



**rsc**  
REGIONS FOR  
SUSTAINABLE  
CHANGE

# The Role of Assessment Tools:

Integrating climate change concerns into regional planning through strategic environmental assessment



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## Abbreviations

- AT** ● Austria
- BG** ● Bulgaria
- CCW** ● Countryside Council for Wales, UK
- CEE** ● Central and Eastern Europe
- EIA** ● Environmental impact assessment
- EPA** ● Environment Protection Agency, UK
- ERDF** ● European Regional Development Fund
- ES** ● Spain
- EU** ● European Union
- GDP** ● Gross domestic product
- GHG** ● Greenhouse gas
- GNI** ● Gross national income
- HIA** ● Health impact assessment
- HU** ● Hungary
- ISA** ● Integrated sustainability assessment
- IT** ● Italy
- LCLIP** ● Local Climate Impacts Profiles, UK
- LCR** ● Low-carbon region
- LDF** ● Local Development Framework, UK
- MEPA** ● Malta Environment and Planning Authority
- MT** ● Malta
- NCEA** ● Netherlands Commission for Environmental Assessment
- NGO** ● Non-governmental organisation
- NGPRSDOP** ● North Great Plain Regional Spatial Development Operational Programme, HU
- NOGPOP** ● North Great Plain Operational Programme, HU
- OECD** ● Organization for Economic Co-operation and Development
- OP** ● Operational Programme
- PL** ● Poland
- RDP** ● Rural Development Programme, Piedmont, IT
- REC** ● Regional Environmental Center for Central and Eastern Europe
- RES** ● Renewable energy sources
- ROP ERDF** ● Regional Operational Programme co-funded by ERDF, Piedmont, IT
- SA** ● Sustainability assessment/appraisal
- SEA** ● Strategic environmental assessment
- SEA Directive** ● Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment
- SIA** ● Social impact assessment
- UK** ● United Kingdom
- UKCIP** ● Climate Impacts Programme, UK
- UNFCCC** ● United Nations Framework Convention on Climate Change
- WCMP** ● Water Catchment Management Plan, Malta
- WFD** ● Water Framework Directive

## Acknowledgements

This discussion and guidance paper is a collaborative effort of the partners participating in the INTERREG IVC co-funded “Regions for Sustainable Change” (RSC) project. The RSC partnership was created with the aim of promoting an EU-wide shift to climate-friendly economies, and this document is one of the key outputs of the project.

This paper aims to enlarge the knowledge of the RSC partners and other European regions regarding the role of strategic environmental assessment (SEA) and sustainability appraisal (SA) in strengthening the integration of climate change and low-carbon issues into policy planning documents, and to provide practical tips and advice for future improvements. It was written by Dusan Sevic, Venelina Varbova and Raisa Gerasina from the Regional Environmental Center for Central and Eastern Europe; Jennifer McGuinn, advisor to the RSC project team; and Jiri Dusik, external expert. It was reviewed by Roger Levett, who provided valuable contributions for its improvement.

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# Introduction

## Background

Climate change threatens the security, comfort, and potentially the survival of humankind. Minimising its severity is a precondition for all other human goals. At the same time, climate change brings not only risks but also opportunities for European regions, which have great potential to contribute to sustainable growth through lower greenhouse gas emissions and the implementation of innovative climate change mitigation and adaptation measures. To achieve this, regions require the right mix of stimulating policies, flexible and knowledgeable institutions, as well as the necessary financial instruments.

The partners participating in the INTERREG IVC Regions for Sustainable Change (RSC) project hope to capitalise on regions' potential for tackling climate change. In the longer term, the partners in the RSC project share a common cause and aim to promote climate-friendly economies by sharing experiences and providing the methodological means to unlock the potential of regional development programmes.

One of the sub-objectives of the RSC project was to investigate the use of strategic environmental assessment (SEA) and related assessment tools for integrating considerations related to climate and low-carbon economy into regional planning.

The initial focus of this work was on a wide range of strategic assessments, including social and health impact assessments. During the course of the work, the focus has narrowed to SEA due to the existing legal requirements and scale of practice within the RSC partnership. Nevertheless, many of the principles, issues and techniques presented in this paper can also be applied to other types of strategic assessment of plans and programmes, thus the paper contains case studies related to social and health impact assessments.

A working group of four RSC partners identified the key issues and linkages between SEA/SA and the integration of climate change issues into planning documents. Information on experience and knowledge in RSC partner regions was collected via a questionnaire and complemented through follow-up interviews with authorities, planners and SEA practitioners. The RSC project team analysed the collected information and carried out desk research and interviews on the identified issues. The output — this paper — is intended to help RSC partners and other regions to learn more about the role of SEA/SA for strengthening the integration of climate and low-carbon issues into policy planning documents, and to provide practical tips and advice for future improvement.

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## The RSC partnership

The RSC partnership is a grouping of 12 organisations from eight EU member states. The partners share a common cause: to promote an EU-wide shift to low-carbon economic development. The partnership developed a number of innovative, easy-to-use mechanisms for all regions that are striving towards a climate-friendly economy. The three-year RSC project was launched in October 2008 and is co-funded by INTERREG IVC, part of the European Territorial Cooperation Objective of the Cohesion Policy for the period 2007–2013.

Partners: Burgenland Regional Management (AT); Bulgarian Ministry of Regional Development (BG); La Rioja (ES); University of Debrecen, Centre for Environmental Management and Policy (CEMP) (HU); the Regional Environmental Center for Central and Eastern Europe (HU); LaMoRo Development Agency (IT); Liguria (IT); Marche (IT); Malta Environment and Planning Authority (MT); Municipality of Wroclaw (PL); Cornwall Council (UK); and Cornwall Development Company (UK).

Project website: [www.rscproject.org](http://www.rscproject.org)

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## Aims of the discussion and guidance paper

The paper aims to:

- investigate critical issues for using SEA as a tool to help integrate climate change aspects into planning;
- provide guidance and recommendations on how to mainstream climate and low-carbon issues into planning processes using SEA; and
- facilitate information sharing and know-how transfer among RSC partners and with other European regions.

It is primarily aimed at national and regional policy planners and SEA practitioners. It may also be useful to other stakeholders with an interest in ensuring that climate change considerations are embedded consistently in policies, plans and programmes.

## Structure

This paper comprises four main chapters, followed by a section of recommendations defining areas for further improvement.

- Chapter 1 outlines key considerations related to climate change mitigation and adaptation that should be addressed at local and regional level.
- Chapter 2 provides an overview of SEA and other assessment tools that can contribute to the consideration of climate change concerns during decision making.
- Chapter 3 presents the main challenges in addressing climate change in SEA and recommends useful approaches.
- Chapter 4 provides guidance on integrating climate change into SEA aimed at authorities and practitioners.





## Considering climate change issues in regional plans and programmes

This chapter highlights the growing importance of climate change on global and national political agendas, and the role of European regions in creating a low-carbon, resource-efficient, climate-resilient and greener economy. Additionally, it emphasises that this goal can only be reached if climate issues are properly and fully integrated into regional policy planning.

## Background

An effective response to climate change requires reducing emissions of greenhouse gases (mitigation) and adaptation to the expected changes in climatic conditions. The relationship between mitigation and adaptation is outlined in the figure below. Mitigation measures are actions taken to reduce human impacts on the climate. Adaptation measures are actions in response to changes that have already taken place (or that are inevitable) and actions that can influence the vulnerability of a region.

Both mitigation and adaptation are frequently seen as issues that must be addressed at different policy levels. Mitigation may often be perceived as a matter for national governments in the context of international negotiations.

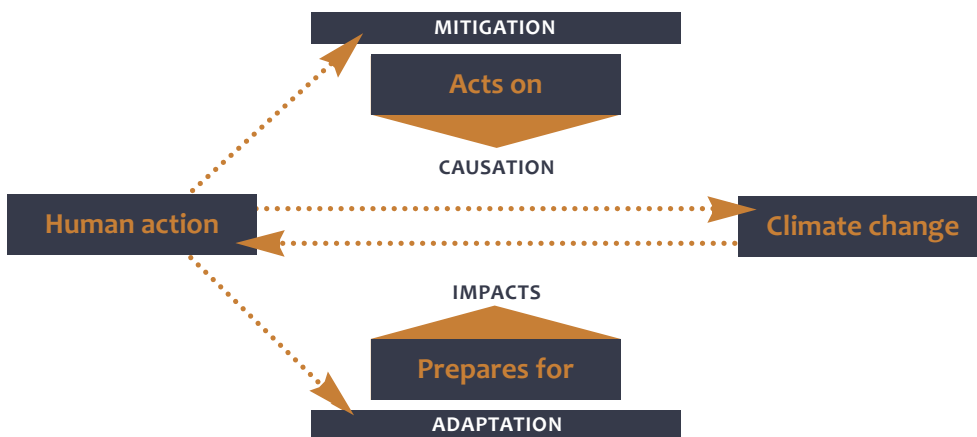
Adaptation is considered as a matter to be addressed primarily by regional and local authorities. Given the fact that the implementation of mitigation and adaptation measures will require structural adjustments in economic and development patterns, irrespective of the level of governance, this division of roles appears arbitrary and somewhat illogical. Essentially, many decisions related to climate change, and any responses to it, will require some form of engagement on the part of the local and regional authorities.

The integration of climate change into regional development planning is still at an early stage of development. Below, we outline some responses that regions have begun to adopt regarding adaptation and mitigation measures.

## Climate change adaptation at regional level

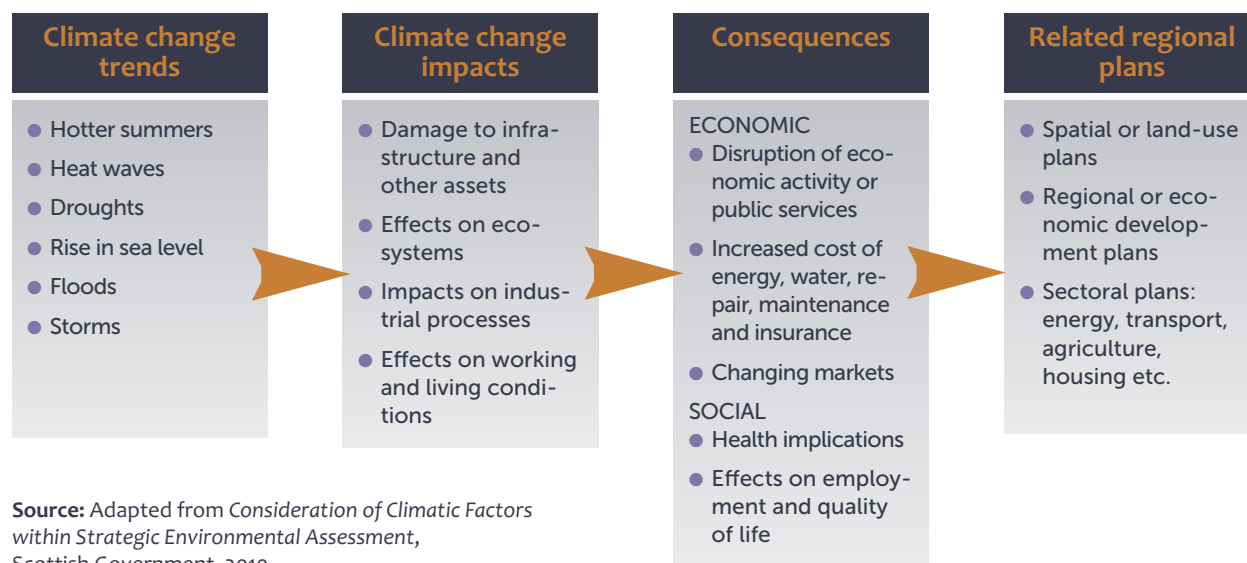
The effects of climate change are already being witnessed and are predicted to increase steadily in the future. The overwhelming consensus among scientists is that climate change is being driven by emissions resulting from human activities and that future human security requires a rapid reduction in anthropogenic emissions of greenhouse gases (IPPC, 2007a). The Stern Review on the Economics of Climate Change concludes that that the benefits of strong, early action on climate change considerably outweigh the costs (Stern, N. et al., 2006).

### ■ The relationship between human actions and climate change



Source: Sivell et al., 2008

## ■ Climate trends, potential social and economic effects and consequences, and related regional plans



Climate change is a global issue but the effects of the changing climate are unevenly distributed. The impact of climate change on regions depends on the magnitude of the change, the exposure and sensitivity of ecological and socioeconomic systems, and the ability of societies to adapt to these changes. The figure above illustrates the flow from climate change adaptation concerns to regional plans.

The recent analysis of climatic conditions in Europe has shown that South Eastern Europe, the Mediterranean and Central Europe are the most vulnerable to climate change (EC, 2009a). The greater vulnerability of these regions will require adequate response from authorities and citizens. The table on page 12 outlines some key climate change impacts. It should be noted that this list excludes some important indirect effects of climate change, particularly on the poor, through price rises and interruptions in the supply of food and fuel, for example.

Most regions are large enough to help in the coherent management of physical catchments that are important for climate change, such as river basins, forests, vegetation zones and coastal areas. They are also able to cooperate with other regions and develop specific approaches to address common issues such as the monitoring of watershed areas and flood risk prevention.

Developing strategies covering “macro-regions” — such as, for example, the Baltic Sea Strategy — is an opportunity to apply a holistic approach to the environmental and climate problems of a geographical area covering regions from different countries. Other examples include the establishment of partnerships between authorities and the private sector for adaptation (e.g. the tourism sector in the French Alps) or setting up regional platforms for disaster risk reduction.

## Climate change impacts in Europe and their probable intensity

CLIMATE CHANGE INDICATORS	NORTHERN EUROPE	CENTRAL AND EASTERN EUROPE	MEDITERRANEAN
Direct losses from weather disasters	M (-)	M (-)	H (-)
River flood disasters	M (-)	H (-)	L (-)
Coastal flooding	H (-)	M (-)	H (-)
Public water supply and drinking water	L (-)	L (-)	H (-)
Crop yields in agriculture	H (+)	M (-)	H (-)
Crop yields in forestry	M (+)	L (-)	H (-)
Biodiversity	M (+)	M (-)	H (-)
Energy for heating and cooling	M (+)	L (+)	M (-)
Hydropower and cooling for thermal plants	M (+)	M (-)	H (-)
Tourism and recreation	M (+)	L (+)	M (-)
Health	L (-)	M (-)	H (-)
H: high; M: medium; L: low; (+): Positive impact; (-): Negative impact			Source: Behrens et al., 2010

### Climate change mitigation at regional level

The adoption of the European climate and energy legislative package has translated climate mitigation objectives into strict obligations on the part of all member states, and these obligations have been passed on to European regions. Many European governments also now seek a transition to a low-carbon economy, as this will enhance their future competitiveness and may open up opportunities for growth. The volatile prices of fossil fuels will also stimulate economies to decarbonise, increase their energy efficiency and change the energy mix.

The specific responses of various regions to the EU energy and climate change agenda and economic incentives for the decarbonisation of the economy will vary between regions. For example, regions with economies that are strongly dependent on heavy industries and fossil fuels will need to undergo deeper structural changes. At the same time, climate change is not only a problem with accompanying costs and job losses. It is also an opportunity for innovations, new businesses and profits.

Many decisions related to mitigation measures are taken by regional authorities and municipalities. For example, the energy autonomy goal declared by Burgenland (Austria) is far in advance of national ambitions. Regions are in a position to make strategic policy interventions in areas where local authorities and cities suffer from lack of financial and administrative resources to act. They can promote local economic development and energy self-sufficiency by setting up clusters or networks that promote adjustments and innovations, or by providing the financing assistance to overcome potentially high initial investment costs.

## Integration of climate change adaptation into regional policies

In Malta, a “climate check” was carried out on the Water Catchment Management Plan (WCMP) to assess changes in pressures on water resources due to climate change, to ensure that planned measures target both current and future pressures on water resources and to put forward recommendations ensuring the performance of measures in a changing climate or within a range of climate scenarios. The check provided an indication of whether the measures could contribute to, or conflict with, adaptation to climate change impacts.

During the preparation of the Hungarian North Great Plain Operational Programme (NOGPOP) 2007–2013 and supporting action plans, higher-level documents related to the management of the extreme weather events hitting Hungary were consulted. Analysis based on European and national practices was used to support planning for coping with adverse weather situations, since the country and the region are extremely vulnerable to flooding. Due to the degree of risk, it was included in Priority 5 (Protection of Environmental Values, Environmental Safety within Urban and Regional Development) of the NOGPOP, and spatial water management was linked with the development of land drainage operations.

In the UK, consideration of flood zones was included into the Cornwall Mineral Development Framework through the application of the Strategic Flood Risk Appraisal to avoid negative developments in areas of flood risk and to identify possible changes in flood risk areas resulting from climate change. All the maps included in the site-specific document for mineral developments (and waste development in the Waste Development Framework) include flood risk areas. The Cornwall Local Development Framework treats climate change as an overarching issue to be considered within all sector-specific development documents.



## Consideration of climate change mitigation in regional plans

In the Italian region of Piedmont, the environmental monitoring of programme implementation makes it possible to check whether climate change issues are being addressed and helps verify that the mitigation measures developed are properly implemented. In the Regional Development Programme, particular attention has been given to the incorporation of three indicators related to climate change and renewable energy: the production of renewable energy from agricultural and forest biomass; useful agricultural surface for renewable energy production; and GHG emissions from agriculture. The Regional Operational Programme refers in particular to the increased energy efficiency of measures and the promotion of renewable energy sources. All these actions are expected to contribute directly to the reduction of atmospheric pollution and GHG emissions initiated by programme implementation.

In Hungary, SEAs carried out for the North Great Plain Operational Programme (NOGPOP) 2007–2013, including its action plan, and for the Action Plan 2009–2010 of the North Great Plain Regional Spatial Development Operational Programme (NGPRSDOP) 2007–2013 focused on the examination of the most important environmental impacts of planned interventions according to defined environmental factors. The most significant aspects of climate change were investigated, including reducing GHG emissions, increasing the use of renewable energy, increasing energy savings and promoting climate-friendly modes of transport such as cycling.



## Going beyond EU climate policy objectives — The Covenant of Mayors

The Covenant of Mayors ([www.eumayors.eu](http://www.eumayors.eu)) is a formal commitment made by signatory cities and towns to go beyond EU energy policy objectives in terms of reductions in CO<sub>2</sub> emissions by 2020 through the implementation of local sustainable energy action plans. As an initiative of the European Commission, the covenant empowers pioneering EU cities to mitigate climate change at local level by enhancing local energy efficiency and through the use and production of cleaner energy. The commitment of signatories is further translated into specific projects and measures stipulated in action plans — subject to constant EC monitoring. Cities are obliged to report on their achievements, and in the event of non-compliance their involvement in the covenant is terminated. As part of their task cities are expected to mobilise society in their areas to participate in action plan implementation, organise local energy days, and promote networking with other cities. Many European regions are also participating in the Covenant of Mayors as supporting structures since they are able to provide strategic guidance and financial and technical support to municipalities with the political will to sign up to the Covenant of Mayors but lacking the skills and /or resources to fulfil its requirements.

The Covenant of Mayors initiative (see above), in which many European cities and regions are participating, demonstrates how European cities and regions can work together towards developing and implementing sustainable energy policies.

## Questions to be asked when considering climate change in regional planning and programming

Regions can start responding to climate change by considering both climate change mitigation and adaptation concerns in their planning and programming processes and optimising them accordingly. Below are some basic questions about climate change that should be asked during planning processes at regional level:

- What are the likely manifestations of climate change in the region?
- In what ways is the region (its ecosystems, economy, infrastructure, society) vulnerable to the various impacts of climate change?
- Are the key developments proposed in the region feasible in the context of changing climatic conditions?
- Do the proposed developments enhance or reduce the region's resilience to the expected changes in climate?
- How can individuals and societies adjust their behaviour to cope with the onset of climate change?
- Do the proposed actions reduce or increase the region's contribution to the causes of climate change?

These questions can be addressed through various planning and assessment tools. Chapter 2 outlines the available tools for this purpose and explains the role that SEA can play in addressing climate change.





## Key tools for addressing climate change in development planning

The integration of climate change concerns requires the right mix of instruments. This chapter presents some of the tools available for climate change mainstreaming. In particular, it examines the potential role of SEA and similar assessment tools, as well as vulnerability assessments and climate proofing.

## Strategic environmental assessments

Strategic environmental assessments (SEA) refer to a family of “analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programmes and evaluate the interlinkages with economic and social considerations” (OECD, 2008). SEA is one of the key instruments for integrating environmental concerns and sustainable development principles into strategic planning and decision making. It allows a systematic review of the objectives, measures, instruments and other aspects of a plan or programme on priority concerns related to the environment and/or sustainability.

In the EU, SEA is regulated by Directive 2001/42/EC (the SEA Directive). The directive requires that SEA be carried out for a wide range of public plans and programmes that are considered to affect the environment. An SEA is mandatory for many regional strategies, plans and development programmes as well as for sectoral plans in a variety of fields including transport, energy, waste, agriculture and forestry.

The SEA Directive requires plan makers to assess the likely impacts of their plans and programmes on “the environment, including on...climatic factors”. It also requires the identification of key environmental problems, which may include those caused by climate change. SEA thus provides a formalised tool for evaluating environmental impacts and risks, including those related to climate change, and can thus strengthen the inclusion of climate-related aspects into plans and programmes.

It is important to highlight that “climatic factors” are only one of the environmental issues specifically referenced in the SEA Directive. Also, while the SEA Directive specifically mentions that climate factors must be taken into account in the assessments, evidence from across the EU shows that climate change has not typically been given sufficient or satisfactory consideration. A study carried out by DG Environment in 2009 on the first five-year implementation period of the SEA Directive found that specific attention to climate change issues is still limited across the EU.

Greater attention has recently been paid in some member states (e.g. the UK, the Netherlands, France, Denmark, Sweden and Austria) to the inclusion of climate change issues into SEA. Examples cited in the COWI study can be found in the box on page 19. Most are in sectoral planning rather than general development and spatial regional planning. This is understandable, since some sectors have direct and obvious links with climate change (e.g. energy, transport and agriculture).

## Experiences of RSC partner regions in integrating climate change into SEA

In order to analyse the current situation in the RSC partner regions with respect to key interactions between SEA/SA, climate change and regional policy planning, the RSC project team carried out a survey in the partner regions via a questionnaire and follow-up interviews with selected authorities and experts. This helped to identify weaknesses and strengths, as well as positive practices and examples. Respondents to the questionnaire were SEA or climate change experts from national authorities and regional authorities involved in regional planning (regional operational programmes for EU funds, other regional development programmes and regional spatial or land-use plans); SEA and SA experts and consultants; and external climate change experts. The survey was carried out in the RSC partner regions between January and June 2010.

## Integrating climate change objectives into planning using SEA

In Italy, the SEA report for the 2008 development plan for Italy's national electricity grid identifies impacts on climate change in terms of the expected reduction of greenhouse gas emissions, due mainly to improved efficiency. (COWI, 2009, p. 116)

In Ireland, the screening report and determination for the SEA of the Transport Strategy for the Greater Dublin Area 2010–2030 underlines the “need to take into account the National Climate Change Strategy and the relevance of the strategy for the implementation of the European Climate Change Programme.” (Ibid.)

France and Austria “specifically include the UNFCCC and the Kyoto Protocol... (along with national climate change strategies or plans)... among the environmental protection objectives established at various levels that need to be taken into account, when appropriate, in the development of the plan or programme.” (Ibid.)

Many respondents reported that, since there has been limited experience to date, the establishment and prioritisation of climate change objectives and targets is relatively new within member states and regions (La Rioja, Malta, Liguria, Wroclaw). A large proportion of regional-level experience with SEA has been for Cohesion Policy planning documents, which were prepared and assessed in 2006 for the current funding period, which is before climate change became a priority on the EU agenda (Burgenland). Another issue is the absence of an overarching national climate change strategy providing overall strategic direction on the determination and/or achievement of targets for both mitigation and adaptation at the time of the assessment (North Great Plain).

However, even in the absence of national or sectoral strategies in the field of climate change, it was reported that many national strategic and planning documents take into account climate change issues as they have to relate to the respective EU legislation (Bulgaria, La Rioja, Malta, Burgenland). Although these documents provide a framework for climate considerations, they are insufficient to guide planning at the regional level (La Rioja, Malta, Marche).

Several regions pointed out that the SEA process was the only available point of entry for incorporating climate change concerns into plans or programmes. This refers mainly to energy-related issues in Cohesion Policy programmes for the 2007–2013 period (Burgenland). In some cases, key planning documents were not subject to SEA, based on interpretations of national law, and therefore environmental and climate change issues were not adequately considered (La Rioja).

Nevertheless, consideration of climate change issues in the SEA process has been gaining in importance in recent years. In general, SEA was defined by respondents to the questionnaire as a useful tool for the integration of climate change issues into regional development plans and sectoral policies, although its influence is still far weaker than required (Bulgaria, Wroclaw, Malta, Marche, North Great Plain, Cornwall).

When carried out in parallel with the plan-making process, SEA helped to modify the initial development proposals with a better focus on environmental protection, the preservation of natural resources and the inclusion of sustainable development aspects (Bulgaria, Cornwall, Marche, Piedmont).

## Consideration of climate issues in the SEA process

**Italy:** Marche's Rural Development Programme includes the mitigation of climate change as one of its most important objectives. During the SEA process of Marche's Regional Water Management Plan, climate change issues were taken into account through different scenarios of water availability and the indication of climate change adaptation actions concerning the sustainable use of water resources and the reduction of water extraction.

**Malta:** In Malta, the significant potential effects of the Water Catchment Management Plan on climatic factors are being assessed in line with Annex I of the SEA Directive. This means that SEA objectives and criteria for climatic factors have been identified in terms of both mitigation and adaptation/vulnerability to climate change impacts. Climatic factors were considered for the SEA of the Solid Waste Strategy for the Maltese Islands, although only in relation to mitigation.

**Italy:** In Piedmont region the SEA process in relation to the Regional Operational Programme co-funded by the European Regional Development Fund (ROP ERDF) allowed for the mapping of areas vulnerable to climate change risks associated with the programme's implementation, and for carrying out a qualitative estimation of the environmental (climate change) effects of the programme in relation to future environmental (climate) conditions. The assessment has been used to improve the integration of environmental and climate change issues within the planning process. A set of indicators has been developed to define appropriate measures for environmental monitoring. The SEA of the Rural Development Programme in Piedmont also addressed climate change issues when dealing with Axis 2: Environment and Rural Areas Improvement. Three indicators related to climate change and renewable energy were introduced to this development axis.

Some partners highlighted that the SEA process influenced the incorporation into planning documents of specific indicators for monitoring climate change, or indicators related to effects on GHG emissions, increased energy efficiency, increased use of renewable energy sources, and the use of climate-friendly modes of transportation (North Great Plain, Cornwall, Bulgaria, Marche, Piedmont).

Experience within the RSC partnership shows that even though national-level development plans and programmes contain many climate-related priorities and measures, improvements need to be made towards:

- the adaptation of national planning documents to concrete regional conditions;
- the development of more detailed measures and targets, including types of activities and time schedules;
- strengthening the capacity of institutions to incorporate climate issues within the policy-making process;
- the distribution of responsibilities and of cooperation and coordination mechanisms among concrete implementing institutions and bodies;
- the allocation of budgetary funds for climate-related measures;
- the development of targeted SEA guidelines and tools that specifically address climate change aspects;
- the preparation of better sets of climate change indicators (measurable and representative); and
- more concrete action plans with defined methodologies and/or operational steps.

## Other strategic assessment processes

The application of SEA is not in itself a guarantee that climate change issues will be considered; nor does the absence of SEA prevent the consideration of those issues. However, SEA does offer an opportunity to:

- explore the potential contribution of a plan, programme or strategy to GHG emissions, with the aim of avoiding or reducing such emissions where possible;
- consider whether the proposed plans and programmes enhance or reduce environmental problems caused by climate change; and
- assess whether the proposed policy planning documents enhance or limit the adaptation of the region (population, infrastructure, economy) to climate change.

Other types of strategic assessment share certain similarities, thus the principles discussed and the guidance given, even though based on SEA, can also be of use for integrating climate change into other processes, such as sustainability appraisal (SA), social impact assessment (SIA) and health impact assessment (HIA).

While SEA assesses the effects on the environment of plans and programmes, their wider purposes and impacts (e.g. economic, social, health) are often not questioned. Some practitioners and assessment regimes therefore broaden SEA to consider a plan's impacts, both positive and negative, on the widest range of factors that have an impact on human wellbeing. The SEA processes that address such issues become part of sustainability appraisals (SAs).

Social impact assessment facilitates the analysis and management of the social consequences of policies, plans and programmes. To date, its use for studying the

## Social impact assessment and climate change — METROMEX

The Metropolitan Meteorological Experiment (METROMEX) was a study of urban weather anomaly in St. Louis, which helped to identify urban-induced unintended changes in the local climate over 30 years and to connect those changes to resulting social changes. Climate anomalies — such as increased cloudiness, rainfall, severe storm activity, local flooding, stream and groundwater pollution and crop-hail losses — were studied by scientists and then projected onto the social changes that have taken place in the area.

Detailed data were collected on the perception of weather and climate change; knowledge of weather changes; reactions to increased/decreased rainfall; the relationship between weather and health, comfort and safety (such as sleep loss, health problems, household water quality, sewer backups, insect profusion); the perception of climate change impacts on traffic flow, commuting behaviour and traffic accidents; the observance of street and basement flooding; impacts on everyday occupational and recreational activity; weather-related property damage; power outages; and adjustments to these problems. Farmers were asked about perceived weather-related damage to crops from flooding, droughts and hail, as well as perceptions of crop yields, and their corresponding adjustments.

Findings from METROMEX showed that over a 30-year period a change in climate as significant as a 30 percent increase in summer precipitation was virtually unnoticed by the affected population. Even farmers most directly affected by increased rain attributed the noticed higher crop yields to better agricultural technologies. The slight changes that took place in occupational and recreational behaviour patterns in response to local climate change also remained unnoticed. Social impact studies carried out in connection with METROMEX demonstrated a linear relationship between increased rainfall and the frequency of traffic accidents.

effects of social interactions on climatic processes has been rather limited. The METROMEX SIA study (see page 21) offers a fascinating insight into how people reacted to local climate change, including, apparently, a large-scale denial of its occurrence.

Health impact assessment (HIA) is defined as “a combination of procedures and methods systematically used to judge the potential effects of a policy, plan or programme on the health of the population and the distribution of these effects within the population itself” (Patz et al., 2008). An HIA is a systematic process through which hazards, risks and opportunities related to health can easily be identified and addressed at the earliest stages of the development planning process. From a climate change perspective, such assessment could facilitate the introduction of preventive measures for various risks, such as heat wave early warning systems (see page 23).

## Vulnerability assessment

Vulnerability assessment takes into account the pressures stemming from a region’s current and potential climate conditions, as well as the likely responses to these pressures. Vulnerability to climate change is defined as a function of:

- exposure to climate hazards;
- sensitivity to climatic variability; and
- capacity to adapt.

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## Selected references for vulnerability assessment methods

Eriksen, S.H. and P. M. Kelly, 2007. “Developing Credible Vulnerability Indicators for Climate Adaptation Policy Assessment.” In: *Mitigation and Adaptation Strategies for Global Change*. Springer. Available at: <http://www.springerlink.com/content/kr6481642w504335/>

Kaiser, G., 2007. “Coastal Vulnerability to Climate Change and Natural Hazards.” 8th Forum DKKV/CEDM: Disaster Reduction in Climate Change. October 15–16, 2007. Karlsruhe University. Available at: [http://www.cedim.de/download/39\\_Kaiser.pdf](http://www.cedim.de/download/39_Kaiser.pdf)

Metzger, M. J., M. D. A. Rounsevell, L. Acosta-Michlik, R. Leemans and D. Schroter, 2006. “The vulnerability of ecosystem services to land-use change.” *Agriculture, Ecosystems and Environment*, 114, 69–85.

Brooks, N., W. N. Adger and P. M. Kelly, 2005. “The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation.” *Global Environmental Change*, 15: 151–163. Elsevier. Available at: <http://www.uea.ac.uk/env/people/adgerwn/Brooksetal2005GEC.pdf>

Santo, H., 2007. *A rapid vulnerability assessment method for designing national strategies and plans of adaptation to climate change and climate variability*. Center for International Forestry Research, Indonesia. Available at: [http://www.cifor.cgiar.org/trofcca/asia/docs/Amsterdam\\_Heru.pdf](http://www.cifor.cgiar.org/trofcca/asia/docs/Amsterdam_Heru.pdf)

Sullivan, C. A. and J. R. Meigh, 2005. “Targeting attention on local vulnerabilities using an integrated indicator approach: The example of the Climate Vulnerability Index.” *Water Science and Technology*, Special Issue on Climate Change, 51(5): 69–78.

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There are a growing number of methods for climate change vulnerability assessment. Most of these studies point out that the general vulnerability of a given region depends on the particular vulnerabilities of its subsystems. Schneider et al. (2008) propose to determine the extent and nature of the key vulnerabilities by analysing:

- pressures caused by climate change, including the magnitude, timing, persistence and irreversibility of those pressures and the probability of their occurrence; and
- the vulnerability of subsystems, including the degree of importance of the region's threatened subsystems; resistance, resilience and adaptive capacity; and readiness to capitalise on the positive impacts of climate change.

With basic information about the intensity and importance/vulnerability of certain economic sectors in a given region available at an early stage (national-level information may also be needed), it should be possible to determine the relevant sectors that will be most affected by climate change and possible issues for consideration within the SEA process.

While the above assessment approach is, in principle, similar to the one typically deployed in SEA, there is an important difference that distinguishes SEA from vulnerability assessments. An SEA assesses the impact of the future actions contained in the proposed plans or programmes, whereas vulnerability assessment is typically used to evaluate the vulnerability of current systems and to suggest their future adjustment.

## Health impact assessment and climate change in the UK

Health impact assessments related to climate change carried out in the UK concentrated on the production of quantitative results for the following health outcomes and included three time periods and four climate scenarios:

- cold- and heat-related deaths and hospital admissions;
- cases of food poisoning;
- changes in the distribution of *Plasmodium falciparum* malaria (global) and tick-borne encephalitis (Europe), and in the seasonal transmission of *Plasmodium vivax* malaria (UK); and
- skin cancer cases due to stratospheric ozone depletion.

The large degree of uncertainty related to these estimates was acknowledged. The main conclusion of the report was that the impacts of river and coastal flooding and of severe winter gales will significantly increase. The report also addressed the balance between the adverse impacts and potential benefits of climate change: the potential decline in winter deaths due to warmer winters is far greater than the potential rise in heat-related deaths. Climate change is also expected to reduce cases of illness and lower the number of deaths related to air pollution, with the exception of those associated with the concentration of tropospheric ozone, which will form far more rapidly at higher temperatures.

Source: McMichael et al., 2003

## Mainstreaming climate change into land-use planning in Malta

Malta Environment and Planning Authority (MEPA) has carried out a review of its national land-use planning system to assess whether it takes into full consideration issues that affect or that may be affected by climatic changes. The exercise resulted in the review of the Maltese land-use planning structures and processes, and recommendations on how the system may be improved by taking greater account of issues related to climate change.

Among other things, the study observed that an inherent objective of the SEA is to assess the effect of the plan on environmental sectors, including climatic factors. In the opinion of the reviewers, this would not necessarily “climate proof” the policies themselves — that is, the SEA process would not necessarily ensure that the policies would perform in a changing climate. A combination of assessment methodologies may therefore be required — the SEA to assess the impacts of the plan on climatic factors, and the application of a so-called climate change lens to ensure that the policies perform in a changing climate. A separate checklist for climate proofing policies was designed for this purpose.





In theory, vulnerability assessment can become part of the baseline analysis in the SEA if there are important potential vulnerabilities not adequately covered by available information. How detailed and elaborate such a study needs to be, and whether it is best done as a stand-alone exercise or as part of the general data collection and analysis supporting the plan making and/or the SEA, will vary with circumstances.

## Climate proofing

The question frequently arises as to whether SEA should “climate proof” the proposed plan or programme from the climate change perspective.

An SEA involves the assessment of the impacts of the proposed plan on the evolving state of the environment. Many environmental baseline trends may be influenced by climate change, and the SEA can examine whether the proposed plan or programme further worsens the relevant baseline trends and reduces the vulnerability of the study area to climate change.

The SEA itself does not a priori aim to examine the technical or economic feasibility of proposed developments in the changing environment. It seems logical that such technical matters would be better addressed as part of a good planning process, or through separate studies. Information gained from the SEA process may be one of the inputs that planners can use when examining the technical and economic viability of development proposals in a changing climatic situation. Climate “checking” or “proofing” can therefore be a useful complement to SEA in those regions that expect severe changes in climate or related phenomena.

## Tips for selecting the right combination of tools

Good planning practice should require that plans and the relevant assessments are based on adequate relevant information and evidence. This needs to include both how climate change may affect the region, and how the plan may affect climate change by contributing to it to a greater or lesser extent, and/or by increasing or reducing vulnerability to it.

Depending on the nature of the plan and the region, there may be enough information already collected and available to cover all the significant issues. Good plan making and appraisal should always concentrate on significant issues and avoid being distracted or confused by trivial ones.

Some member states have better information than others. If some important issues are not adequately covered by available information, it may be necessary to carry out further studies. The next section outlines the key principles for integrating climate change into the SEA process, which are regulated by the SEA Directive. The analyses conducted in accordance with this guidance should facilitate the general identification of the most important concerns related to the interaction between the proposed plan and its environmental context in terms of climate change impacts.

Other specialised studies may be necessary if there is a need for detailed information about the key regional vulnerabilities to climate change, or if detailed proofing is needed of the feasibility of proposed developments in terms of changing climatic conditions. As in the case of vulnerability assessments described above, the level of detail, and whether or not these studies are carried out as an independent exercise, will depend on circumstances.



## Addressing climate change issues in SEA processes at regional level

This chapter discusses some of the complexities and challenges involved in considering climate change issues in planning and outlines an overall approach for integrating climate concerns into SEA processes.

## Recommendations for an overall analytical approach

The first draft of the EC DG Environment's Practical Guidance and Recommendations for Integrating Climate Change and Biodiversity into SEA Procedures notes several characteristics of climate change that require a modification of the conventional approach to conducting SEA and suggests how SEA practitioners might approach the three main challenges in the SEA process (see table below).

**The long-term and cumulative nature of impacts and effects:** We are living in a world that is constantly shaped by countless factors. Climatic factors are just one aspect. The environment is being modified by natural processes, but also by various development activities, the long-term impacts of which may not yet be visible. SEA practitioners should understand this complexity and consider the bigger picture. They should focus on key issues and analyse trends both with and without the proposed plans and programmes.

**Complexity of cause-effect relationships:** The analysis of trends in relation to key issues should yield information on why these trends are evolving as they are — that is, what are their drivers, and how might the trends evolve without the proposed plan or programme. The SEA practitioners can then analyse whether the proposals suggested in the plan or programme can have any direct impact on these trends or can indirectly affect the drivers of these trends. If there are big uncertainties regarding the likelihood and magnitude of these impacts, SEA practitioners can develop a range of scenarios to outline possible changes under different assumptions. These scenarios can help identify “no regrets” actions — that is, actions that have acceptable impacts under all scenarios.

**Uncertainty:** Uncertainties in climatic projections are challenges that decision makers have to face. Some authors (PEER, 2009) argue that we already know more than enough to make many important decisions, and that matters such as lack of political will, public support or resources, and opposition by vested interests, are bigger barriers than imprecise information. For example, in many flood management cases, increased accuracy and more precise predictions are not needed and decisions can be made based on the precautionary principle. Many decisions related to climate change can be simply guided by precaution and

### SEA approaches to climate change and biodiversity concerns

#### KEY CHALLENGES TO CONSIDERING CLIMATE CHANGE AND BIODIVERSITY IN SEA

#### RECOMMENDATIONS FOR THE SEA APPROACH

Long-term and cumulative nature of impacts

Avoid “snapshot” analyses and consider trends both with and without the proposed plan or programme.

Complexity of cause-effect relationships

Analyse the impacts of proposed plans or programmes on the key trends and their drivers.  
Work with both worst-case and best-case scenarios.

Uncertainty

Acknowledge assumptions and the limitations of current knowledge.  
Base recommendations on the precautionary principle.  
Prepare for adaptive management.

Source: EC, 2011

should not be deterred by an absence of accurate scientific answers, which will seldom be available. SEA practitioners should acknowledge the assumptions behind various analyses and suggest proper monitoring systems and adaptive management to cope with unforeseen factors.

Given the above, and in line with the EC draft practical guidance, the present paper recommends using trend analysis as the primary analytical approach for addressing climate change issues in the SEA process. Dusik (2007) defines trend analysis as an interpretation of changes over time, with and without the proposed plan or programme.

Trend analysis helps to describe past trends and the current situation by tracing trends or patterns in the relevant territories in time periods covered by the plan or programme. It also helps when predicting future “baseline” trends without the proposed plan or programme, and when considering whether the trend will reach any breaking points or limits when the carrying capacity of the surrounding environment is reached or exceeded). Lastly, it facilitates the assessment of the cumulative impacts of proposed developments in the plan or programme on the identified future “baseline” trends and helps to draw conclusions for decision making. It can combine many different tools and has the capacity to analyse cause-effect relationships even in situations constrained by significant data gaps.

## Recommendations for the management of the SEA process

According to the RSC SEA survey, planning authorities in the RSC partner regions generally engage external consultants to prepare specific sections of the SEA and to collect relevant background documents. In some countries (e.g. Bulgaria), SEA expertise is also sought from research institutes and universities.

External experts can contribute knowledge and expertise to the SEA process and help to address gaps in expertise in the public administration. However, the external consultants may frequently lack important local knowledge, and the time to gather such knowledge.

It would therefore appear to be beneficial if the assessment is carried out as far as possible by the staff of the regional and local authorities themselves, with outside consultants acting only as external advisors or coaches in order to ensure that the assessment process is in line with relevant regulations and comprehensively addresses key issues, including those related to climate change.

An example of this alternative approach to conducting SEA, adopted by Cornwall Council, is provided on page 30.

## Analysis of trends

Trends can be presented through:

- story-lines that describe overall trends, their main drivers, their territorial dimensions and key concerns and opportunities arising from them;
- maps showing spatial development patterns; and
- graphs, including simple graphs that use available data sets to illustrate the evolution of key issues and/or their drivers over time, as well as complex graphs that provide a comprehensive overview of the correlation between the evolution of drivers over time and the corresponding (sometimes delayed) changes in the aspects covered by the analysis.

Source: Dusik, 2007

## Internalising SEA – Cornwall (UK)

Prior to the administrative reorganisation in Cornwall in 2009, SEAs and sustainability appraisals were performed by subcontracted consultants in order to enable administrative officers to focus more on other aspects of the planning process. According to the Sustainability Assessment Brief (Cornwall Council, 2010), this approach had various disadvantages, including the lack of local knowledge on the part of the consultants, which tended to make the assessment documents very generic and lacking in consideration of specific local issues and objectives. Secondly, using external consultants meant that it was very hard, or even impossible, to get the assessment and policy planning teams working together, with the result that the assessment process was not really integrated into the planning process. In addition, this approach often proved to be excessively costly, since the planning, consultation and participation processes were iterative and often prolonged.

In the event that consultants were not hired — usually in the case of planning documents for smaller territorial units — SEAs and sustainability assessments were carried out by a single administrative officer, which had advantages in terms of level of local knowledge and good integration into the planning process. However, as the same officer was usually involved in creating the planning document itself, it was more difficult to achieve an objective appraisal of the plan. Secondly, one individual may not possess all the required technical skills for the task. Finally, a single individual cannot replace the team approach that is necessary when making judgements about conflicting interests.

For that reason, in the current set-up in which six smaller administrative units have been merged into one and new topical units and teams created, a third approach is being tested in which a small in-house team is responsible for preparing the SEAs and sustainability appraisals, with consultants only acting as objective critics and providing quality assurance checks.

The Sustainability Assessment Brief proposes that the main persons responsible for SEAs should be the sustainability officers from the Sustainability Team, who will “bring their combined knowledge of sustainability objectives into the process”. When required in specific cases, these officers can draw on the technical knowledge of colleagues in other services in the council. It is assumed that the planning team and SEA team will actively cooperate during the planning and assessment process. As mentioned, consultants will be hired only for quality assurance — that is, to provide recommendations for improvements to the draft SEA documents.



## Recommendations on consultations and public participation

The successful integration of climate change into SEA requires involving a range of stakeholders that may be different and/or wider than for the consultations typically carried out for SEA.

Such consultations may seek input from climate research centres, environment agencies, energy agencies, civil protection agencies, specialists in the field of agriculture and transport as well as relevant civil society organisations. The box below contains an illustrative list of organisations that are regularly consulted regarding climate change issues during the design and assessment of planning documents in Cornwall.

Such consultations are especially needed if there is a high likelihood that the relevant plan or programme may be significantly affected by climate change; may reduce resilience to climate change; or may affect the causes of climate change. These consultations do not have to rely on formal communication channels but can be based on information gained through personal interviews, workshops or similar interactive means of information exchange.

Since the information generated through these consultations may be useful not only in the SEA process but also in the planning process itself, plan designers and SEA practitioners may find it useful to conduct such consultations jointly or at least share their outcomes and any other relevant information related to climate change.

### Climate change consultation bodies and organisations in Cornwall

- Climate Southwest (partnership of organisations within South-West England)
- Regen SW (Sustainable Energy Agency for South-West England)
- Cornwall Council
  - Cornwall Council’s Environmental Service
  - Sustainability Team
  - Green Cornwall Team
  - Cornwall Sustainable Energy Partnership (CSEP)
- Cornwall Development Company (CDC)
  - CDC Low-Carbon Team
- Community Energy Plus (CEP)
- Cornwall Strategic Partnership
  - Environment Kernow (Environmental consultation body)
  - Cornwall and Isles of Scilly Economic Forum
- Other organisations that are less concerned with climate change itself but are relevant for related issues, such as biodiversity, water management, agriculture/forestry, fisheries, transport, business and industry.





## Guidance on the consideration of climate change issues in SEA

This chapter provides guidance for regional administrations, planners, SEA practitioners and other stakeholders on ensuring the proper integration of climate change issues into regional planning through different assessment activities. It is based on methods, good practice examples and other information drawn from the earlier chapters of this paper, a literature review, the RSC survey and discussions with RSC project partners as well as external officials and experts. The guidance covers different SEA activities, providing basic advice in the main text and more detailed information in the boxes.

This chapter is organised in eight sections that outline the possible integration of climate change issues into the following typical activities in an SEA process:

- Identification of key issues of concern.
- Analysis of baseline trends.
- Assessment of the consistency of the proposed plan or programme with the relevant environmental objectives.
- Assessment of the cumulative impacts of the proposed plan or programme on evolving baseline trends.
- Consideration of alternatives and recommendations for the adjustment of the proposed developments and mitigation measures.
- Recommendations for monitoring arrangements.
- Compilation of the SEA report, its public review and its use in decision making.

The various activities in the assessment process are not isolated. They overlap in time and should inform each other through feedback loops. The following sections should not be seen as a chronological sequence but as groups of interdependent activities.

### Determination of the key issues of concern

As a matter of principle, the SEA process — and also good plan making generally — should always concentrate on significant issues and avoid being distracted or confused by trivial issues. Defining the scope of the assessment makes it possible to keep SEA focused on the key problems and minimise redundant analyses.

The SEA Directive requires the determination of the scope of the SEA in consultation with relevant environmental authorities. It also calls for an identification of:

- any existing environmental problems that are relevant to the plan or programme, including, in particular, those relating to the Natura 2000 network (Annex 1, item d); and
- environmental protection objectives, established at international, European Community or member state level, which are relevant to the plan or programme (Annex 1, item e).

In order to identify the main issues related to climate change, it is useful to consider, already during the scoping, the possible extreme climatic situations that may occur in the future. Simple consideration of scenarios for the main climate change pressures (see page 35) should provide sufficient orientations on the possible cumulative relationship of climate change and other environmental topics that may be addressed during the SEA process.

The determination of relevant climate issues may also involve consideration of concerns articulated in higher-level climate change objectives.

Many SEAs complement the determination of relevant environmental issues and objectives with the identification of appropriate guiding questions or indicators (e.g. the condition and extent of valuable natural areas) that help to describe existing and future trends with and without the proposed plan or programme. However, when choosing the relevant indicators or guiding questions, SEA practitioners should consider data availability. This does not mean that lack of data for certain indicators automatically prevents their future use within the SEA. The fact that data are not readily available should be pointed out and an informed judgment should be made on whether to use a particular indicator, or on whether other indicators with more readily available information should be selected.

## Groups of physical climate change pressures

GROUPS OF CLIMATE CHANGE PRESSURES	SPECIFIC PRESSURES
Air temperature dynamics	Hotter summers, extremely hot days/periods, milder winters, extremely cold days/periods
Air mass dynamics	Extreme winds (continental and sea storms, hurricanes etc.)
Water dynamics	Drier summers, droughts, wetter winters, extreme precipitation, sea-level rise, floods

## Indicators relevant to climate change mitigation and adaptation

### INDICATORS RELEVANT TO CLIMATE CHANGE MITIGATION

- Total greenhouse gas/CO<sub>2</sub> emissions or emissions reduction in a given period.
- Per capita greenhouse gas/CO<sub>2</sub> emissions or emissions reduction.
- Total renewable energy (electricity and heat) generating capacity approved.
- Number of planning applications approved that include renewable energy generation targets.
- Percentages of household waste that have been recycled; composted; used to recover heat, power and other energy sources; and landfilled.
- Installed capacity of (different) renewable energy and heat generation technologies.
- Installed microgeneration capacity.
- Average energy efficiency of new buildings.
- Amount/ratio of (existing/new) residential buildings within N km of key services.
- Modal share of public transport.
- Number and type of modes available for work-related travel.
- Vehicle/km travelled per person per year.

### INDICATORS RELEVANT TO CLIMATE CHANGE ADAPTATION

- Number of developments built to high sustainability standards, and increase in this number in a given period.
- Number of properties affected by fluvial flood events and reduction in this number in a given period.
- Number of properties affected by coastal flood events and reduction in this number in a given period.
- Number of instances of planning permission granted contrary to the advice of the Environmental Agency on flood defence grounds.
- Household water use and water use reduction in a given period.
- Enhancement of ecological networks through habitat creation/restoration schemes.

Source: Based on UK Environment Agency (2007) and the Draft Cornwall Core Strategy SA Scoping Report (2009)

In any case, the selected indicators need to be appropriate to the nature of the plan or programme. The box on page 35 gives examples of some indicators that may be relevant to climate change mitigation or adaptation.

Any initial list of climate change-related issues, objectives and guiding questions or indicators (if used) should not be applied rigidly. The SEA process should allow for the omission or addition of issues as the understanding of the environmental implications of the proposed plan or programme grows. The initial set of concerns can be revised as baseline information is collected and as the assessment process unfolds.

## Analysis of baseline trends

In order to properly assess the likely impacts of climate change on the proposed plan, and vice versa, it is useful to analyse the relevant environmental trends that may be affected by climate change.

In most cases, the analysis of trends should be based on data already available from existing monitoring systems and documents. There is no necessity for new raw data to be collected during an SEA unless a very important issue is identified for which no data are available. Even then, the SEA may rely on qualitative or semi-qualitative data (i.e. collective expert opinions obtained through interviews or workshops).

In order to ensure that the baseline assessment remains focused, it is recommended to concentrate on the main environmental issues, objectives and guiding questions that have been identified in the preceding SEA step. The SEA experts need to gather just enough information to answer the following questions:

- What is the baseline trend and the current status?
- What is driving this trend? How are these drivers likely to change in the future? Which of these drivers can be influenced by the proposed plan or programme?
- How is the baseline trend expected to evolve without the implementation of the proposed plan or programme, given the ongoing or expected changes in its drivers and any other factors (e.g. changes in the policy and legislative frameworks or economic incentives; implementation of major projects that were approved but not yet implemented; changing climatic conditions)?
- Will this trend reach a critical turning point or bottom line?
- Who benefits and who loses as a result of these trends?

The availability of existing information, studies and scenarios in relation to climate change and climate change vulnerability varies between different EU regions and member states. A generic list of possible sources of information in the context of climate change is provided in the box on page 37.

The description of likely future trends, even with the relevant reports and projections available, will often be constrained by numerous uncertainties. These include the availability of data on future economic development, technological progress or advancements in regulatory frameworks that collectively influence future trends (GRDP, 2006). It should be noted that SEA is not an academic study and it should outline the future trends as well as possible without overburdening this initial step of the assessment process. SEA practitioners can outline the trends semi-qualitatively (e.g. “trend may grow but it is unlikely to exceed a certain value”) or by using the best-case and worst-case scenarios illustrating possible extremes that may reasonably occur under different plausible assumptions. Future outlooks can use terms such as “strongly suspected” or “suspected”, which are used by the IPCC in their Fourth Assessment Report (2007).

## Generic list of relevant sources of information

### GUIDELINES, REPORTS AND SCENARIOS:

- IPCC Fourth Assessment Report and earlier assessment reports and their specific regional and sectoral/thematic sections (2007)
- Outlines of the forthcoming sections of the IPCC Fifth Assessment Report (AR5)
- IPCC special thematic reports and methodology reports
- Other region- and sector-specific climate and climate change reports
- The Stern Review on the Economics of Climate Change (2006)

### INTERNATIONAL AGREEMENTS AND DIRECTIVES:

- Renewable Energy Directive
- Bio-fuels Directive
- Air Quality Framework Directive
- Water Framework Directive
- Conservation of Wild Birds Directive
- Conservation of Natural Habitats Directive

### AVAILABLE STATISTICS, REPORTS, ANALYSES AND SCENARIOS ON:

- meteorology, climate and climate change;
- energy use, production, imports and exports, including renewable/non-renewable ratios;
- GHG emissions and potential for reducing GHG emissions;
- ecological and climate change vulnerability and adaptability;
- economy and population dynamics;
- dynamics of the most relevant economic sectors;
- land use and land-use change;
- geology, hydrogeology and water balance;
- water usage by the population and economic sectors; and
- ecosystems and biodiversity.

## Assessment of the consistency of the proposed plan or programme with the relevant environmental objectives

In general SEA practice, a set of environmental and sustainability (often including climate change) objectives is devised in a way that is appropriate to the region's baseline and then used as a reference framework for analysing synergies or conflicts between the proposed plan or programme and the overall orientations articulated in these objectives.

The SEA climate change objectives should consider both mitigation and adaptation aspects:

Objectives aimed at climate change mitigation may highlight relevant objectives for minimising GHG emissions by, for example:

- reducing the need for energy;
- improving energy efficiency;
- increasing the share of renewable energy;
- promoting more sustainable transport patterns;
- promoting sustainable consumption and production;
- promoting sustainable land use, planning and buildings;
- improving waste management practices to reduce emissions; and
- maintaining and enhancing carbon sequestration by natural carbon sinks.

Objectives aimed at climate change adaptation may include any objectives established for minimising regions' vulnerability to climate change through, for example:

- conserving, restoring and enhancing biodiversity and the resilience of natural ecosystems;
- ensuring adequate future water supply and managing water demand;
- reducing and managing the risks of river flooding, sea-level rise and coastal erosion;
- designing infrastructure, buildings and urban areas to cope with new climate extremes;
- improving health services and infrastructure based on expected climate-related impacts on human health; and
- enhancing the region's adaptive capacity and readiness through institutional changes, strategies and legislation, and information, education and training.

The specific example of the climate change objectives for the Cornwall Core Strategy is provided in the box on page 39.

Relevant climate change objectives can provide overall benchmarks for assessing whether or not the proposed plan or programme moves in the right direction. The relevant climate change objectives may be effectively divided into two sets:

- assessment objectives — minimal/bottom-line targets or standards that need to be firmly respected by the proposed plan or programme; and
- aspirational objectives — long-term environmental goals that should be considered in the proposed plan or programme.

The actual assessment of the consistency of the proposed plan or programme with the relevant climate change objectives may be conducted using matrices or analytical texts that identify their synergies or conflicts with the objectives and priorities of the proposed plan or programme. Other approaches may include simple analyses identifying those environmental objectives that are strongly relevant to the proposed programme and providing commentary on their conflicts or discrepancies with the actions proposed in the respective plan or programme.

This assessment is likely to benefit significantly from iterative discussions between SEA practitioners and those preparing or adopting the relevant plan or programme. Such discussions can identify the broad environmental risks and environmental benefits of various development options and may be helpful when considering or developing alternatives or recommending overall changes in the orientation of the proposed plan or programme itself.

## Example of climate change objectives for the Cornwall Core Strategy

The scoping report for the sustainability appraisal of the Cornwall Core Strategy proposes climate change-related objectives, among other things. The mitigation objective orients the development strategy “to reduce contributions to climate change through a reduction in greenhouse gas emissions”. The adaptation objective suggests to “increase resilience to climate change and reduce vulnerability”.

These overall objectives were developed into detailed assessment objectives that provide the benchmarks for the sustainability appraisal. Some of these detailed objectives stipulate specific orientations on climate change mitigation or adaptation, or both. Examples include:

- To support a balanced and low-carbon economy (objective for Economic Development, Regeneration and Tourism).
- To encourage the use of renewable energy, increase energy efficiency and security and reduce fuel poverty (objective for Energy).
- To improve access to key services and facilities by reducing the need to travel and by providing safe, sustainable travel choices (objective for Transport and Accessibility).
- To reduce traffic congestion and minimise transport-related greenhouse gas emissions (objective for Transport and Accessibility).
- To reduce air pollution and ensure continued improvement in air quality (objective for Air).
- To promote and achieve high-quality design in development, sustainable land use and sustainable built development (objective for Design).
- To conserve, enhance and restore the condition and extent of biodiversity in the county and allow its adaptation to climate change (objective for Biodiversity).
- To reduce and manage the risk of flooding and reduce vulnerability to flooding, sea-level rise and coastal erosion (objective for Water).
- To protect coastal areas and ensure sustainable maritime environments (objective for Maritime).

## Assessment of the cumulative impacts of the proposed plan or programme on evolving baseline trends

The SEA should assess the potential impacts of the plan or programme’s proposed measures on priority concerns. These should cover the impact of the plan or programme on future climate change (e.g. the impact on climate change mitigation efforts) and the impact of the plan or programme on the key evolving environmental trends that may be affected by inevitable climate changes.

Some direct impacts, such as impacts on energy use and GHG emissions, are relatively straightforward to assess. It is more demanding to address climate change adaptation aspects, due to the many other factors involved and the complexity of the issue (see page 40 for examples).

In these situations, SEA practitioners may find it useful to use trend analysis to assess complex relationships between the multiple actions proposed in the plan or programme and the relevant phenomena caused by climate change.

The analytical approach based on trend analysis is baseline led — that is, it focuses on specific trends and identifies various aspects of the proposed plan or programme that may significantly affect the given trend. The impacts of each of these aspects can be described by outlining the assumptions behind the prediction (when or under what

## Examples of possible climate change adaptation concerns related to proposed plans and programmes

- Reduced groundwater levels.
- Coastal erosion and ensuing property/infrastructure damage.
- Flooding and fluvial erosion and the ensuing property/infrastructure damage.
- Extinction of species and reduction of biodiversity.
- Wildfires.
- Direct impacts on human health and mortality (from heat and cold spells, floods etc.).
- Vector-spread diseases, malnutrition etc.

circumstances will the impact occur); the nature of the impact; its magnitude, geographical scale, duration or frequency; and related probability and uncertainties. At the end of this analysis, SEA practitioners may review all the identified impacts on one baseline trend and draw conclusions regarding the changes that are likely to be caused by the multiple impacts of the proposed plan or programme. They may also draw conclusions about who is likely to be affected by these changes and whether these changes affect the feasibility of the proposed plan or programme.

Such conclusions will inevitably involve uncertainties, and the SEA practitioners are advised to outline key assumptions and use scenarios to illustrate the best- and worst-case situations that may occur.

## Considering alternatives and recommending the adjustment of proposed developments and mitigation measures

The consideration of alternatives through SEA should encourage the search, during the planning process, for better ways to meet human needs without causing more climate change, and to minimise the risks resulting from earlier development patterns and the expected climate change phenomena. In particular it should encourage the authors of plans to consider ways to decouple human wellbeing from material production and consumption, which, is the ultimate driver of anthropogenic climate change.

When developing and assessing alternatives, SEA practitioners may find it useful to ask the following questions:

- Is the development proposal in the proposed plan or programme needed? (Could the objectives be achieved by managing development demands or without developing physical infrastructure?) Are there any realistic opportunities for managing demand for developments that are problematic from the climate change perspective through, for example, regulatory, economic or administrative tools or other measures that promote behavioural changes?
- How should the proposed development be carried out (alternative approaches and methods)? Are there methods, technologies or processes that can meet the development demands with fewer impacts on climate change than “obvious” or traditional methods?



- Can the scale of the proposed development be reduced? Where could it go to cause the least effect on climate change (alternative scales and locations)?
- When should it be implemented (alternative timings or sequencing)?

A consideration of alternatives offers an opportunity to explain the contributions of different options to core climate change issues. In some cases, the best option in terms of climate change may differ from the option that is preferred in relation to other environmental topic areas. An SEA provides a means of evaluating this and a chance to make the choice of options more transparent. Ideally, SEA should look for “no regrets”, “low regrets” and “win-win” options that can contribute to achieving the plan’s wider objectives and addressing climate change concerns. Examples of possible alternatives in the key development sectors are shown on page 42.

The consideration of alternatives is often combined with the consideration of possible measures to prevent, reduce or offset the negative effects of a plan or programme (mitigation measures) and enhance benefits. Such measures can be designed by recommending direct adjustments to the interventions proposed in the plan or programme; by providing orientations for the subsequent developments (i.e. guidelines for forthcoming sectoral and spatial plans at regional and lower levels); or by imposing conditions for projects (as in the case of Cohesion Policy planning documents). Mitigation measures may also include proposals for non-technical management or policy responses for addressing unforeseen problems — for example improving cross-sector coordination; elaborating emergency response plans; or launching protection initiatives for those parts of the society and economy that are more vulnerable to the effects of climate change. When doing this, SEA should consider any relevant climate change mitigation and adaptation measures already embedded in other (sectoral, spatial etc.) plans in order to avoid duplication and establish synergies.

The form and character of the measures proposed always depends on the type of impacts identified. SEA may basically suggest:

- Changes to the plan or programme assessed, which may include:
  - the modification of objectives and priorities to integrate relevant environmental and health issues in the strategy in order to shift the focus of the plan or programme towards sustainable development (e.g. the SEA may propose the objective to support public transport if the plan only addresses transport infrastructure); and
  - the modification of specific measures and development actions proposed by the plan or programme in order to minimise or avoid specific negative impacts, which may include, for example, alternative development methods, changes of locations (new location or reduction of area), and changes to the scale and sequencing/timing of the proposed developments.
- The modification of implementation arrangements — SEA can define limits for the implementation of specific projects, for example “no-go” areas; criteria for the selection of projects, prescribing certain climate change adaptation checks for projects that are vulnerable to extreme climatic conditions; guidance on the scope of EIAs for specific projects etc.).
- Suggestions for compensating unavoidable damage (e.g. enhancing the protection of other environmental assets, providing compensation to those affected).
- Other “flanking measures” if some impacts cannot be mitigated though the plan or programme assessed. These may include the modification of other relevant plans or programmes or changes in the regulatory, legal and/or institutional framework that improve the overall management of the identified problems.

## Alternatives in key development activities

SECTOR	OBJECTIVES
<b>Regional energy system</b>	To convert the regional energy system to renewable energy and promote effective energy use by: <ul style="list-style-type: none"> <li>● utilising the region's renewable energy potential;</li> <li>● disseminating and integrating new types of renewable energy facilities; and</li> <li>● saving energy in households, institutions, commercial and service organisations and industry.</li> </ul>
<b>Agriculture</b>	To develop farming methods that reduce GHG emissions by: <ul style="list-style-type: none"> <li>● optimising the use of existing energy resources;</li> <li>● promoting climate- and resource-efficient agriculture to cut CO<sub>2</sub> emissions and nitrogen leaching;</li> <li>● developing and testing integrated energy systems, with a special focus on biogas; and</li> <li>● developing and testing crops that are adaptable to climate change.</li> </ul>
<b>Transport</b>	To reduce GHG emissions from transport and promote energy-efficient transport modes by: <ul style="list-style-type: none"> <li>● reducing the need for transport by changing behaviour and through the appropriate planning of the location of housing and industrial areas;</li> <li>● increasing the attractiveness of public transport;</li> <li>● developing a comprehensive plan for bicycles and pedestrians;</li> <li>● improving the correlation between different forms of goods transport; and</li> <li>● developing new transport technologies.</li> </ul>
<b>Industry and technology</b>	To promote climate-friendly processes and renewable energy in industrial production by: <ul style="list-style-type: none"> <li>● developing climate-neutral industrial products;</li> <li>● optimising the energy and resources used throughout the entire production chain;</li> <li>● developing climate-friendly products through eco-design and network cooperation;</li> <li>● attracting and retaining climate-friendly technological businesses; and</li> <li>● developing and testing new climate technologies.</li> </ul>
<b>Construction</b>	To promote passive or low-energy buildings and to undertake measures to reduce the heat island effect.
<b>Healthcare and emergency management</b>	To increase preparedness for adverse climatic conditions and to increase the focus on preventing climate-contingent infectious diseases by: <ul style="list-style-type: none"> <li>● developing scenarios for extreme weather situations;</li> <li>● making an overview of health risks due to climate changes; and</li> <li>● increasing education and knowledge sharing among health personnel about changes in the pattern of infectious diseases as a consequence of climate change.</li> </ul>
<b>Land use</b>	To adapt water systems to changes in precipitation patterns and to combat the fall in biological diversity. In land planning, to integrate measures to improve the ability of the soil and vegetation to store and retain carbon. To adapt coastal areas to rising sea levels and changing weather by: <ul style="list-style-type: none"> <li>● integrating climate change in water and nature planning and in the resulting action plans;</li> <li>● developing a green structure with larger natural areas and green corridors;</li> <li>● analysing the regional carbon account for the storage and exchange of carbon in the landscape; and</li> <li>● analysing the consequences of a rise in sea level for coastal management in the region.</li> </ul>
<b>Waste management</b>	To adhere to the waste management hierarchy in the Waste Framework Directive; to design waste management infrastructure minimising energy needs for transport and waste handling; and to adapt waste management practices and infrastructure to reduce GHG emissions (especially methane from landfills).
<b>Management of internal business of public authorities</b>	To reduce CO <sub>2</sub> emissions from public authorities at regional level and promote behavioural change by: <ul style="list-style-type: none"> <li>● preparing a status report of current CO<sub>2</sub> emissions due to internal business activities;</li> <li>● investigating possibilities for climate-friendly purchasing; and</li> <li>● incorporating energy considerations.</li> </ul>

**Source:** Based on Levett-Therivel, 2007; Draft Cornwall Core Strategy SA Scoping Report (2009), and Maltese Islands Solid Waste Management Strategy SEA (2009). etc.

## Recommendations for the improved monitoring of key issues related to climate change

The SEA Directive requires member states to monitor the significant environmental effects of the implementation of plans and programmes in order to identify unforeseen adverse effects at an early stage.

Monitoring and evaluation methods should ideally be aligned as far as possible with those established in the implementation/management frameworks created for the respective policies, plans and programmes (COWI, 2009).

The existing monitoring activities in the country and region should ideally be used to identify the relevant data and information that already exist. If additional climate change parameters/indicators are needed, this should be justified in the draft SEA report and available funding in the plan should be sought. If the draft programme already has a budget line for general implementation and/or environmental monitoring, the task will be somewhat easier.

For certain important issues, an SEA may require that certain available data and information are systematically acquired and analysed within the plan's regular monitoring and evaluation procedures.

## Producing the SEA report, its public review and its use in decision making

The elaboration of the SEA report is the concluding activity in the assessment process. The successful completion of the preceding steps should provide SEA practitioners with materials that they can simply collate into one document as the SEA report. As a final step they need only add a concluding technical summary that presents the main findings of the assessment, whether and how those findings were considered in the proposed plan, and key outstanding issues for decision making.

If there are any serious concerns about the implications of the proposed plan or programme for climate change adaptation or mitigation, it may be useful to explain:

- how climate change issues have been identified;
- how climate change impacts have been assessed and ranked by importance;
- how uncertainty has been managed;
- how alternatives have been assessed and chosen against climate change impacts;
- how mitigation and adaptation measures have been chosen in the given context and in relation to available funds; and
- how consultation and public inputs relevant to climate change issues have been taken into account.

In the concluding stages of the SEA report, the SEA process is made available to the relevant authorities and the public for comments.

Ideally, consultations with relevant authorities were already part of the SEA process. If such consultations have not taken place, and if the SEA has identified any significant issues related to climate change, it is recommended that authorities with specific duties related to climate change adaptation or mitigation be provided with a copy of the SEA report and asked to provide their comments, at the very minimum. Ideally, they should be approached directly and asked to review the outcomes of the assessment and the proposed recommendations.

Inputs obtained as a result of these consultations should be considered in the decision-making process on the proposed plan or programme along with the SEA report and comments that came from other authorities and the public in line with the relevant requirements of the SEA Directive.



# Recommendations

## On planning

- The focus of regional plans should shift from a concentration on and promotion of clear economic interests to the inclusion of environmental, social and climate change objectives.
- The administrative capacity to deal with climate change issues must be strengthened. Better cross-sectoral and inter-ministerial cooperation and coordination at national and regional levels is needed in order to improve the vertical and horizontal integration of climate change issues.
- It is important to raise the awareness, knowledge and recognition of climate change issues among the population and decision makers, including options for the incorporation of climate change within policy development documents.

## On the SEA process

- It is important that climate change issues be taken into account before the plan or programme is fully developed. To enable this, SEA should be conducted ex ante or in parallel with the plan development process to allow for the modification of initial proposals for future developments in a timely and cost-effective manner. It will also allow for a better focus on climate change adaptation and mitigation, which is almost impossible in ex post assessments when the majority of decisions related to plan or programme alternatives have already been taken.
- The formal process of undertaking SEA should be replaced by a more participative and open approach that provides opportunity for interaction and corrections.
- The integration of climate change objectives into assessment processes should be based on the relevant national/regional strategy, programmes or plan. Clearly identified climate change objectives, targets, issues and concerns are essential for better integration. The setting of national mitigation and adaptation frameworks and policy directions guiding the development of specific measures and planning policies, as well as the development of sectoral strategic documents addressing climate change, will improve the horizontal integration of climate change issues.
- Capacity for addressing climate change during SEA processes needs to be enhanced. This can be achieved through training and awareness-raising workshops on SEA approaches and principles, emphasising how SEA can help to facilitate adaptation to and mitigation of climate change. Pilot SEAs can also be implemented to mainstream climate change into strategic development frameworks in order to increase understanding of the issues and of the SEA process.

## On data and information support

- Several RSC partner regions indicated problems regarding the availability of information about climate change (studies, reports), especially in connection with future scenario projection at the regional level, which would allow 2020 and 2050 climate projection and its possible interaction with policy planning documents. To rectify this, national data on climatic trends (mainly related to temperature and precipitation) and information on potential climate change impacts should be developed further to illustrate possible changes in the regional climatic conditions.
- Improved access to information and statistical data on expected climate change regional/local impacts and additional translation/explanation guidance for users unfamiliar with the topic will also provide an additional incentive for decision makers for making SEA climate inclusive.

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## Glossary of terms

**Baseline assessment** — in the context of the RSC project — the process of examination and assessment of the "climate confidence" of RSC partner regions, carried out at the beginning of the project to lay the groundwork for subsequent project outputs.

**Carbon intensity** — the amount of carbon by weight emitted per unit of consumed energy, expressed in terms of grams of carbon dioxide released per megajoule of energy.

**Carbon neutrality** — achievement of net zero carbon emissions into the atmosphere by balancing amounts of carbon dioxide released with an equivalent amount captured and offset by a certain region or country.

**Climate change** — a change of climate, attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (UNFCCC).

**Climate change adaptation** — adjustment of ecological, social and economic systems in response to current or expected climate change and its effects in order to moderate or offset possible damage and exploit beneficial opportunities.

**Climate change mitigation** — human interventions to reduce greenhouse gas emissions and to enhance their sinks, aimed at the reduction of climate change effects and impacts.

**Climate change resilience** — the ability of a social, ecological and economic system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change. The climate change aspect refers to the reduction of the energy and climate vulnerability of the regions and their economies.

**Climate (change) scenario** — the difference between a climate scenario and the current climate — a plausible and often simplified representation of the future climate, based on an internally consistent set of climatological relationships and assumptions of radiative forcing, typically constructed for use as input to climate change impact models.

**Climate-friendly low-carbon economy** — a concept of economy defined as one that is 80 percent less carbon intensive than our present one and based on low energy consumption, low pollution and low emissions. The fundamental aim is to achieve high energy efficiency, to use clean/renewable energy and to pursue green GDP via technological innovation.

**Climate proofing** — reduction of the climate vulnerability of natural and human systems and the subsequent enhancement of their climate change resistance.

**Climate vulnerability** — the degree to which a system is susceptible to, and unable to cope with, the adverse effects of climate change, including extremes of climate variability. Vulnerability is a function of the character, rate and magnitude of climate change and the variation to which a system is exposed, its adaptive capacity and sensitivity.

**Climatic factors** — physical conditions that determine the climate in a given area, for example altitude, latitude, ocean streams etc.

**Carbon dioxide emissions** — emissions of carbon dioxide coming from the combustion of fossil fuels such as coal, oil and natural gas.

**Cohesion Policy (European Union Regional Policy)** — an instrument of economic integration introduced by the European Union for member states with GNI per inhabitant less than 90 percent of the Community average to reduce their social and economic disparities with more affluent regions.

**Cumulative effect** — changes to the environment that are caused by the build-up of many actions, each of which only has a limited contribution but which together cause serious effects (in combination with other past, present and future human actions).

**Decarbonisation** — decrease of the carbon dioxide emission intensity per unit of GDP.

**Energy consumption** — amount of primary and secondary energy consumed in a system or process by an organisation or society.

**Energy efficiency** — reduction in the amount of energy used to provide the same amount of given energy service (heating, cooling, lighting etc.) or level of activity.

**Energy intensity** — ratio of energy consumption to a measure of the demand for energy service or economic or physical output: in the case of the national economy, the total energy consumption per unit of GDP.

**Energy production** — production of energy in the form of heat or electricity from primary or secondary sources of energy to provide and fulfil demand for energy services.

**Energy security** — the various security measures that a given nation, or the global community as a whole, must carry out to maintain an adequate energy supply.

**Global warming** — average increase in the temperature of the atmosphere contributing to changes in global climate patterns and induced by anthropogenic emissions of greenhouse gases.

**Green economy** — a system of economic activities related to the production, consumption and distribution of services and goods that results in improved human wellbeing in the long term and that does not expose future generations to ecological scarcities and significant environmental risks.

**Greenhouse gases** — atmospheric gases contributing to the naturally occurring greenhouse effect through absorption of infrared radiation and responsible for causing climate change and global warming; these gases include carbon dioxide, methane, nitrous oxide, hydrocarbons, per fluorocarbons and sulphur hexafluoride.



**Gross domestic product** — the total market value of all the goods and services produced nationwide during a specified period of time.

**Low-carbon region (LCR)** — a region with minimal GHG emissions as a result of integrating all aspects of the economy around technologies and practices with low emissions. LCRs include communities, buildings, transportation and technologies that use or generate energies and materials efficiently, and that dispose or recycle their wastes to minimise GHG emissions.

**Macro-region** — an area including territory from a number of different countries or regions associated with one or more common features or challenges: economic, cultural, geographic and other.

**Regional development programmes** — any governmental programme designed to encourage economic and industrial development and reduce poverty in regions that are stagnant or in which a significant share of population is experiencing prolonged unemployment.

**Renewable energy** — energy sources that are not depleted by use, for example small hydropower, photovoltaic solar cells, wind power and coppicing.

**Stern Review** — report released in October 2006 on the economics of climate change. The report discusses the effect of climate change and global warming on the world economy, the principal message being that the world must act now on climate change or face devastating economic consequences.

**Strategic environmental assessment** — formal environmental impact assessment applied at the level of programmes, plans and policies in order to identify, evaluate, modify, avoid or minimise their adverse environmental effects prior to implementation.

**Sustainability assessment/appraisal** — a formal process of identification, prediction and evaluation of the potential impacts of a wide range of relevant initiatives (such as policies, regulations, legislation, plans, programmes and specific projects) and their alternatives on the sustainable development of society.

**Vulnerability assessment** — the process of identification, quantification, prioritisation and correction of vulnerabilities in social, environmental or economic systems that make them susceptible to climate change and destabilisation.



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REGIONS FOR  
SUSTAINABLE  
CHANGE

**RSC project team**

The Regional Environmental Center for Central and Eastern Europe (REC)

Ady Endre ut 9-11 ● 2000 Szentendre ● Hungary

Tel: (36-26) 504-000

E-mail: [vvarbova@rec.org](mailto:vvarbova@rec.org) ● [dalmassy@rec.org](mailto:dalmassy@rec.org)

[www.rscproject.org](http://www.rscproject.org)