come.

To this end it is suggested that:

- At the EU level sanctions for Member States not respecting their emission quota should be introduced for all legislative proposals (beginning with the ETS and the Effort Sharing Directive) committed to reducing GHG emissions. Only if reward-penalty mechanisms are in place will Member States have the proper incentive to firmly and consistently invest in all directions for the reduction of their emissions. Inflows from penalties of non-complying member states could be used for measures supporting adaptation and mitigation to climate change.
- At the national level comprehensive long-term strategic plans should be adopted in order to provide the proper legislative framework to meet the Kyoto targets. Policy results in terms of reductions in emissions should be monitored and properly assessed, and incentives should be given to local actors (private companies, municipalities and business associations) to firmly invest in this direction.
- Managing Authorities of Cohesion Policy programmes should invest Structural Funds resources in measures consistent with these national long-term strategies. Sanctions could be decided for those not contributing to achieving the set targets. Pilot measures in this direction could be implemented within the framework of Cohesion Policy interventions, in the light of the performance reserve⁶² exercise that was introduced in the 2000-2006 programming period.

Better coordination is needed. There is a need for better coordination of policies at EU level, which is still too inconsistent. For example, the use of Structural spending is not always in line with the EU climate and energy objectives: the four largest beneficiaries (EU funds per capita) of Cohesion Policy funds witnessed the greatest increases in greenhouse gas emissions in the whole EU. Again, the Transport policy invests 28% of its funding in the current period in the improvement of all modes of transport (the majority of which involve the highly carbon-intensive construction of roads and motorways) while the shift to low emission modes of transport is a priority for the reduction of greenhouse gas emissions. Therefore it is urged that:

- All the EU policies consistently contribute to meeting the Kyoto targets, by putting climate change as the top priority of their interventions and, at the same time, avoiding supporting high emission interventions if alternatives are available. Targets should be set and agreed in each policy domain and proper evaluation methodologies should be put in place in order to assess whether the specific interventions and projects are consistent with this overwhelming objective.
- The Cohesion Policy in particular should be more firmly committed to promoting a shift to a low-carbon, energy-efficient economy for its beneficiaries. Climate change earmarking may help in this respect, since the share of funds invested in climate-friendly measures is still too low in the 2007-2013 period (19.2%). In the 2014-2021

⁶² According to art. 44 of Reg. 1260/1999 each OP and SPD was subjected to a mid-term review on the basis of a list of monitoring indicators assessing effectiveness, management and financial implementation, and checks to see if targets set ex-ante were met. Programmes achieving their target were rewarded with an extra allocation from a

period each Managing Authority should earmark at least 30% of its overall Structural Funds budget to climate-related measures.

- Member States and regions should promote the use of Cohesion Policy resources for energy efficiency, sustainable mobility, mitigating and adapting to climate change, at the same time avoiding investing in high-emission measures if feasible cleaner alternative are available. Although Structural Funding alone cannot significantly influence the national emissions of GHG, nevertheless, it can provide useful financial and political leverage effects to implement interventions facilitating the shift of economic systems to low-carbon, low emission economies.

Urgent needs require rapid policy responses. Almost the totality of Cohesion Funds spending on climate change measures is still devoted to more traditional environmental measures, while only a negligible share is oriented towards mitigation and adaptation. The need to make EU regions more resilient to inevitable or already in place climate change effects calls for a more resolute investment in adaptation measures. Therefore, it is recommended that:

- The Commission should be aware that Cohesion Policy programmes for the period 2007-2013 should already support the shift of regional economies to low-carbon infrastructures; although the main policy objectives have already been set, pressure should be put on Managing Authorities to encourage them to select only climate-friendly projects for the achievement of the stated objectives.
- Research and technical assistance activities should be promoted at national and regional levels in order to help decision-makers in charge of Cohesion Policy measures to implement more innovative strategies in tackling climate change. Scientific know-how and technical capacity in climate-related measures should be further supported at the local level.

Higher integration of different policies is required. Climate change is a cross-cutting issue affecting many different policy areas: from environmental to industrial policies, from regional development to research and innovation. Policy instruments to tackle climate change are varied and differentiated. Adaptation in particular is integrated into other precautionary policy actions, such as, for example, disaster prevention, coastal zone management and water management. Integration of policies not only at EU level but also within the national and regional context is an effective way to design innovative and successful initiatives. To this end it is suggested that:

- Climate change is mainstreamed into all Cohesion Policy interventions. This means all the investments supported by Cohesion Policy funds, whatever the sector, should be assessed with the aim of measuring their contribution to climate change mitigation and adaptation. Where competing projects (or options for the same project) are assessed, priority should be given to the one with the lowest impact in terms of climate change. Positive contributions to tackling climate change should be included as award criterion in the project selection process.
- Managing Authorities are more informed and aware that specific evaluation techniques and policy implementation practices for climate change are well developed in different policy domains, thus they should facilitate cross-fertilisation among sectors while designing and promoting their interventions at a local level.

reserve of 4% of the Structural Funds' budget not allocated at the beginning of the period. For the first time, there was a direct link between the allocation of part-financing and results.

Avoid a one-size-fits-all approach. Differences in vulnerability and in the capacity to cope with the challenge of climate change should be addressed: southern countries, being more exposed to the adverse effects of climate change, and EU-12 countries, lacking capacity and being called upon to combine their economic catching up needs with mitigation actions, should be better supported. Thus, it is recommended that:

- Managing Authorities of more the vulnerable regions design an appropriate strategy for their specific needs in terms of mitigating and adapting to climate change challenges, by exchanging good practices with regions facing similar challenges. They should be aware that territorial specificities at sub-regional level do matter (for example coastal and inner zones have totally different needs).
- Local stakeholders take actions in implementing measures targeted at the specific needs of their territories and ask Managing Authorities for appropriate policy responses.

Specific evaluation and monitoring methods can contribute to more effective interventions. Assessments of the contribution of a policy, a programme or a project to the achievement of the ambitious targets set by the EU policies should be extensively used in the policy implementation process. Ad-hoc indicators and data collection activities should be promoted in order to better monitor the progress of programmes, regions and countries towards the achievement of climate change targets. In particular it is suggested that:

- The Commission require more suitable and specific instruments for assessing the impact on climate change of interventions supported by Structural Funding. Climate proofing and pre-screening for potentially risky projects are practices still poorly implemented in the framework of the Cohesion Policy.
- Managing Authorities promote a more comprehensive monitoring system including at least indicators of GHG and CO₂ emissions at a regional level. The environmental horizontal priority should be more explicitly linked to the climate change issue and verifiable targets related to the reduction of emissions should be the basis for the environmental assessment of programmes and projects. Cost-benefit analyses of major investment projects co-funded by ERDF, Cohesion Fund and IPA should always explicitly include the social costs of increased emissions (not only CO₂), especially for road, motorways and non-bio energy major infrastructures, and the social benefits of investments in reducing emissions.

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ANNEXES

ANNEX I. Climate change situation in Finland and Italy

Finland

In the 20th century the mean temperature in Finland increased by 0.76°C. The warming took place during the first two and last three decades of the century. A slight but statistically insignificant cooling occurred in the time period between them. Most of the warming occurred in spring, the diurnal temperature variation has become smaller, again mainly in spring.⁶³

The impacts of climate change have been extensively studied in Finland: remarkably well studied sectors are agriculture, forests, water resources, fisheries and traffic. In some other sectors like construction, health, insurance and tourism the level of research activity is, however, quite low. A sample of findings includes:

- water resources: increased runoff in winter; reduced runoff in spring/summer; reduced flood risk due to snowmelt;
- forestry: northward displacement of boreal forests into Tundra and broadleaved into boreal; northern forests already showing increased productivity and estimated to increase by 70% by the 2080s;
- agriculture: northward shifts of cropping zones of 120-150 km/°C; Finnish wheat yields increase and become less variable; potato yields increase, especially in central and northern Finland; northward shift in pest distribution and increased number of reproductive cycles;
- transport: snow and ice conditions on roads may require more salting; reduced sea ice should lower operational costs of ports and harbours;
- energy: decrease in heating degree days by 20%-30% by the 2080s; air conditioning: over 100% increase in cooling degree days by the 2080s; bio-energy: increased production potential; potential benefits for hydropower in winter;
- tourism and recreation: reduced reliability of winter snow cover; Baltic coast may attract more summer beach tourists;
- human health: lengthened transmission period for tick-borne diseases; risks of exposure to harmful UV radiation may increase.

During the last 15 years, Finland's greenhouse gas emissions have fluctuated substantially owing to economic trends in the energy-intensive industries, the generation of hydropower, electricity imports, and the availability of other non-carbon energy sources. Emission levels have been reduced in Finland by measures aimed at improving energy efficiency, increasing the production and utilisation of renewable energy sources, especially biomass, introducing energy taxation, and curbing methane emissions from waste management, landfills and agriculture.

Direct Government intervention to influence or steer the choice of energy sources used is rare in Finland, apart from decisions regarding the use of nuclear power. However, economic instruments, i.e. taxation and subsidies, have been used to improve energy efficiency and to promote the development of domestic energy sources such as renewable biomass and peat.⁶⁴ In 2004 the share of primary energy sources consumption claimed by renewable energy sources was 24%, wood-based energy sources representing a 20% share and hydro-power 4%. The share of wind power remains very small, though important

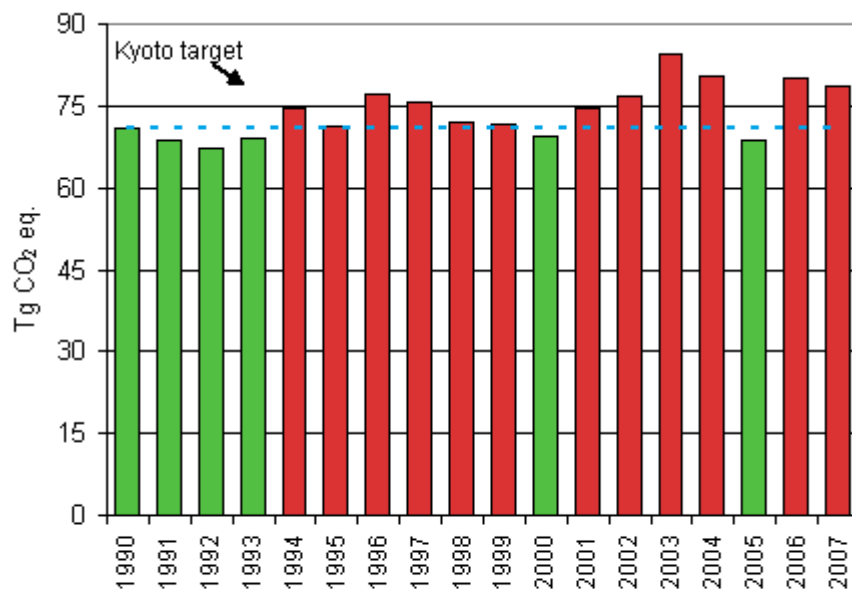
⁶³ Finland's Fourth National Communication under the United Nations Framework Convention on Climate Change. 2006. Ministry of the Environment. Finland.

⁶⁴ Ibidem.

potential has been identified in the coastal, arctic hill and maritime areas. The target for bio-fuel use in the transport sector by the year 2010 is 5.75%. In the national energy and climate strategy, the targets set for the increase in the share of renewable energy sources is 25% by 2015, and at least 40% by 2015. The share of renewable energy sources could then be as high as a third of primary energy, when in 2005 the level was only 25%.⁶⁵

Greenhouse gas emissions in Finland amounted to 78.5 Mt of CO₂ equivalent in 2007, which is about 2% less than in 2006 (see Figure A1). Emissions in 2007 exceeded by good 10% the target level of the 2008-2012 commitment period under the Kyoto Protocol. In the past five reporting years emissions in Finland have exceeded by an average of nearly 7.5 million tonnes, or 10%, the amount assigned for them under the Kyoto Protocol (71 million tonnes).⁶⁶

Figure A1 - Finland's greenhouse gas emissions 1990-2007 in relation to the Kyoto target level



Source: Statistics Finland, 2008

As clarified in Figure A2 the energy sector (energy supply and use, excluding transport) is the most significant GHG source in Finland (about 64%). The next significant source of GHG is transport, its share is about 18%. Greenhouse gas emissions from transport increased by about 14% between 1994 and 2007.⁶⁷

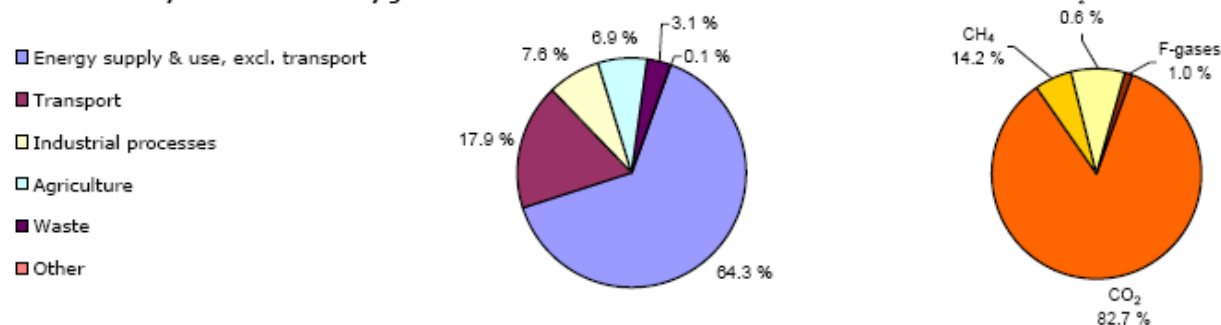
⁶⁵ Kohti kestäviä valintoja. 2006. Kansallisen kestävä kehityksen strategia. Valtioneuvoston kanslian julkaisusarja 5/2006.

⁶⁶ Greenhouse gases 2007. 2008. Official Statistics of Finland. Statistics Finland. Helsinki.

⁶⁷ Liikenne- ja viestintäministeriön hallinnonalan ilmastopoliittinen ohjelma 2009 - 2020. Liikenne- ja viestintäministeriö. 17.3.2009.

Figure A2 - GHG trends and projections in Finland

Share of GHG by main source and by gas in 2006⁽¹⁾



⁽¹⁾ Total greenhouse gas emissions, do not include emissions and removals from LULUCF (carbon sink activities) and emissions from international bunkers.

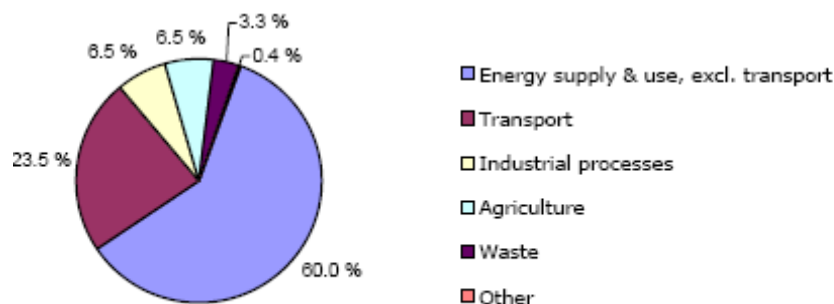
Source: EEA greenhouse gas data viewer: Finland greenhouse gas profile summary 1990-2020

Italy

In Italy total greenhouse gas emissions reached 567.9 Mt CO₂ equivalent in 2006, which corresponds to 11% of the total emissions in EU-27. Italy is the third absolute emitter in the EU-27 (after Germany and UK), the seventeenth in terms of per capita emissions and the twelfth regarding per capita GDP value.

The analysis by sector shows that the sector that emits the most GHG is energy supply and use (60% of total GHG emissions), followed by transport (23.5%). The remaining emissions are mainly due to agriculture and industrial processes (13%) (see Graph1). Note that, in Italy, most of the emissions - more than 80% of total greenhouse gas emissions - consist of CO₂ (carbon dioxide).

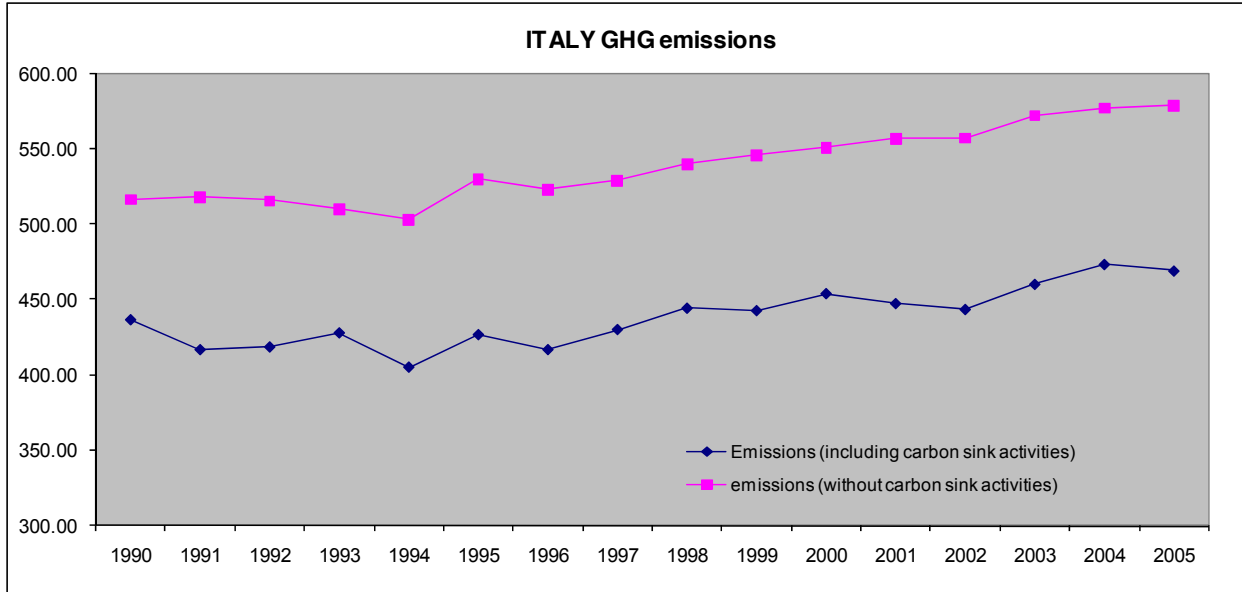
Figure A3 - Emissions by sector



Source: EEA

GHG emissions increased by 9.9% during the 1990–2006 period, well above the burden-sharing target of –6.5% for the period 2008–2012. Emissions seem to have stabilised more recently, with a smooth decrease in 2005–2006 of 1.7% (compared to a decrease of 0.8% for EU-15 in the same year). Per capita emissions also increased by 6% during the 1990–2006 period compared to –8.4% EU-15 average. The increase in emissions was mainly due to:

- road transport;
- fossil fuel combustion for electricity;
- heating production and by household and services.

Figure A4 - Italy GHG Emissions**Source:** EEA

Climate change is assumed to affect both the frequency and the intensity of natural hazards. Natural hazards related to climate changes in Mediterranean regions are expected to impact mainly on human health and ecosystems (extreme temperatures), agriculture production (desertification, floods, storms, extreme events and droughts), energy production (droughts), forest management (forest fires) and tourism (coastal erosion). Areas concerned by desertification and drought are expected to increase in the South of Italy (Sardinia, Sicily, Basilicata, Calabria and Puglia), while floods and drought events should increase in all the regions of the country (see also the specific situation of the Po river basin).

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